CLEO®/Europe - IQEC 2007

Advance Programme

Munich ICM

International Congress
Centre Munich, Germany

17 - 22 June 2007

www.cleoeurope.org

Sponsored by

- European Physical Society / Quantum Electronics and Optics Division
- IEEE/Lasers and Electro-Optics Society
- Optical Society of America

Co-sponsored by

- P*h*OREMOST Network of Excellence
- American Physical Society

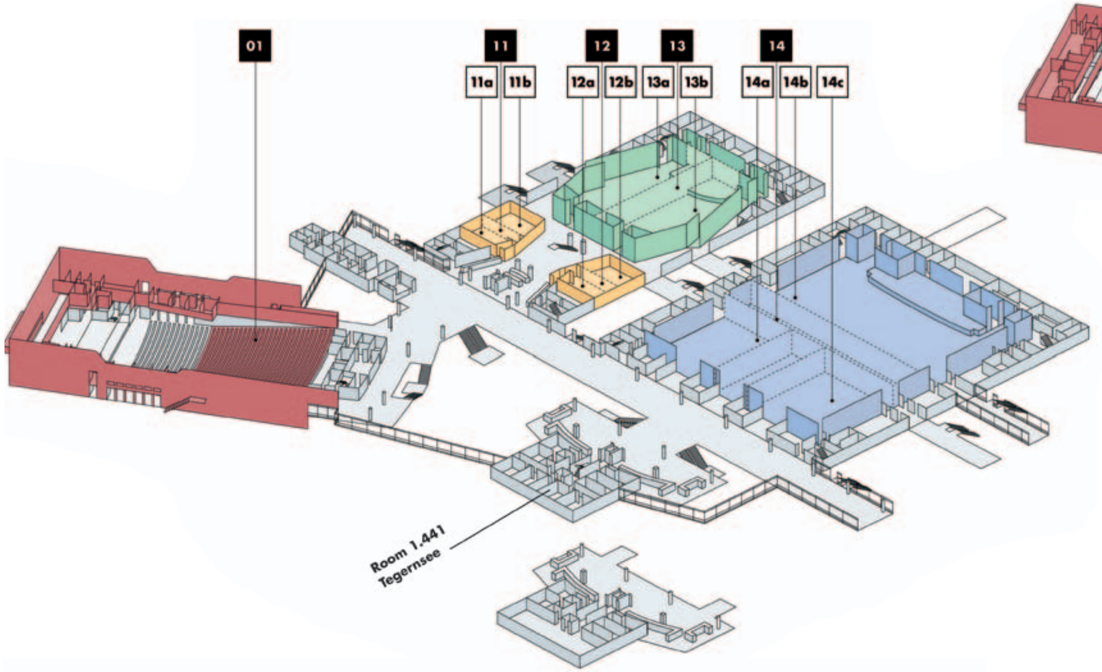
18th International Congress on Photonics in Europe

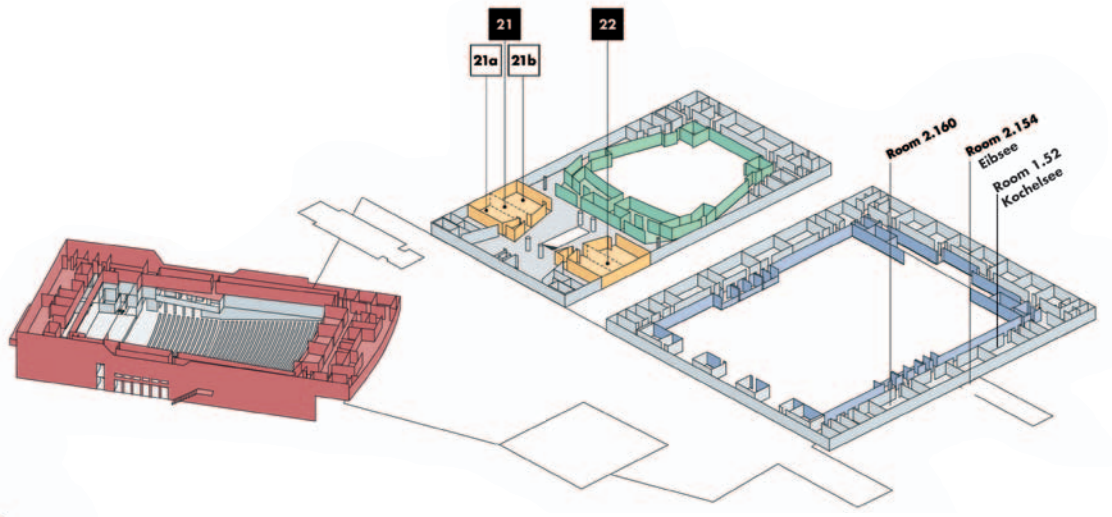
co-located with LASER 2007. World of Photonics

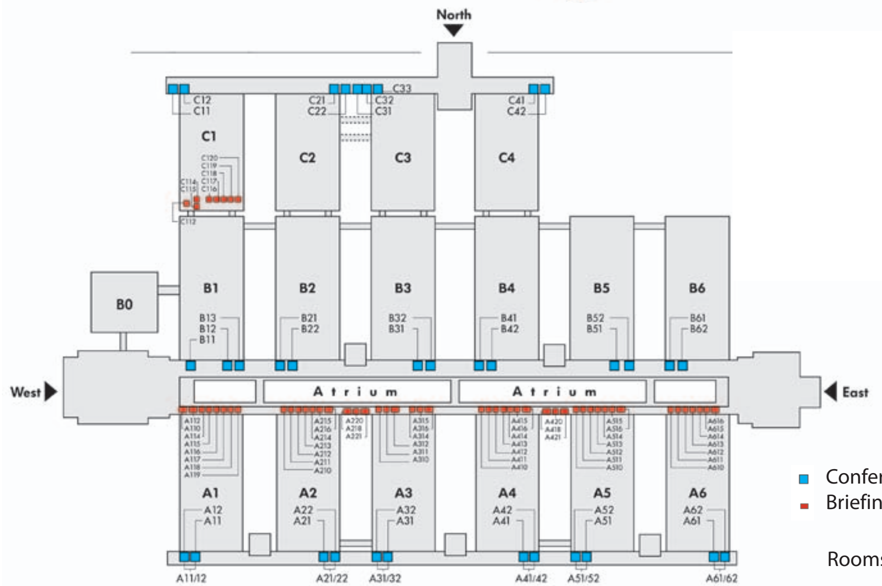
Messe München GmbH, Messegelände, 81823 München, Tel. (+49 89) 949-114 68, info@photonics-congress.com

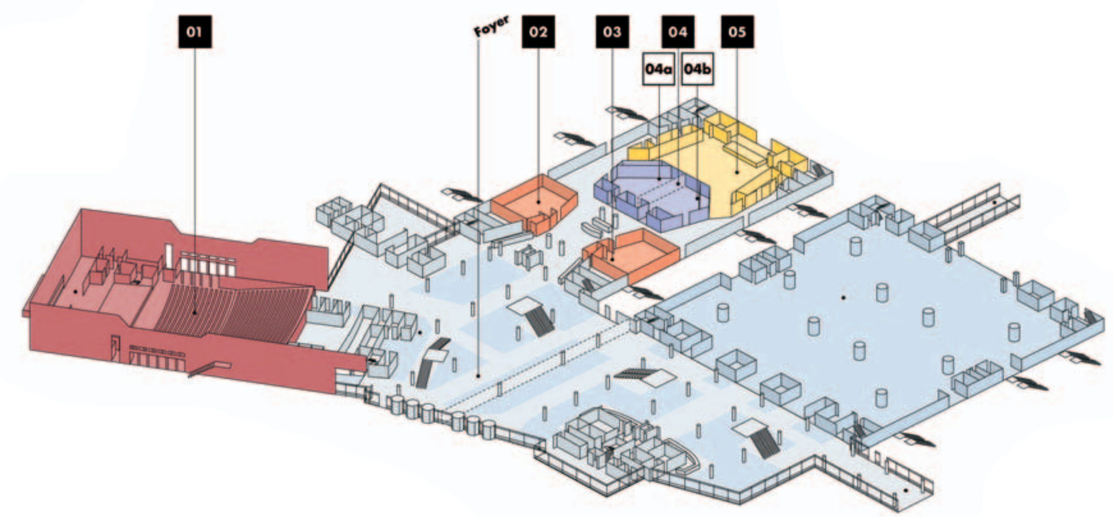
www.photonics-congress.com

MESSE MÜNCHEN INTERNATIONAL









- Conference rooms
- Briefing room/Offices

Rooms B0.R1 and B0.R2 are located in hall B0

GENERAL INFORMATION

TECHNICAL PROGRAMME

Welcome to CLEO®/Europe-IQEC at Laser 2007

Following on from the very successful previous conferences held in Amsterdam (1994), Hamburg (1996), Glasgow (1998), Nice (2000) and Munich (2003, 2005), the General and Programme Chairs would like to warmly welcome you to the seventh CLEO®/Europe-IQEC 2007 conference, which is being held in Munich from June 17-22, 2007. We extend a special welcome to postgraduate and PhD students attending, and we wish them every success, especially if this is their first participation in a major scientific conference. This year sees a particularly international flavour with the International Quantum Electronics Conference IQEC, incorporating the X^{th} European Quantum Electronics Conference (EQEC), and we warmly welcome our visitors from America, Asia, Australasia and elsewhere.

CLEO®/Europe-IQEC 2007 has established a strong tradition as the largest, most comprehensive and prestigious gathering of optics and photonics researchers and engineers in Europe, and this year is no exception. CLEO®/Europe and IQEC reflect two strong symbiotic research traditions: CLEO®/Europe emphasizes applied physics, optical engineering and applications of photonics and laser technology. IQEC emphasizes basic research in laser physics, nonlinear optics and quantum optics. This combination provides a unique forum to obtain informative overviews and discuss recent advances in a wide spectrum of topics, from fundamental light-matter interaction and new sources of coherent light to technology development, system engineering and applications in industry, science and medicine. Over five days the CLEO®/Europe-IQEC conference will showcase 1244 technical contributions in the form of oral presentations and posters from industry, university and research organisations drawn from nearly 60 countries – and will provide an unparalleled opportunity to bring together scientists, engineers and end-users of laser and photonics technology under the same roof. As in 2005, the meeting will be complemented by *LASER 2007 World of PHOTONICS*, the world's largest tradeshow of laser and optical technology, which will provide researchers with the particular opportunity to see the latest developments in a very wide range of laser sources, optical and photonics products - and components.

CLEO®/Europe-IQEC is collocated with a number of smaller specialist conferences and topical meetings, including the European Conference on Biomedical Optics (ECBO 2007), the WLT conference on Lasers in Manufacturing (LIM 2007), the DGLM/ ISLM congress on Medical Laser Applications, the SPIE conference on Laser Metrology and a series of specialist conferences organised by the European Optical Society (EOS). All of the collocated conferences will share registration - and so delegates can attend all the sessions of all the conferences.

Conference Structure and Technical Sessions

CLEO®/Europe-IQEC consists of a large number of technical presentations in a number of different formats:

A Plenary talk is a broad-scope, one-hour long talk given by a world-leading scientist and accessible to a general technical audience including conference attendees, exhibitors, and exhibit visitors. Plenary talks are not held in parallel with other sessions, allowing maximum possible attendance. In 2007, it is our pleasure to feature plenary talks by **Gérard Mourou** (ENSTA, Laboratoire d'Optique Appliquée, Palaiseau, France) who will discuss the physics and applications of ultra-high power lasers in the Exawatt regime, and **Theodor W. Hänsch** (Max-Planck-Institute for Quantum Optics, Garching, Germany) who will discuss precision measurement techniques in quantum optics, work for which he shared the Nobel Prize in 2005. A third plenary session will be dedicated to the memory of Professor Herbert Walther who was instrumental in the previous success of CLEO®/Europe and in cementing international bonds between researchers in optics in many fields. In his honour, this special Memorial Session will consist of a number of invited presentations spanning the wide range of his technical interests by **Ferenc Krausz** (Max-Planck-Institute for Quantum Optics, Garching, Germany) **Joseph Eberly** (University of Rochester, USA) and **Axel Schenzle** (University of Munich, Germany).

Keynote Presentations and Tutorials are also one hour talks given by world leaders in particular technical areas, but are generally directed at a more specific audience, and are given in paral-

CLEO®/EUROPE 2007

Conferences on Lasers and Electro-Optics/Europe

IQEC 2007

International Quantum Electronics Conference

Munich, ICM, Germany
17-22 June 2007

Sponsored by

- European Physical Society / Quantum Electronics and Optics Division
- IEEE/Lasers and Electro-Optics Society
- Optical Society of America

Co-sponsored by

- P*h*OREMOST Network of Excellence
- American Physical Society

lel with other sessions. Keynotes provide a survey of exciting recent developments, and Tutorials are particularly valuable for those unfamiliar with a field to rapidly come up to speed.

An attractive feature of the CLEO®/Europe technical programme has been special Tech-Focus sessions concentrating on selected photonics applications relevant of industrial importance. CLEO®/Europe-IQEC 2007 features a Tech-Focus session on Industrial Applications of Ultrafast Technology, which will showcase this exciting field through presentations from leading academic and industrial researchers.

Another much appreciated feature of the CLEO®/Europe-IQEC meetings has always been the special Symposia that are organized to anticipate on emerging fields by putting emphasis on fast developing, well defined topics. Three symposia have been identified for CLEO®/Europe-IQEC 2007: *JSI - Cryptographic Techniques in Photonics; JSII - Nanophotonics and Metamaterials: From Concepts to Devices; JSIII - Optical Frequency Combs and Applications.* A particular highlight of the last symposium will be some personal reflections from **Professor Jan Hall** who shared the 2005 Nobel Prize with **Professor Hänsch**.

CLEO®/Europe-IQEC 2007 will also present two Short Courses. The first course on Practical Optical Parametric Oscillators will be presented by **Majid Ebrahim-Zadeh**, ICFO, Barcelona, Spain. The second one on Micro- and Nano-Machined Optics, will be presented by **Ernst-Bernhard Kley**, Friedrich-Schiller-University of Jena, Germany. Both courses will be given in parallel on Sunday afternoon 17 June 2007 at the Ludwig Maximilians University of Munich.

In addition to these technical sessions involving oral presentations, all scientific areas of both CLEO®/Europe and IQEC will be covered in Poster Sessions which provide an interactive and less formal way for researchers to discuss their work, to interact and to exchange ideas.

Foreword

The Welcome above has provided an overview of CLEO®/Europe-IQEC. Now established as the largest and most comprehensive gathering of optics and photonics researchers and engineers in Europe, the conference spans classical and quantum optical science, laser technology and photonics application.

The conference program has been organized thanks to the hard work of the 252 members of the 24 technical programme sub-committees who have assembled an excellent series of talks and posters that showcase a wide range of fields in optics and quantum electronics. The technical programme consists of 3 plenary sessions, 74 invited papers, tutorials or keynote talks, and a record number of over 1170 contributed oral presentations and posters. The Conference Chairs would like to extend sincere thanks to the technical programme committee members for all their hard work.

A conference as large as CLEO®/ Europe-IQEC requires two years of planning and organisation, and we would like to thank the staff of the European Physical Society and the local conference chair in Munich for invaluable professional assistance during this period. We would also like to thank all the Sponsoring Societies for oversight and support, and for their advice which ensures that this conference remains at the core of optics and photonics research in Europe.

Organisations, societies and committees, however, can only do so much. The real success of CLEO®/Europe-IQEC in 2007 is due to the efforts and commitment of researchers and students, who all contribute to the tremendous evolution of our research field and the high quality of the papers that will be presented. We thank you all!

GENERAL INFORMATION

Member Societies of the European Physical Society

Albanian Physical Society	Latvian Physical Society
Armenian Physical Society	Lithuanian Physical Society
Austrian Physical Society	Society of Physicists of Macedonia
Belarusian Physical Society	Moldovan Physical Society
Belgian Physical Society	The Netherlands' Physical Society
Union of Physicists in Bulgaria	Norwegian Physical Society
Croatian Physical Society	Polish Physical Society
Czech Physical Society	Portuguese Physical Society
Danish Physical Society	Romanian Physical Society
Estonian Physical Society	United Physical Society of the Russian Federation
Finnish Physical Society	Physical Society of Serbia and Montenegro
French Physical Society	Slovak Physical Society
Georgian Physical Society	Society of Mathematicians, Physicists and Astronomers of Slovenia
German Physical Society	Royal Spanish Physical Society
Hellenic Physical Society	Swedish Physical Society
Eötvös Loránd Physical Society	Swiss Physical Society
Icelandic Physical Society	Turkish Physical Society
Royal Irish Academy	Ukrainian Physical Society
Israel Physical Society	Institute of Physics
Italian Physical Society	

Sunday at a Glance

14:30 - 18:00	SH1 Short Course I - Practical optical parametric oscillators
14:30 - 18:00	SH2 Short Course II - Micro- and nano-machined optics
17:30 - 18:30	Laboratory visit (1st tour)
18:30 - 19:30	Laboratory visit (2nd tour)
18:00 - 22:00	QEOD Reception

Time	ROOM 1	ROOM 2	ROOM 3	ROOM 11	ROOM 12	ROOM 13A	ROOM 13B	ROOM 14A	ROOM 14B	ROOM B11
08:30										
09:00	Opening Ceremony									
09:30	PL1 (Plenary) CLEO IQEC 2007 Plenary 1									
10:00										
10:30	BREAK									
11:00		IG1 Semiconductor cavity solitons	IF1 Joint session IC&IF Quantum repeaters and memory	CE1 Nonlinear organic materials	CD1 Applications of solitons	CA1 Yb-doped basers and amplifiers	CB1 Vertical external cavity surface emitting lasers	CF1 Femtosecond filamentation	CK1 Negative index materials	
11:30										
12:00										
12:30	EXHIBITION AND LUNCH BREAK									
13:00	CA, CF, CH, CK, IB, IG, JSIII POSTER SESSIONS - ICM FOYER									
13:30										
14:00	JSIII1 Optical frequency comb generation				CD2 Photon phonon interaction	CA2 Femtosecond laser sources	CB2 Nonlinears dynamics	CF2 Parametric processes and supercontinuum generation	CK2 3D photonic crystals	CH1 Bio and environmental sensing technology
14:30										
15:00										
15:30	COFFE BREAK									
16:00	JSIII2 Applications of optical frequency combs				CD3 Optical parametric devices	CA3 High-power laser systems	CB3 Microcavity and ring lasers	CF3 Mode-locked oscillators	CK3 Photonic nanostructures and devices	CH2 Photonic sensor technologies and applications
16:30										
17:00										
17:30	Official opening exhibition and congress with ensuing Get-Together									
18:00										
18:30										
19:00										
19:30										
20:00										

	ROOM 1	ROOM 4A	ROOM 4B	ROOM 12	ROOM 13A	ROOM 13B	ROOM 14A	ROOM 14B	ROOM B11	ROOM BOR1
08:30	IB1 Condensed matter physics with quantum gases	IE1 Strong light-matter interactions	IF2 Quantum imaging	CE2 Organic lasers and laser materials	CA4 Raman and parametric optical frequency conversion	CB4 VCSELs I: Device progress	CG1 Relativistic interactions	CK4 Plasmonic nanostructures		CI1 Differential phase-shift keying
10:00	COFFEE BREAK									
10:30	PL2 CLEO IQEC 2007 Plenary 2 - OSA, EPS/QEOD Awards Ceremony and Julius Springer Prize									
12:30	EXHIBITION AND LUNCH BREAK									
13:30	CE, CI, CJ, IA, IC, IE, IF POSTER SESSIONS - ICM Foyer									
14:30	IE2 Frequency mixing and harmonic generation	IC1 Joint session IB, IC & IF Quantum information theory	IA1 Atom chips	CE3 LEDs and semiconductor lasers	CA5 Ultraviolet and visible laser sources	CB5 VCSELs II: Device physics	CG2 Ultrafast dynamics at XUV/ x-ray wavelengths	CK5 Imaging and spectroscopy in PCs	TF1 Tech-focus on industrial applications of ultrafast technology - I	CI2 Optical regeneration
16:00	COFFE BREAK									
16:30	IE3 Ultrafast dynamics of excitonic systems	IC2 Joint Session IC & IF Atoms and photons in a cavity	IG2 Vortices and complexity	CE4 Novel fabrication techniques	CA6 High-energy laser systems	CB6 Quantum dot lasers	CG3 Attosecond metrology	CK6 Photonic crystal fibres	TF2 Tech-focus on industrial applications of ultrafast technology - II	CI3 Advanced communication devices
18:00	Happy Hour - ICM Foyer									
20:00										

Time	ROOM 1	ROOM 4A+B	ROOM 13A	ROOM 13B	ROOM 14A	ROOM 14B	ROOM 21	ROOM B11	ROOM BOR1
08:30–10:00			IE4 Slow light and resonant systems	CB7 VCSELs III : dynamics and switching	CG4 High-harmonic generation and few-cycle laser technology	CJ1 Short pulse fibre lasers I		IG3 Dissipative solitons	IC3 Control of matter qubits
10:00–10:30	COFFEE BREAK								
10:30–12:00			CD4 Generation and manipulation of wide bandwidth optical signals	CB8 Communication lasers	CG5 Strong field molecular dynamics	CJ2 Short pulse fibre lasers II	CK7 Photonic states and propagation	IG4 Dynamics in novel microsystems	IC4 Conditional preparation of photonic quantum states
12:00–13:30	EXHIBITION AND LUNCH BREAK								
13:30–14:30	CB, CC, CD, CG, CL, CM, ID, JSI, JSII POSTER SESSIONS - ICM FOYER								
14:30–16:00	CA7 Laser materials and spectroscopy I	CE5 Microstrucutred fibres, fibre devices and glass materials	CD5 Nonlinear photonic materials	CB9 Semiconductor laser physics		CF4 Pulse characterization	CK8 2D Photonic crystals	IG5 Dynamics in novel systems	IB2 Optical lattices
16:00–16:30	COFFE BREAK								
16:30–18:00	CA8 Laser materials and spectroscopy II	CE6 Nanostructured optical devices	CD6 Photonic chips	CB10 Quantum cascade lasers		CF5 Supercontinua and nonlinear spatiotemporal shaping	CK9 Nonlinear optical properties of PCs	IC5 Joint Session IA & IC & IF Optomechanical control and entanglement	IB3 Novel trapping and cooling schemes
18:00–20:00	CLEO®/Europe-IQEC 2007 Conference reception (end 23:00)								

Time	Room 1	Room 12	Room 13A	Room 13B	Room 14A	Room 14B	Room 21	Room 22	Room 4A	Room 4B	Room 5	Room B11	Room BOR1	Room BOR2
08:30–10:00	IF3 Joint session IA, IC & IF Quantum dots	CC1 Data storage	CD7 Nonlinear optics for measurement and sources	CB11 New devices and applications - I	CE7 Nonlinear and laser-active optical waveguides	CF6 New pulse compression techniques and fibre lasers	CK10 Disorder in photonic nanostructures	CJ3 Properties and dynamics of active fibres	JSI1 Chaos-based cryptography	IB4 Spectroscopic applications of ultracold atoms and molecules		CL1 Enhanced bio sensing	CI4 All optical signal processing	JSII1 Tailoring light-matter interactions
10:00–10:30	COFFEE BREAK													
10:30–12:00	IF4 Measurements at the quantum level	CC2 Solitons and photoinduced lattices	CD8 Engineered quasi phase matched materials	CB12 New devices and applications - II	CE8 Laser waveguide fabrication	CF7 Novel applications of femtosecond pulses	IG6 Instabilities in semiconductor lasers	CJ4 High power fibre lasers	JSI2 Quantum-based cryptography	IB5 Correlations in bosonic and fermionic quantum gases		CL2 Optical trapping, manipulation and modification	CI5 Signal monitoring and conditioning	IE5 Coherent dynamics
12:00–13:30	EXHIBITION AND LUNCH BREAK													
13:30–14:30	PL3 CLEO IQEC 2007 Walther Memorial Plenary													
14:30–16:00	IF5 Squeezing	CC3 Adaptive laser cavities and mirrors	CA9 Mid-infrared laser sources	CB13 Short-pulse generation	CE9 Rare-earth doped laser materials	CG6 Ultra high power laser systems	CM1 Macroprocessing	CJ5 Microstructured fibres and visible sources	JSI3 Novel devices and methods for photonic cryptography		IE6 Pulse propagation and temporal solitons	CL3 Tissue optics	CI6 Optical signal generation	ID1 Optics at the micro- and nano-scale
16:00–16:30	COFFE BREAK													
16:30–18:00	IF6 Quantum optics with single emitters	CC4 Photorefractives and related materials	CA10 New laser architectures	CB14 High power diode lasers	JSII 2 Nano-Photonics	CF8 Material processing and structuring	CM2 Microprocessing	CJ6 Fibre gratings and waveguide lasers	IC6 Quantum cryptography	ID2 High precision metrology	IE7 Spatial solitons	CL4 Multi photon fluorescence	CI7 Transient effects and packet switching	IA2 Microfabricated structures for atomic vapour
18:00–19:30			CP1 CLEO®/Europe Postdeadlines I	IP1 IQEC Postdeadlines I	CP/IP Joint CLEO®/Europe-IQEC Postdeadlines	CP2 CLEO®/Europe Postdeadlines II								
19:30–20:00														

GENERAL INFORMATION

	ROOM 11	ROOM 12	ROOM 13A	ROOM 13B	ROOM 14A	ROOM 14B	ROOM 14C	ROOM 21	ROOM 5	ROOM BOR2
08:30–10:00	CC5 Holographic devices	CJ7 Fibre Raman lasers	CA11 Solid-state laser applications	CB15 THz lasers	CD9 Slow and fast light	CF9 Dispersion compensation and applications of femtosecond pulses	JSII3 Metamaterials - I	CH3 Photonic crystal fibres for sensor applications	IF7 Joint Session IA, IC & IF - QED with quantum dots	ID3 From spectroscopy to relativity
10:00–10:30	COFFEE BREAK									
10:30–12:00		CJ8 Fibre based sources		CI8 Novel transmission techniques	CD10 Engineered supercontinua	CF10 Semiconductor devices and Terahertz technology	JSII4 Metamaterials - II	CH4 Optical spectroscopy and precision metrology	IF8 Quantum optics in matter	IB6 Novel interactions in ultracold gases
12:00–13:30	CONFERENCE ENDS									

How to read the Session Codes?

The following pages are the abstracts of the papers which will be presented at CLEO®/Europe-IQEC 2007.

All CLEO®/Europe sessions are on a white background and have a code which begins with a C. All IQEC sessions are on a shaded background and have a code which begins with an I.

Exceptions:
The short courses are referenced with a SH, plenaries are referenced with a P, tech-focus sessions are referenced with a TF and joint symposia are referenced with a JS. These are on a dark background.

Oral Presentations
Oral presentations have a code made up of three parts separated by hyphens, *e.g.*

CD1-1-WED 8:30

The first part indicates the Conference, the topic title and the session title, *e.g.*

CD1 = CLEO®/Europe
CD1 = Applications of nonlinear optics
CD1 = Applications of solitons

The second part indicates the placement of the presentation within the session.

The third part indicates the day on which the presentation takes place.

SUN = Sunday
MON = Monday
TUE = Tuesday
WED = Wednesday
THU = Thursday
FRI = Friday

The figures on the right indicate at what time the talk begins (08:30).

Posters
Poster presentations have a code made up of three parts separated by hyphens, *e.g.*

IE-1-TUE

The first part indicates the Conference, and the topic title, *e.g.*

IE = IQEC
IE = Nonlinear Optics and Ultrafast Phenomena

The second part indicates the order of the presentation within the topic.

The third part indicates the day on which the presentation takes place.

SHORT COURSES

SH1 **Short Course I on practical optical parametric oscillators**
Majid Ebrahim-Zadeh, ICFO, Barcelona, Spain
Sunday, 14:30 - 18:00 • Ludwig Maximilians University, Munich, Germany

SH2 **Short Course II on micro- and nano-machined optics**
Bernhard Kley, Friedrich-Schiller-University of Jena, Germany
Sunday, 14:30 - 18:00 • Ludwig Maximilians University, Munich, Germany

PLENARIES

PL1 **CLEO®/Europe - IQEC 2007 Plenary 1**
The Exawatt laser: from relativistic to ultra relativistic optics
Gérard Mourou, ENSTA, Laboratoire d'Optique Appliquée, Palaiseau, France
Monday, 09:30 - 10:30 • Room 1

PL2 **CLEO®/Europe - IQEC 2007 Plenary 2 - OSA, EPS/QEOD Awards Ceremony and Julius Springer Prize**
A passion for precision
Theodor Hänsch, Max-Planck-Institute for Quantum Optics, Garching, Germany
Tuesday, 10:30 - 12:30 • Room 1

PL3 **CLEO®/Europe - IQEC 2007 Walther Memorial Plenary**
Moderator and short introduction
Ferenc Krausz, Max-Planck Institute for Quantum Optics, Garching, Germany

Herbert Walther, distinguished scientist and remarkable teacher
Axel Schenzle, University of Munich, Germany

Quantum entanglement: a vanishing resource
Joseph Eberly, University of Rochester, USA
Thursday, 13:30 - 14:30 • Room 1

TUTORIAL TALKS

CK1 **Negative index materials**
Costas Soukoulis, Iowa State Univ., Ames, USA
Monday, 10:45 - 11:45 • Room 14b

CK6 **New directions in photonic crystal fibres**
Philip Russell, Max-Planck Research Group, Erlangen, Germany
Tuesday, 16:30 - 17:30 • Room 14b

IE4 **Slow light in room-temperature optical waveguides**
Daniel Gauthier, Duke University, Durham, North Carolina, USA
Wednesday, 08:30 - 09:30 • Room 13a

IB2 **Ultracold atoms in optical lattices**
Immanuel Bloch, Johannes Gutenberg University, Mainz, Germany
Wednesday, 14:30 - 15:30 • Room BOR1

KEYNOTE TALKS

IB1 **Cold quantum gases: when atomic physics meets condensed matter**
Jean Dalibard, Ecole Normale Supérieure, Paris, France
Tuesday, 09:00 - 10:00 • Room 1

CG2 **Attosecond spectroscopy comes of age**
Reinhard Kienberger, Max-Planck-Institut für Quantenoptik, Garching, Germany
Tuesday, 14:30 - 15:30 • Room 14a

CJ2 **The diversity of fibre laser technology**
David Richardson, Southampton University, United Kingdom
Wednesday, 11:00 - 12:00 • Room 14b

CD6 **The all-photonic chip**
Benjamin Eggleton, University of Sydney, Australia
Wednesday, 16:30 - 17:30 • Room 13a

JSII1 **Tailoring NanoMaterials for light-matter interactions**
Jeremy Baumberg, University of Southampton, United Kingdom
Thursday, 08:30 - 09:30 • Room BOR2

ID1 **The new high-Q physics: photonic clocks and back-action cooling on a chip**
Kerry Vahala, Caltech, Pasadena, CA, USA
Thursday, 14:30 - 15:30 • Room BOR2

IA2 **Chip-scale atomic devices based on microfabricated alkali vapor cells**
John Kitching, NIST, Boulder, CO, USA
Thursday, 16:30 - 17:30 • Room BOR2

TECH-FOCUS SESSIONS

TF1 **Industrial applications of ultrafast technology – I**
Tuesday, 14:30 - 16:00 • Room B11

TF2 **Industrial applications of ultrafast technology – II**
Tuesday, 16:30 - 18:00 • Room B11

CLEO®/Europe 2007 SESSIONS

CA SOLID-STATE LASERS

CA1 **Yb-doped basers and amplifiers**
Monday, 10:45 - 12:15 • Room 13a

CA2 **Femtosecond laser sources**
Monday, 14:00 - 15:30 • Room 13a

CA3 **High-power laser systems**
Monday, 16:00 - 17:30 • Room 13a

CA4 **Raman and parametric optical frequency conversion**
Tuesday, 08:30 - 10:00 • Room 13a

CA5 **Ultraviolet and visible laser sources**
Tuesday, 14:30 - 16:00 • Room 13a

CA6 **High-energy laser systems**
Tuesday, 16:30 - 18:00 • Room 13a

CA7 **Laser materials and spectroscopy I**
Wednesday, 14:30 - 16:00 • Room 1

CA8 **Laser materials and spectroscopy II**
Wednesday, 16:30 - 18:00 • Room 1

CA9 **Mid-infrared laser sources**
Thursday, 14:30 - 16:00 • Room 13a

CA10 **New laser architectures**
Thursday, 16:30 - 18:00 • Room 13a

CA11 **Solid-state laser applications**
Friday, 08:30 - 10:00 • Room 13a

CB SEMICONDUCTOR LASERS

CB1 **Vertical external cavity surface emitting lasers**
Monday, 10:45 - 12:15 • Room 13b

CB2 **Nonlinear dynamics**
Monday, 14:00 - 15:30 • Room 13b

CB3 **Microcavity and ring lasers**
Monday, 16:00 - 17:30 • Room 13b

CB4 **VCSELs I: Device progress**
Tuesday, 08:30 - 09:00 • Room 13b

CB5 **VCSELs II: Device physics**
Tuesday, 14:30 - 16:00 • Room 13b

CB6 **Quantum dot lasers**
Tuesday, 16:30 - 18:00 • Room 13b

CB7 **VCSELs III: dynamics and switching**
Wednesday, 08:30 - 10:00 • Room 13b

CB8 **Communication lasers**
Wednesday, 10:30 - 12:00 • Room 13b

CB9 **Semiconductor laser physics**
Wednesday, 14:30 - 16:00 • Room 13b

CB10 **Quantum cascade lasers**
Wednesday, 16:30 - 18:00 • Room 13b

CB11 **New devices and applications – I**
Thursday, 08:30 - 10:00 • Room 13b

CB12 **New devices and applications – II**
Thursday, 10:30 - 12:00 • Room 13b

CB13 **Short-pulse generation**
Thursday, 14:30 - 16:00 • Room 13b

CB14 **High power diode lasers**
Thursday, 16:30 - 18:00 • Room 13b

CB15 **THz lasers**
Friday, 08:30 - 10:00 • Room 13b

CC HOLOGRAPHY, ADAPTIVE OPTICS, OPTICAL STORAGE AND PHOTOREFRACTIVES

CC1 **Data storage**
Thursday, 08:30 - 10:00 • Room 12

CC2 **Solitons and photoinduced lattices**
Thursday, 10:30 - 12:00 • Room 12

CC3 **Adaptive laser cavities and mirrors**
Thursday, 14:30 - 16:00 • Room 12

CC4 **Photorefractives and related materials**
Thursday, 16:30 - 18:00 • Room 12

CC5 **Holographic devices**
Friday, 08:30 - 10:00 • Room 11

CD APPLICATIONS OF NONLINEAR OPTICS

CD1 **Applications of solitons**
Monday, 10:45 - 12:15 • Room 12

CD2 **Photon phonon interaction**
Monday, 14:00 - 15:30 • Room 12

CD3 **Optical parametric devices**
Monday, 16:00 - 17:30 • Room 12

CD4 **Generation and manipulation of wide bandwidth optical signals**
Wednesday, 10:30 - 12:00 • Room 13a

CD5 **Nonlinear photonic materials**
Wednesday, 14:30 - 16:00 • Room 13a

CD6 **Photonic chips**
Wednesday, 16:30 - 18:00 • Room 13a

CD7 **Nonlinear optics for measurement and sources**
Thursday, 08:30 - 10:00 • Room 13a

CD8 **Engineered quasi phase matched materials**
Thursday, 10:30 - 12:00 • Room 13a

CD9 **Slow and fast light**
Friday, 08:30 - 10:00 • Room 14a

CD10 **Engineered supercontinua**
Friday, 10:30 - 12:00 • Room 14a

CE OPTICAL MATERIALS, FABRICATION AND CHARACTERISATION

CE1 **Nonlinear organic materials**
Monday, 10:45 - 12:15 • Room 11

CE2 **Organic lasers and laser materials**
Tuesday, 08:30 - 10:00 • Room 12

CE3 **LEDs and semiconductor lasers**
Tuesday, 14:30 - 16:00 • Room 12

CE4 **Novel fabrication techniques**
Tuesday, 16:30 - 18:00 • Room 12

CE5 **Microstructured fibres, fibre devices and glass materials**
Wednesday, 14:30 - 16:00 • Room 4a+b

CE6 **Nanostructured optical devices**
Wednesday, 16:30 - 18:00 • Room 4a+b

CE7 **Nonlinear and laser-active optical waveguides**
Thursday, 08:30 - 10:00 • Room 14a

CE8 **Laser waveguide fabrication**
Thursday, 10:30 - 12:00 • Room 14a

CE9 **Rare-earth doped laser materials**
Thursday, 14:30 - 16:00 • Room 14a

CF ULTRAFAST OPTICS, ELECTROOPTICS AND APPLICATIONS

CF1 **Femtosecond filamentation**
Monday, 10:45 - 12:15 • Room 14a

CF2 **Parametric processes and supercontinuum generation**
Monday, 14:00 - 15:30 • Room 14a

CF3 **Mode-locked oscillators**
Monday, 16:00 - 17:30 • Room 14a

CF4 **Pulse characterization**
Wednesday, 14:30 - 16:00 • Room 14b

CF5 **Supercontinua and nonlinear spatio-temporal shaping**
Wednesday, 16:30 - 18:00 • Room 14b

CF6 **New pulse compression techniques and fibre lasers**
Thursday, 08:30 - 10:00 • Room 14b

CF7 **Novel applications of femtosecond pulses**
Thursday, 10:30 - 12:00 • Room 14b

CF8 **Material processing and structuring**
Thursday, 16:30 - 18:00 • Room 14b

CF9 **Dispersion compensation and applications of femtosecond pulses**
Friday, 08:30 - 10:00 • Room 14b

CF10 **Semiconductor devices and Terahertz technology**
Friday, 10:30 - 12:00 • Room 14b

CG HIGH-FIELD LASER PHYSICS AND APPLICATIONS

CG1 **Relativistic interactions**
Tuesday, 08:30 - 09:45 • Room 14a

CG2 **Ultrafast dynamics at XUV/ x-ray wavelengths**
Tuesday, 14:30 - 16:00 • Room 14a

CG3 **Attosecond metrology**
Tuesday, 16:30 - 18:00 • Room 14a

CG4 **High-harmonic generation and few-cycle laser technology**
Wednesday, 08:30 - 10:00 • Room 14a

CG5 **Strong field molecular dynamics**
Wednesday, 10:30 - 12:00 • Room 14a

CG6 **Ultra high power laser systems**
Thursday, 14:30 - 16:00 • Room 14b

CH OPTICAL SENSING AND METROLOGY

CH1 **Bio and environmental sensing technology**
Monday, 14:00 - 15:15 • Room B11

CH2 **Photonic sensor technologies and applications**
Monday, 16:00 - 17:15 • Room B11

CH3 **Photonic crystal fibres for sensor applications**
Friday, 08:30 - 10:00 • Room 21

CH4 **Optical spectroscopy and precision metrology**
Friday, 10:30 - 12:00 • Room 21

CI OPTICAL TECHNOLOGIES FOR LIGHTWAVE COMMUNICATIONS AND NETWORKS

CI1 **Differential phase-shift keying**
Tuesday, 08:30 - 10:00 • Room BOR1

CI2 **Optical regeneration**
Tuesday, 14:30 - 15:45 • Room BOR1

CI3 **Advanced communication devices**
Tuesday, 16:30 - 17:45 • Room BOR1

CI4 **All optical signal processing**
Thursday, 08:30 - 10:00 • Room BOR1

CI5 **Signal monitoring and conditioning**
Thursday, 10:30 - 12:00 • Room BOR1

CI6 **Optical signal generation**
Thursday, 14:30 - 15:45 • Room BOR1

CI7 **Transient effects and packet switching**
Thursday, 16:30 - 17:45 • Room BOR1

CI8 **Novel transmission techniques**
Friday, 10:30 - 12:00 • Room 13b

CJ FIBRE AND GUIDED WAVE LASERS AND AMPLIFIERS

CJ1 **Short pulse fibre lasers I**
Wednesday, 08:30 - 10:00 • Room 14b

CJ2 **Short pulse fibre lasers II**
Wednesday, 10:30 - 12:00 • Room 14b

CJ3 **Properties and dynamics of active fibres**
Thursday, 08:30 - 09:45 • Room 22

CJ4 **High power fibre lasers**
Thursday, 10:30 - 12:00 • Room 22

CJ5 **Microstructured fibres and visible sources**
Thursday, 14:30 - 16:00 • Room 22

CJ6 **Fibre gratings and waveguide lasers**
Thursday, 16:30 - 18:00 • Room 22

CJ7 **Fibre Raman lasers**
Friday, 08:30 - 10:00 • Room 12

CJ8 **Fibre based sources**
Friday, 10:30 - 12:00 • Room 12

CK PHOTONIC CRYSTALS, PHOTONIC NANOSTRUCTURES AND INTEGRATED OPTICS

CK1 **Negative index materials**
Monday, 10:45 - 12:15 • Room 14b

CK2 **3D photonic crystals**
Monday, 14:00 • 15:30 • Room 14b

CK3 **Photonic nanostructures and devices**
Monday, 16:00 - 17:30 • Room 14b

CK4 **Plasmonic nanostructures**
Tuesday, 08:30 - 10:00 • Room 14b

CK5 **Imaging and spectroscopy in PCs**
Tuesday, 14:30 - 16:00 • Room 14b

CK6 **Photonic crystal fibres**
Tuesday, 16:30 - 18:00 • Room 14b

CK7 **Photonic states and propagation**
Wednesday, 10:30 - 12:00 • Room 21

CK8 **2D Photonic crystals**
Wednesday, 14:30 - 16:00 • Room 21

CK9 **Nonlinear optical properties of PCs**
Wednesday, 16:30 - 18:00 • Room 21

CK10 **Disorder in photonic nanostructures**
Thursday, 08:30 - 10:00 • Room 21

CL BIOPHOTONICS AND APPLICATIONS

CL1 **Enhanced bio sensing**
Thursday, 08:30 - 10:00 • Room B11

CL2 **Optical trapping, manipulation and modification**
Thursday, 10:30 - 12:00 • Room B11

CL3 **Tissue optics**
Thursday, 14:30 - 16:00 • Room B11

CL4 **Multi-photon fluorescence**
Thursday, 16:30 - 18:00 • Room B11

CM FUNDAMENTALS AND MODELLING OF MATERIALS PROCESSING WITH LASERS

CM1 **Macroprocessing**
Thursday, 14:30 - 16:00 • Room 21

CM2 **Microprocessing**
Thursday, 16:30 - 18:00 • Room 21

CP CLEO®/EUROPE POSTDEADLINES

CP1 **CLEO®/Europe Postdeadlines I**
Thursday, 18:00 - 19:30 • Room 13a

CP2 **CLEO®/Europe Postdeadlines II**
Thursday, 18:00 - 19:30 • Room 14b

CLEO®/Europe-IQEC 2007 JOINT SYMPOSIUM SESSIONS

JSI CRYPTOGRAPHIC TECHNIQUES IN PHOTONICS

JSI1 **Chaos-based cryptography**
Thursday, 08:30 - 10:00 • Room 4a

JSI2 **Quantum-based cryptography**
Thursday, 10:30 - 12:00 • Room 4a

JSI3 **Novel devices and methods for photonic cryptography**
Thursday, 14:30 - 16:00 • Room 4a

JSII NANOPHOTONICS AND METAMATERIALS: FROM CONCEPTS TO DEVICES

JSII1 **Tailoring light-matter interactions**
Thursday, 08:30 - 10:00 • Room BOR2

JSII2 **Nano-Photonics**
Thursday, 16:30 - 18:00 • Room 14a

JSII3 **Metamaterials – I**
Friday, 08:30 - 10:00 • Room 14c

JSII4 **Metamaterials – II**
Friday, 10:30 - 12:00 • Room 14c

JSIII OPTICAL FREQUENCY COMBS AND APPLICATIONS

JSIII1 **Optical frequency comb generation**
Monday, 14:00 - 15:30 • Room 1

JSIII2 **Applications of optical frequency combs**
Monday, 16:00 - 17:30 • Room 1

JSP JOINT CLEO®/EUROPE-IQEC POSTDEADLINES

JSP1 **Joint CLEO®/Europe-IQEC Post-deadlines**
Thursday, 18:00 - 19:30 • Room 14a

IQEC 2007 SESSIONS

IA MICROSTRUCTURED DEVICES FOR QUANTUM AND ATOM OPTICS

IA1 **Atom chips**
Tuesday, 14:30 - 16:00 • Room 4b

IA2 **Microfabricated structures for atomic vapour**
Thursday, 16:30 - 18:00 • Room BOR2

IB - COLD ATOMS AND MOLECULES

IB1 **Condensed matter physics with quantum gases**
Tuesday, 08:30 - 10:00 • Room 1

IB2 **Optical lattices**
Wednesday, 14:30 - 16:00 • Room BOR1

IB3 **Novel trapping and cooling schemes**
Wednesday, 16:30 - 18:00 • Room BOR1

IB4 **Spectroscopic applications of ultracold atoms and molecules**
Thursday, 08:30 - 10:00 • Room 4b

IB5 **Correlations in bosonic and fermionic quantum gases**
Thursday, 10:30 - 12:00 • Room 4b

IB6 **Novel interactions in ultracold gases**
Friday, 10:30 - 12:00 • Room BOR2

IC QUANTUM INFORMATION

IC1 **Joint session IB, IC & IF Quantum information theory**
Tuesday, 14:30 - 16:00 • Room 4a

IC2 **Joint Session IC & IF Atoms and photons in a cavity**
Tuesday, 16:30 - 18:00 • Room 4a

IC3 **Control of matter qubits**
Wednesday, 08:30 - 10:00 • Room BOR1

IC4 **Conditional preparation of photonic quantum states**
Wednesday, 10:30 - 12:00 • Room BOR1

IC5 **Joint Session IA & IC & IF Optomechanical control and entanglement**
Wednesday, 16:30 - 18:00 • Room B11

IC6 **Quantum cryptography**
Thursday, 16:30 - 18:00 • Room 4a

ID PHOTONIC APPLICATIONS IN FUNDAMENTAL PHYSICS

ID1 **Optics at the micro- and nano-scale**
Thursday, 14:30 - 16:00 • Room BOR2

ID2 **High precision metrology**
Thursday, 16:30 - 18:00 • Room 4b

ID3 **From spectroscopy to relativity**
Friday, 08:30 - 10:00 • Room BOR2

IE NONLINEAR OPTICS AND ULTRAFAST PHENOMENA

IE1 **Strong light-matter interactions**
Tuesday, 08:30 - 10:00 • Room 4a

IE2 **Frequency mixing and harmonic generation**
Tuesday, 14:30 - 16:00 • Room 1

IE3 **Ultrafast dynamics of excitonic systems**
Tuesday, 16:30 - 18:00 • Room 1

IE4 **Slow light and resonant systems**
Wednesday, 08:30 - 10:00 • Room 13a

IE5 **Coherent dynamics**
Thursday, 10:30 - 12:00 • Room BOR2

IE6 **Pulse propagation and temporal solitons**
Thursday, 14:30 - 16:00 • Room 5

IE7 **Spatial solitons**
Thursday, 16:30 - 18:00 • Room 5

IF QUANTUM OPTICS

IF1 **Joint session IC&IF Quantum repeaters and memory**
Monday, 10:45 - 12:15 • Room 3

IF2 **Quantum imaging**
Tuesday, 08:30 - 10:00 • Room 4b

IF3 **Joint session IA, IC & IF Quantum dots**
Thursday, 08:30 - 10:00 • Room 1

IF4 **Measurements at the quantum level**
Thursday, 10:30 - 12:00 • Room 1

IF5 **Squeezing**
Thursday, 14:30 - 16:00 • Room 1

IF6 **Quantum optics with single emitters**
Thursday, 16:30 - 18:00 • Room 1

IF7 **Joint Session IA, IC & IF - QED with quantum dots**
Friday, 08:30 - 10:00 • Room 5

IF8 **Quantum optics in matter**
Friday, 10:30 - 12:00 • Room 5

IG DYNAMICS- INSTABILITIES AND PATTERNS

IG1 **Semiconductor cavity solitons**
Monday, 10:45 - 12:15 • Room 2

IG2 **Vortices and complexity**
Tuesday, 16:30 - 18:00 • Room 4b

IG3 **Dissipative solitons**
Wednesday, 08:30 - 10:00 • Room B11

IG4 **Dynamics in novel microsystems**
Wednesday, 10:30 - 12:00 • Room B11

IG5 **Dynamics in novel systems**
Wednesday, 14:30 - 16:00 • Room B11

IG6 **Instabilities in semiconductor lasers**
Thursday, 10:30 - 12:00 • Room 21

IP IQEC POSTDEADLINES

IP1 **IQEC Postdeadlines I**
Thursday, 18:00 - 19:30 • Room 13b

GENERAL INFORMATION

CLEO®/Europe 2007 Topics

Tech-Focus Session

TFI) Industrial application of ultrafast technologies
Ultrafast laser technologies are now reaching a stage of maturity such that they are having a significant impact on industry, and this Technical Focus Session will present a representative overview of both existing and emerging industrial applications. The Session will aim at providing a comprehensive introduction to the field for the non-specialist as well as identifying key new directions for future research. The invited speakers will cover topics including: ultrafast fiber and solid state lasers, the search for higher power and more compact sources, femtosecond micromachining applications, THz generation and imaging, optical communication systems, femtosecond biophotonics and more.

Chair: *Wilson Sibbett, University of St. Andrews, United Kingdom*

CLEO®/Europe 2007 Conference Topics

CA) Solid-state lasers
Advances in solid-state lasers: novel solid-state lasers; high-efficiency and small quantum defect lasers; high power operation (including amplifiers); solid-state micro-chip and nanolasers; random lasers; pulse generation; short wavelength lasers; mid-infrared lasers; intracavity wavelength conversion; upconversion lasers; tunable lasers; thermal handling, beam quality characterization and improvements; novel pump sources and pumping techniques; laser resonator design; spectroscopic characterization of solid-state gain media; advanced laser crystals and glasses; linewidth reduction and tuning techniques; amplitude and frequency stability; laser characterization and modelling.

Chair: *Irina Sorokina, Technical University of Vienna, Austria*

CB) Semiconductor lasers
Technology, new devices and applications; nonlinear dynamics of semiconductor lasers: optical feedback, coupled lasers, spatial and temporal instabilities, synchronization, multimode dynamics; modelling of semiconductor lasers; vertical cavity surface emitting lasers, photonic crystal lasers, micro-cavity lasers; quantum dot/quantum dash lasers; optical amplifiers; high power and high brightness laser diodes; near-infrared long wavelength lasers; mid-infrared and far-infrared semiconductor lasers: quantum cascade lasers and THz lasers; short-pulse generation, mode locking, switching, clock recovery; harnessing nonlinear dynamics for novel applications: chaos communication, incoherent sources; short wavelength lasers: blue and green; semiconductor laser physics related investigations.

Chair: *Ingo Fischer, Vrije Universiteit, VUB, Brussels, Belgium*

CC) Holography, adaptive optics, optical storage and photorefractives
Organic and inorganic materials and applications for dynamic optics; Wave mixing, dynamic holography and phase conjugation; Resonant and off-resonance optical effects, optical amplification, nonlinear scattering, photorefractive effect, photochromic effect and photopolymerization; Application to spatial and temporal dynamic optics, light polarization control, solitons, optical data storage, optical data processing, adaptative laser resonators etc.

Chair: *Loïc Mager, CNRS, Institut de Physique et de Chimie des Matériaux de Strasbourg, France*

CD) Applications of Nonlinear Optics
Novel applications of nonlinear optical phenomena and new devices; nonlinear frequency conversion for the UV, visible and IR; telecommunications applications and all-optical switching; all-optical delay lines and slow light; optical parametric devices such as optical parametric amplifiers and oscillators; nonlinear optics in waveguides and fibres, including photonic crystal structures and microstructured optical fibres; quasi-phasematched materials and devices; novel nonlinear materials and structures; stimulated scattering processes and devices; optical limiting; applications of spatial and spatio-temporal nonlinearities including localization phenomena; electro-optic and Kerr devices in crystals and semiconductors; Raman based devices including amplifiers and lasers, beam deflectors and spatial light modulators; nonlinear probing of surfaces; two-photon imaging.

Chair: *Neil Broderick, University of Southampton, UK*

CE) Optical materials, fabrication and characterization
Crystal growth and epitaxy of optical materials; new crystalline and glass laser materials in bulk, fiber and waveguide geometry; micro- and nano-fabrication and -engineering techniques; optical characterisation of laser and nonlinear materials, micro-structured fiber and photonic crystal waveguides, quantum-wells, -wires and -dots, nano-crystalline materials, nano-tubes and innovative molecules such as fullerenes; optical modulators; polymer, organic, and related light absorbers, emitters, LEDs, and lasers.

Chair: *Markus Pollnau, University of Twente, Enschede, The Netherlands*

CF) Ultrafast Optics and Applications
Femtosecond and picosecond pulse generation from solid state, fiber and waveguide sources; mode-locked and Q-switched lasers; optical few-cycle pulses; ultrashort-pulse semiconductor lasers and devices; ultrafast parametric and nonlinear optical conversion of short pulses; ultrashort-pulse mid-IR and THz radiation; pulse compression; super-continuum generation; dispersion compensation; pulse-shaping; carrier-envelope effects; ultrafast characterization methods and measurement techniques, ultrafast optoelectronic systems and devices; applications of ultrafast technology.

Chair: *Günter Steinmeyer, Max-Born-Institute, Berlin, Germany*

CG) High-field laser physics and applications
Laser and parametric chirped-pulse amplification; compression and carrier-envelope phase (CEP) stabilisation of Terawatt pulses; carrier-envelope phase metrology; characterization and manipulation of high-intensity femtosecond light pulses; optical field ionization and attosecond xuv/x-ray pulse generation; generation of high brightness attosecond pulse trains using surface harmonic generation, optimal control of ultrafast non-linear processes, time-resolved measurement of Auger decay, XUV/soft x-ray spectroscopy, metrology, interferometry and microscopy; time-resolved Coulomb explosion imaging, electron dynamics in strongly driven molecules, attosecond and femtosecond electron diffraction imaging of molecular structures, dynamics in fixed-in-space molecules, ultrafast electron dynamics in bulk media and quantum-confined structures, probing of surface physiochemical processes via time-resolved UPS/soft XPS; time-resolved XAS, XANES & EXAFS; femtosecond-laser-produced plasmas; relativistic nonlinear optics; laser-driven particle acceleration.

Chair: *Marc Vrakking, FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, The Netherlands*

CH) Optical sensing and metrology
Optical sensing and metrology allow for non-contact inspection of a wide range of objects, from the macroscopic to the nanometric scale. This topic area focuses on recent progress in all aspects of optical sensing and metrology, particularly in new photonic sensor technologies and applications. Papers are solicited on the following and related topics: new trends in optical remote sensing; fiber sensors using conventional and photonic crystal fibers; active multispectral and hyperspectral imaging; sensor multiplexing; novel spectroscopic techniques, applications and systems; optical precision metrology; novel measurement methods and devices based on interferometry, diffractometry or scatterometry; critical dimension metrology; virtual metrology; multiscale surface metrology; UV and DUV microscopy; resolution enhancement technologies in microscopy; inverse problems; phase retrieval.

Chair: *Hanne Ludvigsen, Helsinki University of Technology, Espoo, Finland*

CI) Optical technologies for lightwave communications and networks
Fibre devices including dispersion compensating fibres, non-linear fibres, fibre propagation effects, fibre amplifiers and fibre lasers, fibre gratings and fibre grating-based devices; semiconductor devices that may be employed in lightwave communications for generation, processing and detection of optical signals including laser sources, detectors and modulators, performance monitoring devices, switches, picosecond and femtosecond pulse sources; optical components for enabling WDM and OTDM systems including filtering and switching devices; optical sub-systems including clock recovery techniques, packet/burst switching subsystems, modulation formats, microwave photonic technologies and optical regeneration.

Chair: *Liam Barry, Dublin City University, Ireland*

CJ) Fibre and guided wave lasers and amplifiers
Waveguide and fibre laser oscillator and amplifiers including novel waveguide and fibre geometries; power scaling of waveguide and fibre lasers - including beam combination techniques (for both pump and signal beams) and new waveguide coupling approaches; upconversion la-

sers; nonlinear effects in waveguides and fibres - including nonlinear frequency conversion and pulse generation and compression; advances in fibre waveguide materials; fabrication techniques for doped waveguide and fibre devices; active microstructured fibre and waveguide laser devices; novel waveguide and fibre sources for industrial applications.

Chair: *J.R. Taylor, Imperial College London, UK*

CK) Photonic crystals, photonic nanostructures and integrated optics

The intensive research nowadays being carried out in the area of nanostructured materials for photonic applications has branched in many directions but keeps a common goal. This is learning and profiting form the novel phenomena occurring when light is created, transported and detected in environments where either dimensionality or size are reduced and, in particular, when light-matter interaction occurs in regions smaller than or similar to the wavelength of light. This trend has earned the term nanophotonics. Such a vast field includes but is not restricted to photonic band gaps in various dimensions and new phenomena originating from periodicity or quasi-periodicity; materials aspects and fabrication techniques, including single molecules and nanocrystals in photonic band gap environments; issues related to order/disorder in nanostructured materials; and applications tending to the integration into photonic devices for biology, generation, routing, switching, modulating and detecting light, etc.

Chair: *Cefe Lopez, Instituto de Ciencia de Materiales de Madrid (CSIC), Madrid, Spain*

CL) Biophotonics and applications

This topic area addresses emerging concepts in biophotonics: single particle detection and tracking; spatio-temporal manipulation of light fields; enhanced linear and non linear detection; micro-fluidics and micro-optics; new optical probes for local measurements – including organic and inorganic nano-crystals, electric fields and temperature measurements etc; new routes for optical detection in biophotonics: non linear processes; squeezed states; twin photons; phase conjugation time reversal etc; physics of optical phenomena in biological media: scattering; coherence; polarization; symmetry and invariance; coupling of optical fields with flows and acoustic fields.

Chair: *Benoît C. Forget, Université Pierre et Marie Curie, Paris, France*

CM) Fundamentals and modelling of materials processing with lasers

Fundamental physics during materials processing with lasers; welding; surface treatment; cutting; ablation; LPVD; LCVD; interaction light-matter; surface and plasma absorption; heat conduction and convection; phase transformations solid-liquid and liquid-vapour; metallurgy; chemical reactions and diffusion; plasma formation; fluid flow of melt, gas, vapour and plasma; stress formation and strain; mathematical modelling of the physical processes; interaction front; process geometry; analytical modelling; numerical methods and FEA.

Chair: *Alexander Kaplan, Luleå University of Technology, Sweden*

Joint Symposia Topics

JSI) Cryptographic techniques in photonics

This Joint Symposium welcomes contributions on any topic relevant to the application of photonic and optical technologies for cryptography. Topics include, but are not restricted to, the following: chaotic emitter and receiver sources; compact and integrated devices; optical chaos cryptography; quantum key distribution; schemes for information encryption; evaluation of transmission characteristics: bit rate, bit error rate, maximum transmission distance, dispersion compensation techniques; synchronization improvements; free-space and fiber implementations; security aspects: evaluation and characterization; information-theoretic security; key distribution; bidirectional communications; exploitation of correlations via public discussion protocol; single photon sources; use of coherent states for cryptography.

Co-Chairs: *Nobuyuki Imoto, Osaka Univ., Japan and Claudio Mirasso, Univ. de les Illes Balears, Palma de Mallorca, Spain*

JSII) Nanophotonics and metamaterials: from concepts to devices

Nanophotonics and Metamaterials are overlapping areas of photonics research that have rapidly grown in importance in recent years. The symposium will be concerned with wavelength scale and sub-wavelength scale photonics - and, more generally, with optical structures and devices where the response is determined by nanoscale features. Interest in metamaterials that operate at optical frequencies has increased greatly since deterministic fabrication technology that can produce specific properties reproducibly has now emerged. The symposium will cover basic physics, new phenomena, materials properties, fabrication technologies, modelling, device design and characterization - applied in a nanophotonics environment. The symposium will seek to capture the excitement and diversity of this field by gathering experts and newcomers alike to present their latest research developments (both fundamental and applied) in the above-mentioned areas. Submissions that address specific areas of potential application will be especially welcome.

Co-Chairs: *Ted Sargent, University of Toronto, Canada and Nikolay I. Zheludev, Southampton Univ., UK*

JSIII) Optical frequency combs and applications

Optical frequency combs based on femtosecond mode-locked lasers have brought about a revolution in optical frequency metrology, providing a simple and robust means of connecting the optical and microwave domains of the electromagnetic spectrum. This has made possible the direct counting of optical cycles, which is a critical milestone in the creation of next-generation optical atomic clocks and techniques of precision spectroscopy. Indeed, the importance of these recent developments, as pioneered by T.W. Hänsch and J.L. Hall, was recognized in the award of the 2005 Nobel Prize in physics. Beyond applications in precise time/frequency metrology and tests of fundamental theories, such combs have opened new research avenues in precise length metrology, remote ranging and sensing, novel broadband spectroscopy techniques, and the synthesis of low-noise/low-jitter waveforms. Moreover, these applications have synergistically motivated important developments in carrier-envelope stabilized femtosecond lasers, coherent linking of multiple broadband sources and nonlinear broadening and frequency conversion techniques that have now pushed frequency combs into new spectral regimes from the XUV to far-IR. This joint symposium will seek to capture the excitement and diversity of this field by gathering experts and newcomers alike to present their latest research developments (both fundamental and applied) in the above-mentioned areas.

Co-Chairs: *Scott Diddams, National Institute of Standards and Technology, Boulder, CO, USA and Harald Telle, Physikalisch-Technische Bundesanstalt (PTB), Braunschweig, Germany*

IQEC 2007 Topics

IA) Microstructured devices for quantum and atom optics

Cold atoms and Bose Einstein condensates can be confined in extremely small magnetic traps and guides on atom chips, made using microfabricated current-carrying wires or micro-structured patterns of permanent magnetisation. Switched magnetic, electrostatic and radiofrequency fields add further options for atom manipulation. Alternatively atoms may be trapped and manipulated on the microscopic scale in optical lattices, which may be free-standing or integrated into an atom chip. When coupled to high-finesse optical micro-resonators, trapped atoms offer possibilities for quantum coherent control, including quantum logic gates and quantum memories and with an interconnect to flying optical qubits. This conference topic covers all such effort to miniaturise quantum atom optics and to realise applications such as interferometry, metrology and quantum information processing.

Chair: *Ed Hinds, Imperial College London, UK*

IB) Cold atoms and molecules

Quantum degenerate Bose and Fermi gases — Bose-Einstein condensation, multi-component and spinor gases, Fermi degeneracy, superfluid Bose and Fermi gases, the BEC-BCS crossover regime, gases in restricted geometries, effects of disordered potentials, effects of quantum degeneracy on atom-light interactions and atomic coherence, coherent and quantum atom optics, trapping and cooling techniques; quantum gases in optical lattices — internal state/spin dynamics, quantum phases and transitions, single- and multi-band gas models, controlled collisions and photoassociation; cold molecules —production and detection methods, manipulating molecular motion, trapping schemes; ultracold polar molecules, scattering and chemistry; applications of quantum gases — metrology, precision measurements, testing of fundamental symmetries.

Chair: *Dan Stamper-Kurn, UC Berkeley, USA*

IC) Quantum Information

Quantum information processing has progressed rapidly in the past decade, and grown into a large interdisciplinary activity. The conference program will highlight recent innovations in all areas of the field, from algorithm development to experimental implementations of quantum computers. Of especial interest are results in quantum communications systems and in quantum cryptography, including entanglement distribution and distillation, conversion of information between static and flying qubits, and quantum memories, both for individual particles and ensembles. In addition, novel platforms, devices and materials for

GENERAL INFORMATION

quantum information processing, such as photonic bandgaps, micro-mechanics, ion-trap arrays, superconducting structures, quantum dots and nonlinear optical processes will be covered.

***Chair:** Ian A. Walmsley, University of Oxford, United Kingdom*

ID) Photonics applications in fundamental physics

Novel laser-spectroscopy techniques, high-resolution spectroscopy, nonlinear spectroscopy, nonlinear magneto- and electro-optical effects, and their applications to metrology; novel frequency standards; measurements of fundamental constants, and searches for their temporal variation; fundamental-symmetry tests.

***Chair:** Dmitry Budker, UC Berkeley, USA*

IE) Nonlinear optics and ultrafast phenomena

Fundamentals of nonlinear optics; fundamentals of ultrashort optical fields; frequency conversion, parametric processes and wavemixing; novel nonlinear optical materials, processes and effects; temporal and spatial solitons; ultrafast spectroscopy; ultrafast dynamics in condensed matter and molecules; control of chemical reactions; electromagnetic induced transparency, lasing without inversion, slow light and dark states.

***Chair:** Steve Cundiff, JILA, University of Colorado and NIST, Boulder, USA*

IF) Quantum optics

Photons in confined structures and cavity QED; quantum correlation and quantum noise reduction; entangled states and decoherence; single photon and nonclassical light sources and applications; QND measurements; quantum imaging, quantum metrology and quantum lithography.

***Chair:** Hans A. Bachor, The Australian National University., Canberra, Australia*

IG) Dynamics, instabilities and patterns

Pattern forming optical systems: localized and extended structures; novel optical systems for non linear dynamics such as quantum dot lasers, hybrid devices, microlasers, fiber lasers; dynamics of nonlinear optical systems such as lasers, OPOs, optical valves; instabilities in semiconductor lasers: injected signal, optical feedback, multimode dynamics; control, synchronisation and applications of chaos in optical systems.

***Chair:** Fedor Mitschke, University of Rostock, Germany*

CLEO®/Europe 2007 Committees

Steering Committee

European Physical Society:
Chair: **Sandro De Silvestri,**
Politecnico di Milano, Italy

Ennio Arimondo,
INFM - University of Pisa, Pisa, Italy

Gunnar Björk,
Royal Institute of Technology, Kista, Sweden

Robert W. Boyd,
University of Rochester, NY, USA

Richard De La Rue,
University of Glasgow, UK

John Dudley,
Université de Franche-Comté, Besançon, France

Paul French,
Imperial College, London, UK

Ursula Keller,
ETH Zurich, Zürich, Switzerland

Daan Lenstra,
Delft Univ. of Technology, Delft, The Netherlands

Peter Loosen,
Fraunhofer Inst. of Laser Technology, Aachen, Germany

Ralf Menzel,
University of Potsdam, Germany

Dieter Meschede,
University of Bonn, Germany

Klaus Mølmer,
University of Aarhus, Denmark

Eberhard Riedle,
LMU Munich, Germany

Gérald Roosen,
Laboratoire Charles Fabry, Institut d'Optique, Orsay, France

Ken-Ichi Ueda,
University of Electro-Communications, Tokyo, Japan

IEEE/Lasers and Electro-Optics:
Roal Baets,
Ghent University - IMEC, Gent, Belgium

Silvano Donati,
University of Pavia, Italy

Concetto Giuliano,
US Airforce Research Laboratory, Kirtland, NM, USA

Richard Linke,
IEEE/LEOS, Piscataway, NJ, USA

Optical Society of America:
Kari Apter,
Optical Society of America, Palo Alto, CA, USA

Jean-Pierre Huignard,
Thales Research & Technology, Palaiseau, France

Franz Kärtner,
Massachusetts Inst. of Technology, Cambridge, MA, USA

Jürg Leuthold,
University of Karlsruhe, Germany

Elizabeth Rogan,
Optical Society of America, Washington DC, USA

William F. Ryan,
Optical Society of America, Washington DC, USA

Organising Committee

General Chairs
Ursula Keller,
ETH Zürich, Zürich, Switzerland

Gérald Roosen,
Lab. Charles Fabry de L'Inst. d'Optique, Orsay, France

Programme Chairs
Richard De La Rue,
University of Glasgow, UK

John Dudley,
Université de Franche-Comté, Besançon, France

Local Chair
Eberhard Riedle,
Ludwig-Maximilians-University, Munich, Germany

Programme Committees

CA - Solid-state lasers
Chair: **Irina Sorokina,**
Technical University of Vienna, Austria

Tasoltan T. Basiev,
General Physics Inst. Russian Ac. of Sciences, Moscow Russia

Camille Bibeau,
Lawrence Livermore National Lab., Livermore, CA, USA

Robert L. Byer,
Stanford University, Ginzton Lab., Stanford, CA, USA

William A. Clarkson,
University of Southampton, UK

Allister I. Ferguson,
University of Strathclyde, Glasgow, UK

Patrick Georges,
Institut d'Optique, Orsay, France

Thomas Graf,
University of Stuttgart, Germany

Fredrik Laurell,
Royal Institute of Technology, Stockholm, Sweden

Richard Moncorgé,
Centre Interdisciplinaire de Recherches Ions et Lasers (CIRIL), ENSICAEN, Caen, France

Valentin A. Orlovich,
B.I. Stepanov Institute of Physics, NASB, Minsk, Belarus

Rüdiger Paschotta,
RP Photonics, Zürich, Switzerland

Hanno Scheife,
Tesat-Spacecom GmbH & Co.KG, Backnang, Germany

CB - Semiconductor lasers

Chair: **Ingo Fischer,**
Vrije Universiteit, Brussels, Belgium

Eugene A. Avrutin,
The University of York, Heslington, UK

Gadi Eisenstein,
Technion, Haifa, Israel

Wolfgang Elsäßer,
Darmstadt University of Technology, Germany

Götz Erbert,
Ferdinand-Braun-Institut für Höchstfrequenztechnik, Berlin, Germany

Thomas Erneux,
Université Libre de Bruxelles, Belgium

Andrea Fiore,
Ecole Polytechnique Fédérale de Lausanne, Switzerland

Mark Hopkinson,
University of Sheffield, Sheffield, UK

Francesco Marin,
Univ. Firenze and INFM and LENS, Sesto F.no (FI), Italy

Cristina Masoller,
Universitat Politècnica de Catalunya, Barcelona, Spain

Geert Morthier,
Gent University – IMEC, Gent, Belgium

Atsushi Uchida,
Takushoku University, Tokyo, Japan

Ian White,
University of Cambridge, Jesus College, Cambridge, UK

Hans-Jürgen Wünsche,
Humboldt-Univesität zu Berlin, Germany

CC - Holography, adaptive optics, optical storage and photorefractives
Chair: **Loïc Mager,**
CNRS, Institut de Physique et de Chimie des Matériaux de Strasbourg, France

Arnaud Brignon,
Thales Research & Technology, Palaiseau, France

Marc Georges,
Univ. de Liège, Centre Spatial, Angleur (Liège), Belgium

Kazuo Kuroda,
University of Tokyo, Japan

Gilles Pauliat,
Lab. Charles Fabry de L'Inst. d'Optique, Orsay, France

John T. Sheridan,
University College Dublin, Ireland

Jingjun Xu,
Nankai University, Tianjin, China

CD - Applications of nonlinear optics
Chair: **Neil Broderick,**
University of Southampton, UK

Gaetano Assanto,
University of Rome, Roma Tre, Rome, Italy

Ole Bang,
Tech. Univ. of Denmark, Res. Center COM, Lyngby, Denmark

Martijn de Sterke,
University of Sydney New South Wales, Australia

Philippe Delaye,
Institut d'Optique, Orsay, France

Philippe Grelu,
LPUB, Université de Bourgogne, Dijon, France

Jonathan Knight,
University of Bath, UK

Ulf Peschel,
University Erlangen-Nürnberg, Erlangen, Germany

Peter G.R. Smith,
University of Southampton, UK

Paul Westbrook,
OFS Labs, Somerset, NJ, USA

Aleksei Zheltikov,
M.V. Lomonosov Moscow State Univ., Moscow, Russia

CE – Optical materials, fabrication and characterisation
Chair: **Markus Pollnau,**
University of Twente, Enschede, The Netherlands

Chantal Fontaine,
LAAS-CNRS, Groupe Photonique, Toulouse, France

Christos Grivas,
University of Southampton, UK

Eli Kapon,
Swiss Federal Institute of Technology, Lausanne (EPFL), Switzerland

Anna Köhler,
University of Potsdam, Germany

Yaroslav Romanyuk,
Lawrence Berkeley National Lab., Berkeley, CA, USA

Witold Ryba-Romanowski,
Polish Academy of Sciences, Wroclaw, Poland

Ifor D.W. Samuel,
University of St. Andrews, St. Andrews Fife, UK

Wolfgang Sohler,
University of Paderborn, Germany

Alessandra Toncelli,
University of Pisa, NEST – INFM, Pisa, Italy

CF - Ultrafast optics, electrooptics and applications
Chair: **Günter Steinmeyer,**
Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

Luc Bergé,
CEA-DAM / Ile de France, Bruyères-le-Châtel, France

Giulio Cerullo,
Politecnico di Milano, INFM, Milan, Italy

Takao Fuji,
Max-Planck-Inst. of Quantum Optics, Garching, Germany

Pablo Loza-Alvarez,
ICFO, Institute of Photonic Sciences, Castelldefels (Barcelona), Spain

Uwe Morgner,
University of Hannover, Hannover, Germany

Derryck T. Reid,
Heriot-Watt University, Edinburgh, UK

Jeff A. Squier,
Colorado School of Mines, Golden, USA

John W.G. Tisch,
Imperial College, London, UK

Kenji Torizuka,
AIST, Tsukuba, Ibaraki, Japan

CG - High-field laser physics and applications
Chair: **Marc Vrakking,**
FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

Joachim Burgdörfer,
Vienna University of Technology, Vienna, Austria

Dimitris Charalambidis,
FORTH – IESL, Heraklion, Greece

Reinhard Dörner,
University of Frankfurt, Frankfurt am Main, Germany

Victor Malka,
ENSTA, CNRS, Ecole Polytechnique, Palaiseau, France

Jon Marangos,
Imperial College, London, UK

Mauro Nisoli,
Politecnico di Milano, Italy

Jan Michael Rost,
Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany

Pascal Salières,
CEA Saclay, Gif sur Yvette, France

Henrik Stapelfeldt,
Aarhus University, Aarhus C, Denmark

CH - Optical sensing and metrology
Chair: **Hanne Ludvigsen,**
Helsinki University of Technology, Espoo, Finland

Ian Bennion,
Aston University, Birmingham, UK

Andreas Erdmann,
Fraunhofer Institute (IISB), Erlangen, Germany

Min Gu,
Swinburne University of Technology, Victoria, Australia

Julian Jones,
Heriot-Watt University, Edinburgh, UK

Tomasz Nasilowski,
Vrije University Brussel, Belgium

Mitsuo Takeda,
University of Electro-Communications, Tokyo, Japan

Waclaw Urbanzyk,
Wroclaw University of Technology, Wroclaw, Poland

Luc Thevenaz,
EPFL Swiss Federal Inst. of Tech., Lausanne, Switzerland

Germán Vergara,
Centro de Investigación y Desarrollo de la Armada, Madrid, Spain

CI - Optical technologies for lightwave communications and networks
Chair: **Liam Barry,**
Dublin City University, Dublin, Ireland

Polina Bayvel,
University College London, UK

Pascal Besnard,
ENSSAT- FOTON / CNRS, Lannion, France

Harmen J.S. Dorren,
Eindhoven Univ. of Tech., Eindhoven, The Netherlands

Andrew Ellis,
Univ. College Cork, Tyndall National Inst., Cork, Ireland

Dan Kilper,
Bell Laboratories, Lucent Technologies, Holmdel, NJ, USA

Periklis Petropoulos,
University of Southampton, UK

Christophe Peucheret,
Technical University of Denmark, Research Centre COM, Lyngby, Denmark

Stefan Wabnitz,
Université de Bourgogne, Dijon, France

Neil D. Whitbread,
Bookham, Caswell Towcester, UK

CJ - Fibre and guided wave lasers and amplifiers
Chair: **J.R. Taylor,**
Imperial College, London, UK

Pierre A. Champert,
Keopsys SA, Lannion, France

Andrei A. Fotiadi,
Faculté Polytechnique de Mons, Belgium

Denis V. Gapontsev,
IPG Photonics, Oxford, MA, USA

Kim P. Hansen,
Crystal Fibre A/S, Birkerod, Denmark

Thomas Schreiber,
Friedrich-Schiller University of Jena, Germany

William Wadsworth,
University of Bath, UK

CK - Photonic crystals, photonic nanostructures and integrated optics
Chair: **Cefe Lopez,**
Instituto de Ciencia de Materiales de Madrid, Spain

GENERAL INFORMATION

Lucio Claudio Andreani,
Università di Pavia, Italy

Gonçal Badenes,
ICFO-Institut de Ciències Fotòniques, Castelldefels, Spain

U. Gösele,
Max-Planck-Institute of Microstructure Physics, Halle, Germany

L. (Kobus) Kuipers,
FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

Florian Kulzer,
Huygens Laboratory, Leiden, The Netherlands

Ekmel Ozbay,
Bilkent University, Ankara, Turkey

Andrew R. Parker,
Green College, Oxford, London, UK

Michael Scalora,
AMSRD-AMR-WS-ST, U.S. Army RDECOM, Redstone Arsenal, AL, USA

Andrew J. Turberfield,
University of Oxford, UK

Willem Vos,
University of Twente, Enschede, The Netherlands

Ralf B. Wehrspohn,
University of Paderborn, Germany

Diederik S. Wiersma,
European Laboratory for Non-linear Spectroscopy and INFM-MATIS, Sesto-Fiorentino (Florence), Italy

Anatoly Zayats,
Queens University, Belfast, Ireland

CL - Biophotonics and applications

Chair: **Benoît C. Forget,**
Université Pierre et Marie Curie, Paris, France

Kishan Dholakia,
University of St. Andrews, St. Andrews Fife, UK

Alberto Diaspro,
University of Genoa, Genova, Italy

Andrew Dunn,
University of Texas at Austin, USA

Emmanuel Fort,
ESPCI, Laboratoire de Physique des Solides, Paris, France

Amir H. Gandjbakhche,
National Institute of Child Health and Human Development, Bethesda, MD, USA

Fritz Keilmann,
Max-Planck-Inst. für Biochemie, Martinsried, Germany

Katrin Kneip,
Wellman Center for Photomedicine, Harvard University, Medical School, Boston, MA, USA

A.G.H. Podoleanu,
University of Kent, Canterbury, UK

Hervé Rigneault,
Fresnel Institute, Marseille, France

Bruno Sfez,
Soreq NRC, Yavne, Israel

Valery V. Tuchin,
Saratov State University, Saratov, Russia

CM - Fundamentals and modelling of materials processing with lasers

Chair: **Alexander Kaplan,**
Lulea University of Technology, Lulea, Sweden

Peter Berger,
University of Stuttgart, Germany

Eckhard Beyer,
Fraunhofer IWS, Dresden, Germany

John M. Dowden,
University of Essex, Colchester, UK

Rémy Fabbro,
Coopération Laser Franco-Allemande, Arcueil, France

Costas Fotakis,
FORTH – IESL, Heraklion, Greece

Bernd Hüttner,
DLR, Institute of Technical Physics, Stuttgart, Germany

Seiji Katayama,
Osaka University, Japan

José Luis Ocaña,
Madrid Polytechnical University, Spain

Wolfgang Schulz,
Fraunhofer Institut für Lasertechnik and RWTH, Aachen, Germany

Armando J. Yáñez Casal,
Universidade da Coruña, Ferrol, Spain

Gang Yu,
Chinese Academy of Sciences, Beijing, China

Tech-Focus 1: Industrial application of ultra-fast technologies

Chair: **Wilson Sibbett,**
University of St. Andrews, UK

Joint Symposia Committees

Programme committees

JSI - Cryptographic techniques in photonics

Co-Chairs: **Nobuyuki Imoto,** *Osaka University, Toyonaka, Japan*
and **Claudio R. Mirasso**, *Universitat de les Illes Balears, Palma de Mallorca, Spain*

Valerio Annovazzi Lodi,
University of Pavia, Italy

Artur Ekert,
University of Cambridge, UK

Nicolas Gisin,
University of Geneva, Switzerland

Takuya Hirano,
Gakushuin University, Tokyo, Japan
Ido Kanter,
Bar-Ilan University, Ramat-Gan, Israel

Jia-Ming Liu,
University of California, UCLA, Los Angeles, CA, USA

Hoi-Kwong Lo,
University of Toronto, Canada

Norbert Lütkenhaus,
University of Waterloo, Waterloo, ON, Canada

John Rarity,
University of Bristol, UK

Marco Santagiustina,
University of Padova, Italy

Alan Shore,
University of Wales, Bangor, UK

Dimitris Syvridis,
University of Athens, Greece
Mirvais Yousefﬁ,
University of Eindhoven, The Netherlands

JSII - Nanophotonics and metamaterials: from concepts to devices

Co-Chairs: **Nikolay I. Zheludev,**
Southampton University, UK
and **Ted Sargent**, *University of Toronto, Canada*

F. Javier Garcia de Abajo,
CSIC, San Sebastian, Spain

Joachim Krenn,
University of Graz, Austria

Michal Lipson,
Cornell University, Ithaca, NY, USA

David R. Smith,
Duke University, Durham, NC, USA

Tomasz Szoplik,
Warsaw University, Poland

Din Ping Tsai,
National Taiwan University, Taipei, Taiwan

Niek F. van Hulst,
ICFO - Institute of Photonic Sciences, Castelldefels (Barcelona), Spain

JSIII - Optical frequency combs and applications

Co-Chairs: **Scott Diddams,**
National Institute of Standards and Technology, Boulder, USA
and **Harald Telle**, *Physikalisch-Technische Bundesanstalt, Braunschweig, Germany*

Alexander Gaeta,
Cornell University, Ithaca, NY, USA

David Jones,
University of British Columbia, Vancouver, BC, Canada

R. Jason Jones,
JILA/ University of Colorado and NIST, Boulder, CO, USA

Franz Kärtner,
Massachusetts Institute of Technology, Cambridge, MA, USA

Motonobu Kourogi,
Optical Comb Institute, Tokyo, Japan

Stephen N. Lea,
National Physical Laboratory, Teddington, UK

Kaoru Minoshima,
National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

Giorgio Santarelli,
BNM-Syrte, Observatoire de Paris, France

Florian Tauser,
Toptica Photonics AG, Gräfelfing/Munich, Germany

Thomas Udem,
Max-Planck Institute for Quantum Optics, Garching, Germany

Lijun Wang,
Max-Planck Research Group, Erlangen, Germany

IQEC 2007 Committees

Organising Committee

General chairs
Ennio Arimondo,
INFM, University of Pisa, Italy

Daan Lenstra,
Delft University of Technology, Delft, The Netherlands

Programme chairs
Robert W. Boyd,
University of Rochester, Rochester, NY, USA

Dieter Meschede,
University of Bonn, Germany

Klaus Mølmer,
University of Aarhus, Denmark

Ken-Ichi Ueda,
University of Tokyo, Japan

Local chair
Eberhard Riedle,
Ludwig-Maximilians-University, Munich, Germany

Programme Committees

IA - Microstructured devices for quantum and atom optics

Chair: **Ed Hinds,**
Imperial College, London, UK

Victor Balykin,
Russian Academy of Sciences, Troitsk, Moscow, Russia

Francesco Saverio Cataliotti,
University of Florence and University of Catania, European Laboratory for Non-Linear Spectroscopy, Sesto Fiorentino, (FI), Italy

Peter Hannaford,
Swinburne University of Technology, Melbourne, Australia

Ifan G. Hughes,
Durham University, Durham, UK

John Kitching,
JILA, Boulder, Colorado, Gaithersburg, MD, USA

Markus Oberthaler,
University of Heidelberg, Germany

Arno Rauschenbeutel,
University of Bonn, Germany

Alastair Sinclair,
Centre for Basic, Thermal and Length Metrology, Teddington, Middlesex UK

Robert J.C. Spreeuw,
University of Amsterdam, The Netherlands

Aephraim M. Steinberg,
University of Toronto, Canada

Chris Westbrook,
Laboratoire Charles Fabry, Orsay, France

Claus Zimmerman,
University of Tübingen, Germany

IB - Cold atoms and molecules

Chair: **Dan Stamper-Kurn,**
UC Berleley, USA

Jean Dalibard,
Laboratoire Kastler Brossel, Paris, France

Nir Davidson,
Weizmann Institute of Science, Rehovot, Israel

Axel Görlitz,
Heinrich-Heine University, Düsseldorf, Germany

Hanns-Christoph Nägerl,
University of Innsbruck, Austria

Luis A. Orozco,
University of Maryland, USA

Jörg Schmiedmayer,
University of Innsbruck, Heidelberg, Austria

Klaus Sengstock,
University of Hamburg, Germany

IC - Quantum information

Chair: **Ian A. Walmsley,**
University of Oxford, UK

Gerard J. Milburn,
The University of Queensland, Brisbane, Australia

Yasunobu Nakamura,
NEC Corporation, Tsukuba, Ibaraki, Japan

Martin Plenio,
Imperial College, London, UK

Gerhard Rempe,
Max-Planck-Institut für Quantenoptik, Garching, Germany

Goran Wendin,
Chalmers University, Göteborg, Sweden

ID - Photonics applications in fundamental physics

Chair: **Dmitry Budker,**
UC Berkeley, USA

Marcis Auzinsh,
University of Latvia, Riga, Latvia

Martial Ducloy,
Laboratoire de Physique des Lasers, Villetaneuse, France

Wojciech Gawlik,
Jagiellonian University, Krakow, Poland

Zheng-Tian Lu,
University of Chicago, Argonne National Laboratory, Argonne, USA

Sadiq Rangwala,
Raman Research Institute, Bangalore, India

Guglielmo M. Tino,
Dipartimento di Fisica and LENS Laboratory - Universita' di Firenze Sesto Fiorentino, Firenze, Italy

Antoine Weis,
University of Fribourg, Switzerland

Jun Ye,
JILA, National Institute of Standards and Technology and University of Colorado Boulder, USA

IE - Nonlinear optics and ultrafast phenomena

Chair: **Steve Cundiff,**
JILA, University of Colorado and NIST, Boulder, CO, USA

Nail Akhmediev,
The Australian National University, Canberra, Australia

Paola Borri,
Cardiff University, UK

Robert Kaindl,
E.O. Lawrence Berkeley National Laboratory, Berkeley, CA, USA

Martti Kauranen,
Tampere Technical University, Tampere, Finland

DaiSik Kim,
Seoul National University, South Korea

Makoto Kuwata-Gonokami,
University of Tokyo, Japan

Alfred Leitenstorfer,
University of Konstanz, Germany

Stefan Lochbrunner,
Ludwig-Maximilians-Universität München, Munich , Germany

Ilias Perakis,
University of Crete, Heraklion, Crete, Greece

John E. Sipe,
University of Toronto, Canada

IF - Quantum optics

Chair: **Hans A. Bachor,**
The Australian National University, Canberra, Australia

Rainer Blatt,
University of Innsbruck, Austria

Ignacio Cirac,
Max-Planck-Institut für Quantenoptik, Garching, Germany

Thomas Jennewein,
University of Vienna, Austria

Agnès Maître,
Université Pierre et Marie Curie, Paris, France

Alexander V. Sergienko,
Boston University, MA, USA

Victor Zadkov,
M.V. Lomonosov Moscow State University, Moscow, Russia

IG - Dynamics, instabilities and patterns

Chair: **Fedor Mitschke,**
Universität Rostock, Germany

Thorsten Ackemann,
University of Strathclyde, Glasgow, UK

Pere Colet,
IMEDEA, Palma de Mallorca, Spain

German de Valcarcel,
Universitat de València, Burjassot, Spain

Stefano Longhi,
Politecnico di Milano, Italy

Jorge Tredicce,
Institut Non-linéaire de Nice, France

Sergei K. Turitsyn,
Aston University, Birmingham, UK

Evgeny Viktorov,
Université Libre de Bruxelles, Belgium

General infomation

Abstracts of the papers to be presented at CLEO®/Europe-IQEC 2007 appear in this advance programme. The presentation of the large number of contributed papers requires that there be up to fourteen parallel sessions during the 5 days of the conference. The programme includes two short courses, one tech-focus session, thirteen CLEO®/Europe topics, seven IQEC topics, and three joint CLEO®/Europe-IQEC symposia. All sessions with exception of the short courses will be held at the International Congress Centre (ICM) in Munich. The short courses will be held at the Ludwig Maximilians University of Munich.

The CLEO®/Europe-IQEC 2007 technical programme features 1244 presentations. These include 3 plenary sessions, 4 tutorial, 7 keynote, and 58 invited talks. The conference also features 1170 contributed papers including posters. Among them 26 contributions were upgraded to invited presentations. Postdeadline sessions were also added.

Poster Sessions

Poster Sessions for contributed papers have been a major attraction at recent conferences. To allow participants to see as many posters as possible, all posters will be displayed in the ICM Foyer. The conference will feature 3 poster sessions taking place from Monday to Wednesday after lunch time (Monday between 13:00 and 14:00, Tuesday and Wednesday between 13:30 and 14:30). There will be no oral presentations during this time.

All authors are requested to display posters on their allocated boards on the morning of their assigned poster day. In order to present their work and answer questions, they are requested to be present in the vicinity of their poster during that day between the assigned time schedule. The schedule of the poster sessions is presented on the respective pages of this programme.

Each author is provided with a bulletin board measuring 1 meter wide x 2 meter high on which to display a summary of the paper. Tape to fix the posters will be provided (pins cannot be applied). Poster paper presentation provides an intimate interaction between the presenter and the viewer.

Poster presenters will also have the possibility to electronically upload their presentations prior to the congress or on site. These uploads can then be viewed on site during the whole Congress. Each poster presenter will receive an additional email directly from the company in charge of this task with all the detailed information including upload-link, log-in data, upload guide, etc. All files will be destroyed after the conference.

Tech-Focus Session

A feature of CLEO®/Europe-IQEC 2007 will be the half-day Tech-Focus Session which concentrates on selected Photonics Application topics. It consists of a combination of extended tutorial introductory material and authoritative technical reviews. CLEO®/Europe-IQEC 2007 will feature a Tech-Focus session on **Industrial Applications of Ultrafast Technology** taking place on Tuesday afternoon.

CLEO®/Europe-IQEC 2007 paid registrants are invited to attend the Tech-Focus Sessions at no additional charge. Those wishing to attend the Tech-Focus who are **not full fee** registrants of the conference must pay the one day fee.

Authors' Information

The presentations need to be uploaded prior to the beginning of the conference - or on site. Authors will receive an additional email from m-events containing all detailed information including upload-link, log-in data, upload guide, etc. approx 2.5 weeks before the congress begins. Prior to performing the uploading please carefully read the user guide for the upload interface. Please note that all files will be destroyed after the conference.

Authors are asked to check-in with the session chair in the room of their relevant session, ten minutes before the beginning of the session.

Short Courses

Sunday 17 June 2007, Ludwig Maximilians University of Munich, 14:30 - 18:00

All sessions except the short courses will take place at the ICM congress centre. Additional information about the courses is to be found in the technical programme.

Short Course Location:
Ludwig-Maximilians-Universität München
Lehrstuhl für BioMolekulare Optik, Fakultät für Physik
Oettingenstrasse 67
See: www.bmo.physik.uni-muenchen.de/ under "General"

Laboratory Visits

Sunday 17 June 2007, Ludwig-Maximilians-University of Munich, 17:30 - 19:30. Departure from the Seminar Room (at 17:30 and 18:30)

There will be the opportunity to visit the laser laboratories of the Lehrstuhl für BioMolekulare Optik. At 17:30 the first tour begins with a short introduction. A second tour starts at 18:30. The number of participants will be limited. Interested participants need to send an email to s.jung@eps.org in order to be registered. Deadline to register: Tuesday 12 June 2007.

Additional lab tours are conducted at other groups of the Fakultät für Physik and the Max-Planck-Insitut für Quantenoptik in Garching on Friday 22 June. See the local website **http://cleoeurope2007.physik.uni-muenchen.de/** for details.

Official Congress Opening

The official congress will begin on **Monday 18 June, Room 1, at 08:45** in the morning. The congress will be opened by Mr. R. Strohmeier, Head of Cabinet of European Commissioner Viviane Reding at 09:00. The CLEO®/Europe plenary given by Gérard Mourou will directly follow from 09:30 to 10:30.

Prizes

Prize and award ceremonies will take place after Theodor W. Hänsch's plenary scheduled Tuesday from 10:30 to 11:30, Room 1.

11:30 - 11:50
- EPS/QEOD Awards Ceremony:
- EPS Quantum Electronics Prize (2 laureates)
- Fresnel Prize (2 laureates)
- QEOD Thesis Prize (4 laureates)

11:55 - 12:15
- OSA Award Ceremony
- Fellow presentations (7 laureates)
- Announcement of the Walther Award

12:20 - 12: 30
- Julius Springer Prize

Social Programme

QEOD Members' Reception

Sunday 17 June 2007, Ludwig Maximilians University of Munich, 18:00 - 22:00

The European Physical Society Quantum Optics and Electronics Division (QEOD) will hold a special reception for members on Sunday evening. Drinks and a range of Bavarian style food – sufficient to even feed hungry grad students - will be served at no cost for members! The beer garden opens at 18:00 and the buffet will open at 19:00.

The reception will provide an exciting opportunity to meet colleagues and other members of the QEOD, and to learn about the benefits of QEOD membership in developing a career in optics and photonics in Europe.

Reception participation needs to be confirmed by e-mailing your name and affiliation to abascal@kth.se before 13 June 2007.

For details see **http://cleoeurope2007.physik.uni-muenchen.de/** and for information about the venue, see Short Courses.

Not an EPS Individual Member? Not a Problem! Non-members of the EPS-QEOD are of course also very welcome. You will be able to join EPS-QEOD on site at a specially reduced rate.

If you have paid the non-member conference fee, you will be offered a free membership for 2007, including admission to the reception.

If you are a non-member of EPS, but paid a reduced fee, you can join EPS QEOD in 2007 and enter the reception for 5 Euros if you are a student, teacher, retired person, or under 30 years old. For anyone else, 10 Euros gets you a 2007 membership and admission to the reception.

If you intend to come, please confirm your reception participation by e-mailing your name and affiliation to abascal@kth.se before 13 June 2007.

Short course opportunity
The QEOD reception is being held at the same venue, and directly after the short courses on Practical OPOs and Micro- and Nano-Machined Optics, 14:30 - 18:00.

If you have registered for a short course, and you are not an EPS QEOD member, then we invite you to become a member for 2007 without any charge, including admission to the reception, but please confirm your participation by e-mailing your name and affiliation to abascal@kth.se before 13 June 2007.

Evening Event with Get-Together

Monday 18 June, Room 1, 18:00 - 20:00
John R. Ambroseo, CEO, Coherent Inc., will give a keynote speech.

All exhibitors and attendees of the World of Photonics Congress are cordially invited to attend the opening event with ensuing reception to meet colleagues and enjoy refreshments and live music.

Happy Hour

Tuesday 19 June, Beer garden outside the ICM, 17:30 - 20:00

All attendees of the congress as well as exhibitors are welcome to enjoy free drinks in the beer garden outside the ICM.

Conference Reception

Wednesday 20 June, Downtown Munich, 19:00 - 23:00
The delegates registered with the CLEO®/Europe-IQEC 2007 are invited to the conference reception, which will be held in at the famous Löwenbräukel-

ler in downtown Munich. A rich selection of fine Bavarian food and ample drinks will be provided. Due to space and reservation imperatives the invitations will be directly distributed at the registration counters on a basis first come, first served up to a maximum of 800.

Exhibition Information

A major exhibition of laser and electro-optic equipment and services, **LASER World of Photonics** will be held in conjunction with the congress.

All the CLEO®/Europe-IQEC 2007 registrants will have free entrance to the technical exhibition. Longer lunch breaks are organised to allow visits to the exhibition.

The range of products exhibited will cover innovative optical technologies such as laser and optronics, optics, optical manufacturing technology, sensors, test and measurement and the application of this technology in production, laser medical and bio technology, imaging, optical measurement systems and illumination. The latest technology first hand will be exhibited.

For more information on the exhibition, please check the website **www.laser.de** or **www.world-of-photonics.net/de/laser/start**

Opening hours of the exhibition

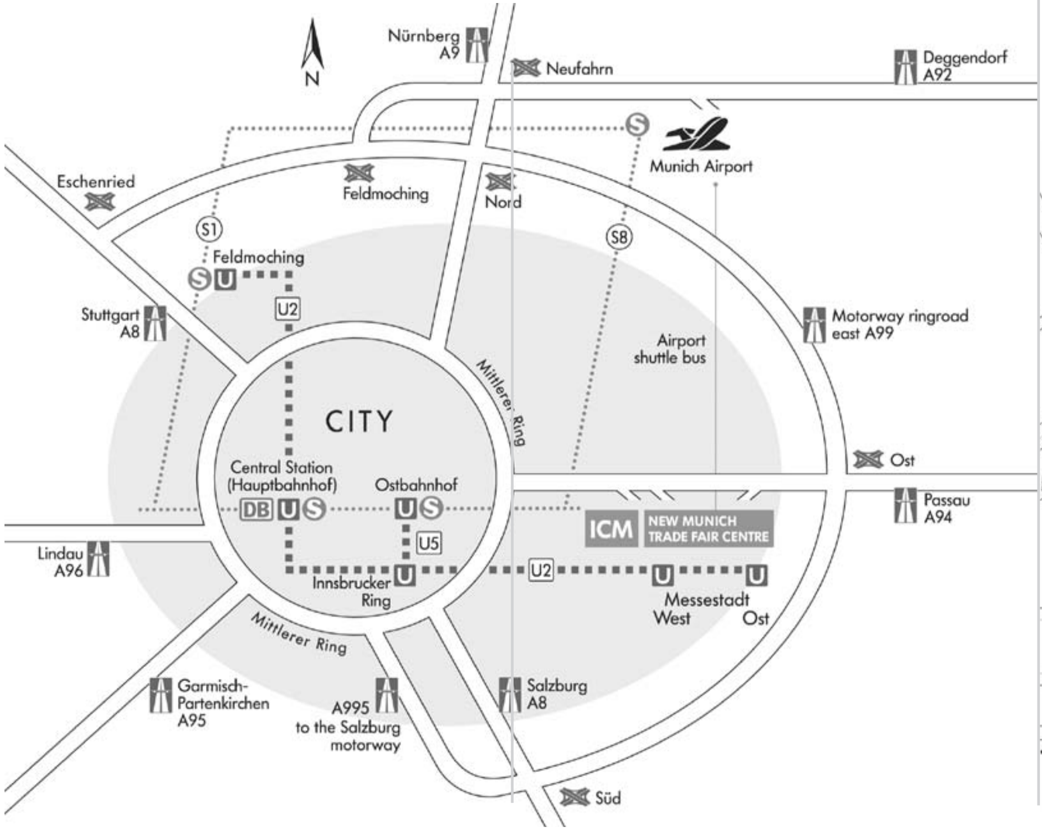
The exhibition will be opened from Monday through Wednesday 09:00 - 17:00 and on Thursday 09:00 - 16:00.

Conference Venue

CLEO®/Europe-IQEC 2007 will take place at the New Munich Trade Fair Centre at the ICM - International Congress Centre, Am Messesee 6, 81829 Munich, Germany. Please visit **www.messe-muenchen.de/** or **www.icm-muenchen.de.**

How to reach the ICM centre

By car: simply follow the trade fair signs from the outskirts and throughout the city to the ICM. There you will find parking space.



By train: The ICM is about 20 minutes from Munich central station (Hauptbahnhof) by underground U2, exit "Messestadt West".

From the airport: At Munich airport, the station for urban railway lines S1 and S8 is directly below the central area. Trains in the direction of the city centre run at 10-minute intervals. **There are two routes from the airport to the ICM:**
Route S1 / U2: S1 from the airport to Feldmoching station or Munich Central Station (Hauptbahnhof). Change to underground U2 which takes you directly to the **ICM - Messestadt West**.
Route S8 / U2: S8 from the airport to Munich central station (Hauptbahnhof). Change to underground U2 which takes you directly to the **ICM - Messestadt West.**

By taxi from the airport:
Taxis are available in front of the terminals. The journey takes about 35 minutes, depending on the volume of traffic (cost around 50 EUR).

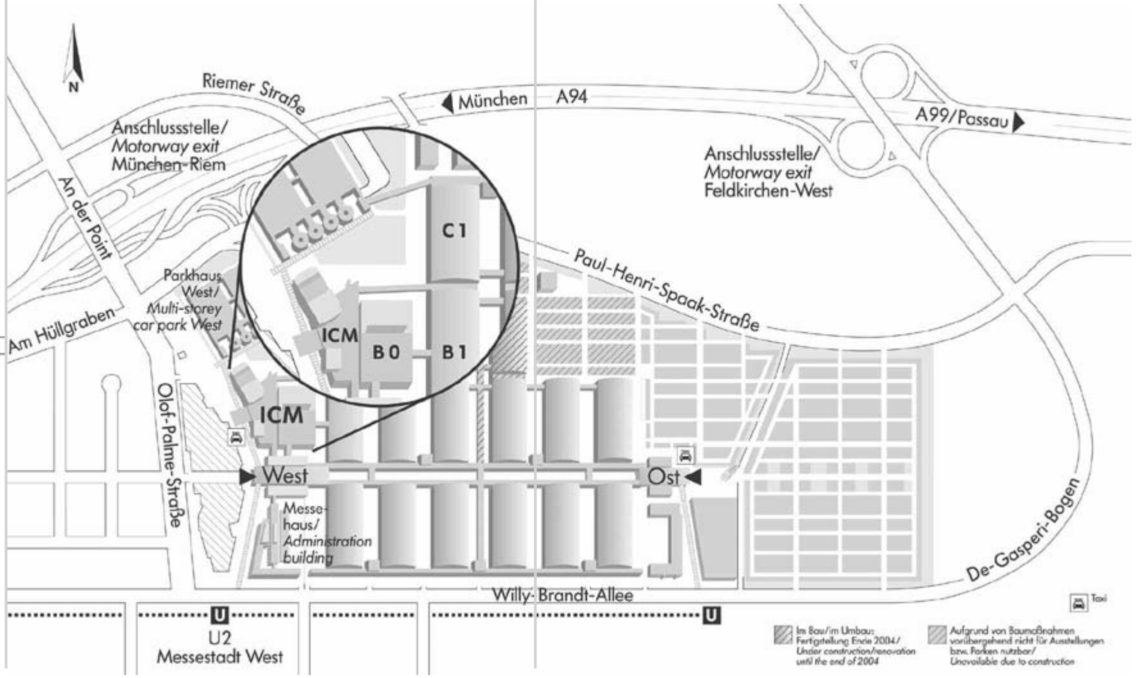
By hire car from the airport:
All the major car rental firms are represented at Munich airport. The car rental centre with its own parking facilities is in front of module A, to the north of car park P6.

Please take the following route: From Munich Airport follow the signs "Messe/ICM" on the A92 in the direction of Munich to the motorway intersection Eching/Neufahrn. Then take the A9 in the direction of Munich to the motorway intersection München-Nord. Continue on the motorway ring road A99 in the direction of Salzburg to the motorway intersection München-Ost. Then take the A94 in the direction of Munich to the exit Feldkirchen-West or München-Riem. The journey takes about 35 minutes, depending on the volume of traffic.

How to take a taxi from the ICM Centre to the airport
You will find taxi ranks at all trade fair entrances and in front of the ICM going to the airport (Central Building).

Airport shuttle (organised in connection with the trade fair, cost € 7 one way):
Airport shuttle June 17, 2007
From: airport (central building) to: Trade Fair Centre (West Entrance). Every full hour from 8.00 a.m. through 12.00 p.m.

Airport shuttle June 18 - 21, 2007
From: airport (central building) to: Trade Fair Centre (West Entrance). Every 30 minutes from 8.00 a.m. through 6.00 p.m.
From: Trade Fair Centre (West Entrance) to: airport (central building). Every 30 minutes from 9.30 a.m. through 7.00 p.m.



GENERAL INFORMATION

Technical Digest

The full registration fee for CLEO®/Europe-IQEC 2007 includes one technical digest in CD-format, provided this is ordered in advance. If not the case, then the organisers cannot guarantee to provide a digest. All the accepted papers of both conferences will be included in the digest.

Additional copies of the digest may be ordered or bought at the meeting, using the appropriate section of the registration form, at a cost of Euro 50 per digest.

Conference Registration

For your own convenience, pre-registration is strongly encouraged to save time collecting your conference material. To pre-register you can proceed on-line via **www.cleoeurope.org** or return the enclosed registration form.

The registration fee for the meeting includes admission to all CLEO®/Europe-IQEC 2007 technical sessions, as well as to those of all conferences collocated with Laser 2007. It includes admission to the conference reception and the technical exhibition. One copy of the technical digest in CD-format is included for full fee payment. Coffee breaks are included.

One-day registration fees are available for those wishing to attend one particular session rather than the whole conference. Please note that the digest is not included in the one-day fees.

Conference Registration fees	
EPS/OSA/IEEE-LEOS Member with technical digest (CD-Rom)	€ 510
Non-Member with technical digest (CD-Rom)	€ 630
EPS/OSA/IEEE-LEOS Student Member (*) with technical digest (CD-Rom)	€ 135
Student Non-Member (*) with technical digest (CD-Rom)	€ 165
One Day without technical digest (CD-Rom)	€ 240
Student (*) extra fee for Short Course	€ 150
Regular extra fee for Short Course	€ 270

All registration fees are exempt from Value Added Tax.

(*) Applications for the student rates must include a photocopy of an official student identity card, which must also be presented on-site when collecting registration materials.

In connection with the fair, a transportation ticket for the Munich transportation network (MVV) will be handed out at the registration counters. Its validity corresponds to the duration of the trade fair: This means that it works from Monday to Thursday. On all other days, the participants have to get regular tickets. With this ticket, one can travel on the S-Bahn, U-Bahn (metro), Bus and Tram all around Munich during the fair duration. The ticket needs to be stamped each day.

Registration hours and location

Registration for technical sessions will take place at the ICM Centre. To enter the ICM Centre please take the main Entrance West (named "Haupteingang WEST").

Sunday 17 June	12:00-16:00
Monday 18 June	08:00-17:00
Tuesday 19 June	08:00-17:00
Wednesday 20 June	08:00-17:00
Thursday 21 June	08:00-17:00
Friday 17 June	08:00-09:00

Conference Hours

Sunday 17 June	14:30-18:00
(Short Courses only at LMU University)	
Monday 18 June	09:00-17:30
Tuesday 19 June	08:30-18:00
Wednesday 20 June	08:30-18:00
Thursday 21 June	08:30-19:30
Friday 22 June	08:30-12:00

Payment

Conference payment can be initiated by one of the methods detailed below:

1. Cheque, bank draft, postal order in euros payable to: European Physical Society
2. Bank transfer- payment in euros only- payable to:

Bank name: B.N.P PARIBAS Alsace Franche Comté,
Address: 2 rue de Berne F - 67300 Schiltigheim, France
Bank code: 30004 **Office code:** 00440
Account N°: 000 100 58 374 **Key:** 76
IBAN: FR 76 3000 4004 4000 0100 5837 476
SWIFT/BIC: BNPAFRPPCST
Account holder: European Physical Society
Details of payment: Write the name of the participant and CLEO07

If paying by bank transfer, please note that all bank fees are payable by the applicant. In all cases please quote the name of the participant and the reference CLEO. A copy of the instruction to the bank should be enclosed with the conference registration form.

3. By Visa/MasterCard credit card:
   Please complete the appropriate section of the conference registration form. (NB - American Express and Diners Club cannot be accepted).

Registration forms received without payment, or information as to how payment is to be made, will not be accepted.

Cancellation

An administration charge of 46 Euros will be made for processing refunds. A request for cancellation must be made in writing. In the case of cancellation, requests received on or before Wednesday, 30 May 2007 will be refunded (less the administration charge). No refunds will be made if notice of cancellation is received after 30 May 2007.

Passport and Visa Requirements

Foreign visitors entering Germany must be in possession of a valid ID or passport. Delegates from countries requiring visas should apply to the German consular offices or diplomatic missions in their home countries. Participants requiring a letter of invitation to include with their visa application should contact the European Physical Society.

Supports

Young Physicist Fund and East West Task Fund: The deadline is over. All grants were distributed. No additional requests can be received.

Student Helpers

Student helpers are needed to work as general helpers. In compensation their registration fees will be waived. They must be full time undergraduate or graduate students. Applications should be sent by email to **eps.conf@uha.fr**

On Site Facilities for Attendees

Web-database

The programme of the whole World of Photonics Congress is available in the internet at www.photonics-congress.com/program. The database offers versatile search functions and supports the composition of each individualized congress schedule that you can transmit to your PDA. The database provides information about all lectures and posters of a specific topic as well as the information about exhibitors at the show related to your inquiry.

ePoster terminal

Due to the high number of posters shown, the physical poster topics change every day. But all posters are available electronically on the ePoster terminals in the internet area - where they can be printed as well.

W-LAN lounge and internet access

All attendees of the congress have free access to the internet in the internet area on the ground floor of the ICM or with their own laptop in the W-LAN Lounge on the 1st floor. The access times for the W-LAN Lounge are from 08:00 to 18:00.

The ICM centre is designed for flexible use. It offers first-class services such as:

International business-centre

Open from Monday to Thursday from 08:00 to 17:00 hour and on Friday from 08:00 to 16:00 hour, closed Saturday and Sunday: PC work stations, access to internet, internet connection for notebook, internet connection via wireless-LAN, fax, photocopies, office services, briefing room, interpreting services. All these services are at cost.

Bank:

No bank-counter but an ATM-machine to withdraw money; Banks are to be found in the centre of Munich or at the main railway station.

Public telephones:

Two types are placed working either with coins or phone cards.

Catering:

- All conference attendees are invited to attend free coffee breaks.
- Between the coffee breaks a number of gastronomy facilities are available.
- Depending on the weather the beer garden outside will be open.
- Two restaurants located on the first floor offer first-class international cuisine. **Am See** restaurant is the closest to the session rooms. **Am Turm** restaurant is located between Halls A3 and A4.
- Other **self-service restaurants** located on the first floor can also be found in the exhibition halls offering international cuisine (Food Galery, between Halls A1 and A2), Bavarian cuisine (Valentin's, between Halls B2 and B3) Asian cuisine (Asia Garden, between Halls B4 and B5), Italian cuisine (Paganini, between Halls A5 and A6).
- Many **snack bars** located in the exhibition halls offer Alpine, American, Asian, Italian cuisine.
- Four **coffee shops** can be found. The closest to the ICM centre is the West Side. Exact locations can be found at **www.messemuenchen.de** (go to Visitor Services).

- **First aid service** (paramedical service, emergency treatment) is found next to Hall B0.
- **Post office, groceries with bakery, cloakroom, and travel service**… are located in the Main Hall of the Entrance West leading to Halls A1 and B1.

Message board
A message board will be installed. Participants should consult it daily for internal messages. It will be placed at the entrance of the ICM.

Information desk
An information desk will be installed near the entrance of the ICM.

Press services
All members of the Press are requested to register. They will receive the conference material and badges that will admit them to all technical sessions and the exhibition.

Hotel information

Considering the large number of attendants to the exhibition, running in conjunction with the conference, we recommend to make your hotel reservation as soon as possible.

Messe Munich has arranged for an on-line hotel reservation which can also be used for the CLEO®/ Europe-IQEC 2007 participants at:
www.messe- muenchen.de

Hotels can be directly booked via the Hotel Directory or Maritz, direct partner of Messe Munich for hotel reservations. Maritz direct on-line reservation with full description of hotels, including prices is published under the following URL address:
www.smart-fairs.de

Hotels, pensions, apartments or youth hostels in Munich can also be found at:
www.munich-info.de/hotels/welcome_en.html

A complete list of affordable housing in Munich is to be found on the conference website **www.cleoeurope.org.**

Hotels, pensions, apartments or youth hostels in Munich can also be found at:
www.munich-info.de/hotels/welcome_en.html

Munich also offers the possibility to rent private rooms: **www.zimmerundmehr.de**

Economically priced hotels and private rooms; with recommendations from various travel guides are to be found at (only German version available):
www.net4.com/muenchen-hotels

Hotels in the surrounding of Munich can be found at (only German version available):
www.hotels-muenchen-umland.de

Munich, Germany

The celebrated capital of Bavaria is one of the major cities in Europe. The 1,3 million inhabitants city is famous for its science and industry environment, in particular in optics. Its historical monuments and cultural landmarks, including many fine arts museums, as well as its beer festival in October, are world famous. Tourist attractions include the Bavarian beer and South German cuisine tradition, and many half-day or one-day excursion opportunities to the nearby Bavarian Alps and geographical and historical landmarks of Southern Bavaria. At the end of June the weather is likely to be warm and the sun is likely to shine, although rain is not impossible. Munich enjoys an outstanding public transportation system, and the modern Münchner Messe complex where CLEO®/Europe-IQEC 2007 and all Laser 2007 events will be held is easy to reach from the airport, from the city centre and from most parts of the city by easy U-Bahn and S-Bahn lines. Shuttle bus service to the Munich airport will be available as well during most of the Laser 2007 week.

Munich's churches:
Munich is well-known for its many churches, among them:

> Frauenkirche (Church of our lady),
1 Frauenplatz, Munich

Opening hours: 07:00-19:00, Thu 07:00-20:30, Fri 07:00-18:00 (no visits during the church services).
Getting there: all S-Bahn train, U-Bahn lines 3/6 to Marienplatz

> Alter Peter,
1 Rindermarkt, Munich
Opening hours: daily 07:30-19:00, Wed 12:00-17:00 (no visits during the church services).
Opening hours of the tower: Mon-Sat 09:00-18:00, Sun and holidays 10:00-18:00 (depending on the weather).
Getting there: all S-Bahn trains, U-bahn lines 3/6, Bus 52 to Marienplatz

> Heiliggeistkirche,
Tal 77, 80331 Munich, Tel. 089/22 44 02
Opening hours: 7.00-18.00 (Midday from 12.00-15.00 and no visits during the church services)
Getting there: U-Bahn lines 3/6 to Marienplatz

Munich's Museums:
Many museums can also be visited, among them:

> Glyptothek
Königsplatz 3, 80333 München, Tel. 089/28 61 00
Opening hours: Tue, Wed, Fr-Su 10.00-17.00, Thu 10.00-20.00, Mo closed
Getting there: U-Bahn line 2 to Königsplatz

> Antikensammlung
Königsplatz 1, 80333 München, Tel. 089/59 83 59
Opening hours: Tue and Thu-Su 10.00-17.00, Wed 10.00-20.00, Mo closed
Getting there: U-Bahn line 2 to Königsplatz

> Deutsches Museum Flugwerft Schleissheim
Effnerstr. 18, 85764 Oberschleißheim, Tel. 089/315 71 40
Opening hours: daily 9.00-17.00
Getting there: S-Bahn line 1 to Oberschleißheim, Bus 292

> Deutsches Museum
Museumsinsel 1, 80538 München, Tel: 089 / 2179-0 oder 2179 433 (recorded information)

Opening hours: daily 9.00-17.00
Getting there: all S-Bahn trains, to Isartor; Tram 18, to Museumsinsel

> Städtische Galerie im Lenbachhaus
Luisenstr. 33, 80333 München, Tel. 089/233-0320 oder 233-32002
Opening hours: daily (except Mo) 10.00-18.00
Getting there: U- Bahn line 2 to Königsplatz

> Neue Pinakothek
Barer Str. 29, Eingang Theresienstraße, 80799 München, Tel. 089/238 05-195
Opening hours: daily (except Mo) 10.00-17.00, Tue

and Thu 10.00-20.00
Getting there: Tram 27 to Pinakothek

> Kunsthalle der Hypo-Kulturstiftung
Theatinerstr. 15, 80333 München, Tel. 089/22 44 12
Opening hours: daily 10.00-18.00 , Thu till 21.00
Getting there: U-Bahn lines 3/4/5/6 to Odeonsplatz or Tram 19

> Villa Stuck
Prinzregentenstr. 60, 81675 München, Tel. 089/45 55 51 25
Opening hours: Tue-Su 10.00-17.00, Tue till 21.00, Mo closed
Getting there: U-Bahn line 4 to Prinzregentenplatz or U-Bahn line 5 to Max-Weber-Platz or Bus 53 or Tram 18 to Friedensengel

> Bayerisches Nationalmuseum
Prinzregentenstr. 3, 80538 München, Tel. 089/211 24-1
Opening hours: Tue-Su 9.30-17.00, Mo closed
Getting there: Bus 53, Tram 17 to Haus der Kunst/Nationalmuseum, U-Bahn lines 4/5 to Lehel

> Haus der Kunst
Prinzregentenstr. 1, 80538 München, Tel. 089/211 27-0
Opening hours: Sa-Mo and Holy Days 10.00-18.00, Tue-Fr 10.00-22.00
Getting there: Bus 53 to Haus der Kunst/Nationalmuseum

> Münchner Stadtmuseum
Sankt-Jakobs-Platz 1, 80331 München, Tel. 089/233-223 70 and 233-255 86
Opening hours: Tue- Su 10.00-18.00 (Mondays closed)
Getting there: all S-Bahn trains to Marienplatz, U-Bahn line 3/6 to Marienplatz, U-Bahn lines 1/2 to Sendlinger Tor, Bus 52 to Viktualienmarkt, Bus 56 to Blumenstraße

Munich's famous places to be visited:

> Marienplatz

Named according to the column of the Virgin Mary at its centre, the square is famed for its neo-Gothic Town Hall, whose mechanical clock, or Glockenspiel, plays every day at 11.00, 12.00 and 17.00. The Marienplatz is a central place for the city's Founding Festival as well as for Fasching (carnival) celebrations and the popular Christmas market. The major restaurants, coffees and shops are located in this area. Shops are completely closed on Sunday.
The place is famous for its carillon in the New Town Hall Tower (Glockenspiel im Rathausturm). This is the largest carillon in Germany, with near-lifesize figures performing the traditional Coopers' Dance and a jousting match. Three times a day at 11.00, 12.00 and 17.00.

> Königsplatz

Commissioned by Ludwig I, this neo-Classical square boasts the Propyläen gateway and the Glyptothek, a small but enchanting collection of Greek and Roman sculpture. Also the sight of an annual summer outdoor concert series.

> Isartor (Isar Gate)

Most easterly of Munich's three remaining town gates, dating from the 14th century. Careful restoration has recreated the dimensions and appearance of the original structure. The Isar Gate accommodates the Valentin Museum.

> Karlstor (Charles' Gate)

Westerly town gate from 14th century. Incorporated at the end of the 18th century into the square known as "Stachus" (officially Karlsplatz). Today it marks one end of Munich's primary pedestrian zone.

Sendlinger Tor (Sendlinger Gate)
Remaining towers of southerly fortifications from the 14th century.

> Beer Gardens

Nothing defines Munich more than its beer. You cannot talk about one without the other and you could never fully discover Munich without at least sampling its brews. Today the Munich breweries dispense 123 million gallons of beer annually. That is why many beer gardens are located in Munich:

> Augustiner-Grossgaststätte

Pedestrian Zone, Neuhauser Straße 16, 80331 Munich, Tel. 089/2 60 41 06.
The Augustiner Großgaststätte is one of the more traditional Munich establishments, with a history that reaches back to 1328. The Augustin Brothers began brewing something heavenly in Augustiner's back rooms up until 1855 when the actual brewing plant was moved to Landsberger Straße. Today Augustiner Großgaststätte is a traditional beer hall with a small courtyard beer garden, smack dab in the middle of Munich's Marienplatz pedestrian zone. The food is great and the beer is the best.

> Altes Hackerhaus

Sendlinger Str. 14, Munich, Tel. 089/2605026, www.hackerhaus.de
Opening hours: 9 am to midnight daily.
Located in Munich's newspaper publishing district and near Sendlinger Tor, Altes Hackerhaus has a long history involving two of the City's most renowned beer producing families, the Hackers and the Pschorrs. An entire wall in the restaurant is dedicated to the family tree, dating back to 1738 when the first Hackerhaus was founded. Highlights include a small but comfortable interior courtyard beer garden, and an outstanding restaurant serving excellent Bavarian fare. Although average by Munich high standards, Altes Hackerhaus benefits from its proximity to the Marienplatz (just a few blocks away) and easy access from the nearby U-Bahn stop at Sendlinger Tor.

> Chinesischer Turm (Chinese Tower)

One of Munich's largest beer gardens, and perhaps its most famous. With more than 7,000 seats around the famous erzat Chinese pagoda in the middle of Englischer Garten (900-acre park

with shaded paths, brooks, ponds and swans), this place could hardly be overlooked. Location: Englischer Garten 3, open from 11.00 to midnight.

Munich is very famous for its **theatres** but also for its **Olympic Park** (www.olympiapark.de/index.html) located Spiridon-Louis-Ring 21, 80809 Munich,
Tel.: 089/30 67 - 0, Fax: 089/30 67 - 22 22
Getting there: U-Bahn line 3 to Olympiazentrum

Further information on Munich is available at
www.muenchen-tourist.de/englisch/index_e.htm

Conference Management

Conference management is provided by the **European Physical Society**, 6 rue des Frères Lumière, BP 2136, 68060 Mulhouse Cedex, France

Language

English will be the official language of the conferences.

NOTES

Short courses

CLEO®/Europe-IQEC 2007 will present two short courses held in parallel. These courses will take place on **Sunday afternoon 17 June 2007** at the Ludwig Maximilians University of Munich. The courses will be at an extra cost: € 150 for students, € 270 for others.

Advance registration is recommended in order to obtain the short course material. This material will not be available for purchase during the conference.

The courses are intended for engineers, scientists and graduate students with some general knowledge of optics and photonics who wish to improve their detailed understanding of the particular technical domains covered. Each course is scheduled in two parts: Course Part I (90 minutes), coffee break, Course Part II (90 minutes).

Detailed Programme:

Schedule: Sunday, 14:30 - 18:00

Location: *Ludwig Maximilians Universität München, Department für Physik, Lehrstuhl für BioMolekulare Optik, Oettingenstraße 67, Munich*

Short Course 1:
Practical Optical Parametric Oscillators

Majid Ebrahim-Zadeh,
ICFO, Barcelona, Spain

Course Description:
This course provides an overview of optical parametric oscillator (OPO) device technology from basic operation principles to advanced architectures. The course will begin with a description of the fundamental concepts in nonlinear frequency conversion, followed by a discussion of the critical design issues for OPO devices - and then a review of the current status of OPO technology. The discussion will encompass OPO systems operating in all time-scales, from the continuous-wave (cw) to the ultrafast femtosecond regime.

Specifically, the course participants will gain knowledge of the basic principles of parametric generation and amplification; OPO design issues, including material and pump laser selection criteria; birefringent and quasi-phase-matched materials and devices; OPO threshold conditions, resonator design, focusing and tuning behavior; OPO resonance configurations, including singly- and multi-resonant oscillators; externally and internally pumped devices; stability requirements; amplitude and frequency control; pulsed OPOs, including compact all-solid-state oscillators, high- and low-energy devices, linewidth control, and material damage issues; picosecond OPOs, including high-repetition-rate cw and pulsed mode-locked OPOs; all-solid-state, Nd-based, and Ti:sapphire-pumped systems; visible to mid-infrared pulse generation; quasi-phase-matched devices; femtosecond OPOs, including Ti:sapphire-pumped oscillators, noncritical, noncollinear, and compact semi-monolithic devices, quasi-phase-matched and mid-infrared OPOs, spectral and temporal control; commercial developments in OPO devices from the cw to femtosecond operating regime; and the generation of THz radiation using OPOs.

Benefits and Learning Objectives:
- Understand the basic principles of optical parametric generation and amplification of light
- Learn the operating principles of optical parametric devices, in particular optical parametric oscillators (OPOs)
- Obtain a detailed understanding of nonlinear gain, phase-matching, threshold conditions, resonator design, tuning, spectral and temporal behavior
- Identify the critical issues, particularly material and laser pump source selection, in the design of optical parametric devices
- Acquire the practical skills and apply the necessary procedures in the construction of OPO devices
- Learn the necessary techniques for spatial, spectral, and temporal control of OPO devices
- Gain a perspective of the current technology in OPO devices and the important recent developments in the field

Intended Audience:
This course is intended for researchers with little or no background in OPOs, as well as those more familiar with the subject area who wish to enhance their understanding and update their knowledge of the emerging developments in OPO device technology. The course will benefit graduate students and other industrial and academic researchers already involved or in early stages in OPO development.

Biography:
Majid Ebrahim-Zadeh is an Institucio Catalana de Recerca i Estudis Avancats (ICREA) Professor at the Institute of Photonic Sciences (ICFO), Barcelona, Spain. His research in experimental nonlinear optics extends over 20 years and he has contributed to the advancement of OPO devices from the UV to mid-IR and in all temporal regimes from the continuous-wave to ultrafast femtosecond time-scales.

Professor Ebrahim-Zadeh has published over 250 technical papers and refereed communications, including 35 invited papers and tutorials and 10 post-deadline papers at the *Conference on Lasers and Electro-Optics (CLEO)*, USA. He has co-edited 2 books and has authored 10 major book chapters and invited reviews on OPOs. He has been a regular instructor for the short course on Practical OPOs at *CLEO/USA* since 1996. Professor Ebrahim-Zadeh has served on the technical program committees of several international conferences including subcommittee chair and technical program committees of *CLEO/USA*, *CLEO/Europe*, *SPIE/Photonics West*, and *Nonlinear Guided Waves*. He serves on the international Joint Council on Quantum Electronics (JQEC) and the International Conferences on Materials and Technologies (CIMTEC). He has served as advisory editor of Optics Letters, guest editor of *J. Opt. Soc. Am. B*, and is currently a topical editor of Optics Letters. His awards and honours include a Royal Society of London University Research Fellowship, the Royal Society of London Merit Award, and Innova Prize for commercial enterprise. He is a Fellow of the Optical Society of America.

Short Course 2:
Micro- and Nano-Machined Optics

Ernst-Bernhard Kley,
Friedrich-Schiller-University of Jena, Germany

Course Description:
Miniaturization and microstructures are keywords in the modern technical world. Optical components and systems are affected by this trend, too, which means that miniaturized optical lenses, prisms, gratings, and even artificial materials based on subwavelength structures have to be fabricated for a lot of applications. As a consequence, micro- and nanolithography is challenged to realize complex optical elements, as well as artificial materials, both on the base of 2-D and 3-D microstructures. In order to fabricate such optical elements and materials, special demands on lithography or micro- and nano-machining arise from the wave nature of light. This refers to the accuracy as well as to special 2-D and 3-D fabrication techniques.

This course gives an introduction to micro- and nano-optics, will show the vision and give an overview of the relevant lithographic fabrication technologies. Specific problems and limitations of the technologies will be described as well. Keywords are: continuous profiles, multilevel profiles, binary patterns, high aspect ration patterns, photo- and e-beam lithography, laser writing, analogue lithography (gray tone, half tone), dry etching, proportional etching, and replication.

Benefits and Learning Objectives:
- Understand the motivation for the application of micro- and nano-optics
- Understand the physical background of microstructured optics
- Select the suitable kind of element for the application
- Select the suitable technology for the element origination/fabrication
- Recognize typical fabrication problems and limitations
- Recognize the possibilities and potential of microstructured optics

Course Level:
Advanced Beginner (basic understanding of the topic is necessary to follow course material).

Category:
Photonics Basics.

Intended Audience:
This course is intended for beginners and users in the field of micro- and nanostructured optics, beginners in fabrication technologies, and people interested in micro-structured optics.

Biography:
Ernst-Bernhard Kley received his diploma in physics from the Friedrich-Schiller University in Jena, Germany. After a 3-year stay in the industry, he returned to Friedrich-Schiller University and received his Ph.D. Currently he is the head of the microlithography/ micro-optics group. His field of research is micro- and nano-lithography for various applications like micro-optics, integrated optics and cryoelectronics. The main part of his work is focused on electron- and photo-lithography and dry etching for optics.

Tech-focus sessions

An attractive feature of the CLEO®/Europe-IQEC technical programmes are special Tech-Focus Sessions that concentrate on selected Photonics Application topics. These feature a combination of Extended Tutorial/Short Course introductory material and authoritative technical reviews.

CLEO®/Europe-IQEC 2007 paid registrants are invited to attend the Tech-Focus Sessions at no additional charge. Those wishing to attend the Tech-Focus who are NOT FULL FEE registrants of the conference must pay the one day fee.

In 2007, there will be one half-day Tech-Focus session consisting of 6 invited presentations on Industrial applications of ultrafast technology by leading experts, as follows:

Schedule: Tuesday, 14:30-16:00 and 16:30-18:00
Location: ROOM B11

14:30 – 16:00

TF1 Session: Industrial applications of ultrafast technology – I
Chair: *Wilson Sibbett, University of St. Andrews, UK*

TF1-1-TUE 14:30

Industrial perspectives on ultrafast fiber lasers
A. Tünnermann, Fraunhofer-Institute for Applied Optics and Precision Engineering, Jena, Germany; J. Limpert, S. Nolte, Friedrich-Schiller-University, Jena, Germany
We will review the achievements of high average power and high energy ultrafast ytterbium-doped fiber laser systems and their potential to revolutionize the high precision production technology

TF1-2-TUE 15:00

Ultrafast lasers for nanomaterial growth and processing
S. Mao, University of California, Berkeley, USA
Recent progress of ultrafast laser-based nanoscale material growth and processing will be discussed, along with selected emerging applications of laser-produced nanomaterials in the development of renewable energy technologies.

TF1-3-TUE 15:30

Next generation ultrafast telecommunications technologies
M. Nakazawa, Tohoku University, Sendai, Japan
Recent progress on ultrafast transmission technology, including a differential phase technique, is reviewed. Then, we describe a new scheme for 160 Gbit/s distortion-free high speed transmission which employs time-domain optical Fourier transformation and TL pulses.

16:30 – 18:00

TF2 Session: Industrial applications of ultrafast technology – II
Chair: *Wilson Sibbett, University of St. Andrews, UK*

TF2-1-TUE 16:30

Spectral coherence interferometry (SCI) for fast and rugged industrial applications
A. Knüttel, F. Rammrath, ISIS Sentronics GmbH, Mannheim, Germany
ISIS sentronics has introduced Spectral Coherence Interferometry (SCI) as powerful 3D metrology tool for use in industrial production. Inner diameters from 1 mm up to 30 mm can be evaluated with the sensor generation RayDex.

TF2-2-TUE 17:00

All-optical THz oscilloscope
A.Bartels, Gigaoptics GmbH, Konstanz, Germany
An all-optical oscilloscope based on high-speed asynchronous optical sampling (ASOPS) is presented. It acquires ultrafast optical signals of 1ns duration with 160fs resolution at a 10kHz scan-rate. THz spectroscopy and picosecond ultrasound based thin-film characterization are discussed as applications.

TF2-3-TUE 17:30

Laser micromachining workstations
P. Chabassier, NOVALASE, Canejan, France
Ultra fast laser micro machining is becoming a very powerful process to get high precision work in many difficult conditions and materials. We will present some important design rules for industrial laser workstation in this field.

Plenaries

The CLEO®/Europe-IQEC 2007 programme includes 3 plenary sessions.

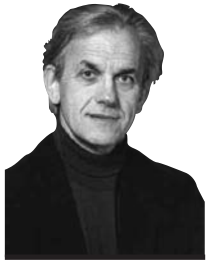
Plenary session 1

Monday, 09:30 – 10:30, Room 1
Plenary chair: *Ursula Keller, ETH, Zürich, Switzerland*

The first plenary session will take place immediately after the Official Opening of the World of Photonics Congress 2007 scheduled Monday 18 June 2007, beginning at 09:30, Room 1. The Congress will be opened at 09:00 by Mr. R. Strohmeier, Head of Cabinet for European Commissioner Viviane Reding.

PL1-1-MON

The Exawatt laser: from relativistic to ultra relativistic optics



Gérard Mourou, ENSTA, Laboratoire d'Optique Appliquée, Palaiseau, France

We will describe the European Extreme Light Infrastructure project (ELI) dedicated to the fundamental study of laser-matter interaction in a new and unsurpassed regime of laser intensity: the ultra-relativistic regime. These investigations will rely on the development of an exawatt-class laser ~100-1000 times more powerful than either the Laser Mégajoule in France or the National Ignition Facility (NIF) in the US. In contrast to these other projects, ELI will attain its extreme power from the shortness of its pulses (femtosecond and attosecond). The infrastructure will serve to investigate a new generation of compact accelerators delivering energetic particle and radiation beams of femtosecond (10^{-15} s) to attosecond (10^{-18} s) duration. Relativistic compression offers the potential of intensities exceeding I 10^{25} W/cm^2, which will challenge the vacuum critical field, as well as provide a new avenue to ultrafast attosecond to zeptosecond (10^{-21} s) studies of laser-matter interaction. ELI will afford wide benefits to society ranging from improvement of oncology treatment, medical imaging, fast electronics and our understanding of aging nuclear reactor materials - to development of new methods for the processing of nuclear waste.

Biography:
Gérard Mourou is the Director of the Laboratoire d'Optique Appliquée at ENSTA/Ecole Polytechnique/CNRS and Professor at the Ecole Polytechnique.

He has pioneered a number of disciplines in the field of ultrafast lasers and applications, with his most important contribution being the invention of the technique known as Chirped Pulse Amplification (CPA). CPA is used on all Intense and Ultra-Intense lasers today. It has revolutionized laser-matter interaction and extended the field of classical optics to Relativistic Plasma Physics, Nuclear Physics, High Energy Physics, Astrophysics, Cosmology and Non-linear QED.

He received many awards, mainly in the field of Ultra high intensity laser including:
- Recipient of the 2005 Lamb Medal at the Physics of Quantum Electronics Conference
- Recipient of the 2004 Quantum Electronics Award from IEEE-LEOS
- Recipient of the 1999 D. Sarnoff Award from IEEE,
- Recipient of the 1997 H. Edgerton Award from the SPIE,
- Recipient of the 1995 R. W. Wood Prize,

He is a fellow of the Optical Society of America, a fellow of the IEEE, a member of the American Physical Society - and a member of the National Academy of Engineering (USA).

Plenary session 2

Tuesday, 10:30 – 12:30, Room 1
Plenary chair: *Ennio Arimondo, University of Pisa, Italy*

The second plenary will begin at 10:30 and will be directly followed with the EPS, QEOD and OSA Awards and the Julius Springer Prize Ceremony

PL2-1-TUE

A passion for precision

Theodor W. Hänsch, Max-Planck-Institute for Quantum Optics, Garching, Germany

For more than three decades, the quest for ever higher precision in laser spectroscopy of the simple hydrogen atom has inspired many advances in laser, optical, and spectroscopic techniques, culminating in femtosecond laser optical frequency combs as perhaps the most precise measuring tools known to man. Applications range from optical atomic clocks and tests of QED and relativity to searches for time variations of fundamental constants. Recent experiments are extending frequency comb techniques into the extreme ultraviolet. Laser frequency combs can also control the electric field of ultrashort light pulses, creating powerful new tools for the emerging field of attosecond science.

Biography:
Professor Theodor W. Hänsch is a Director at the Max-Planck-Institute of Quantum Optics in Garching and Carl Friedrich von Siemens Professor at the Department of Physics of Ludwig-Maximilians-University in Munich, Germany. He was born in Heidelberg, Germany, where he received his doctorate in laser physics in 1969. In 1970, he joined Arthur L. Schawlow at Stanford University as a postdoc. Two years later, he accepted a faculty appointment at the Stanford Physics Department, where he worked as a Full Professor from 1975 until he returned to his native Germany in 1986. In 1974, Hänsch and Schawlow made a seminal proposal for laser cooling of atomic gases. 25 years later, Hänsch and his Munich team were the first to realize Bose-Einstein condensation on a microfabricated atom chip. In 2005, Theodor W. Hänsch shared half of the Physics Nobel Prize with John L. Hall *for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique.*

Plenary session 3 - Walther Memorial Plenary

Thursday, 13:30 – 14:30, Room 1
Plenary chair: *Ferenc Krausz, Max-Planck Institute of Quantum Optics, Garching, Germany*

Herbert Walther (1935 - † 2006)

Professor **Herbert Walther** died on Saturday, the 22nd of July 2006 in Garching, Germany. Professor Walther was an internationally-renowned scientist and teacher, and for 10 years he chaired the World of Photonics Congress Steering Committee. This third plenary session will be dedicated to his memory and will consist of a number of invited presentations on topics spanning the wide range of his technical interests.

PL3-1-THU 13:30-13:40

Moderator and short introduction

Ferenc Krausz, Max-Planck Institute of Quantum Optics, Garching, Germany

Ferenc Krausz will introduce the memorial session.

Biography:
Ferenc Krausz was awarded his M.S. in Electrical Engineering at Budapest University of Technology in 1985, his Ph.D. in Quantum Electronics at Vienna University of Technology in 1991, and his "Habilitation" degree in the same field at the same university in 1993. He joined the Department of Electrical Engineering as Associate Professor in 1998 and became Full Professor in the same department in 1999. In 2003 he was appointed as Director of Max Planck Institute of Quantum Optics in Garching, Germany – as successor of Professor Herbert Walther – and since October 2004 he has also been Professor of Physics and Chair of Experimental Physics at Ludwig Maximilian's University of Munich. His research has included nonlinear light-matter interactions, ultrashort light pulse generation from the infrared to the X-ray spectral range, and studies of ultrafast microscopic processes. By using chirped multilayer mirrors, his group made intense light pulses comprising merely a few wave cycles available for a wide range of applications and utilized them for pushing the frontiers of ultrafast science into the attosecond regime. His most recent research focuses on attosecond physics: the control and real-time observation of the atomic-scale motion of electrons. He co-founded Femtolasers GmbH, a Vienna-based company specializing in cutting-edge femtosecond laser sources.

PL3-2-THU 13:40-14:05

Herbert Walther, distinguished scientist and remarkable teacher

Axel Schenzle, LMU - University of Munich, Germany

Professor Schenzle will discuss Professor Walther's career as a renowned scientist and educator.

PL3-3-THU 14:05-14:30

Quantum entanglement: a vanishing resource

Joseph Eberly, University of Rochester, USA

Experts have said: "…it seems fair to say that the study of entanglement is in its infancy, … it is not entirely clear what … can be expected as a result of the study of quantitative measures of entanglement." In an ideal world, entanglement of small and isolated quantum systems would be stable and uncorrupted. But in reality no physical system can be isolated completely. We will discuss the qualitatively and quantitatively surprising effects that weak noise can have on entangled pairs of quantum objects, even when they relax individually very slowly.

Biography:
J.H. Eberly holds the Andrew Carnegie Chair of Physics in the University of Rochester and is also Professor of Optics. He is the co-author of texts and monographs on quantum optics and laser physics, with active research interests in theoretical aspects of quantum relaxation and measures of quantum entanglement, cavity quantum electrodynamics, atomic multiphoton and attosecond ionization processes, and coherent nonlinear optical pulse propagation. Professor Eberly is currently President of the Optical Society of America.

Tutorial talks

The CLEO®/Europe – IQEC 2007 programme includes 4 tutorial talks

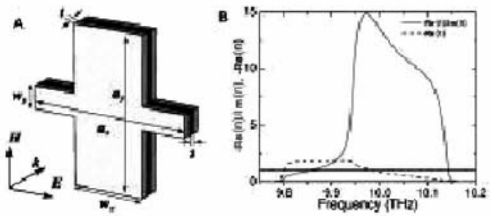
Monday, 10:45 – 11:45, Room 14B

CK1-1-MON

Negative index materials

Costas M. Soukoulis, Iowa State University, Ames, USA

The possibility of negative refraction has brought about a reconsideration of many fundamental optical and electromagnetic phenomena. This new degree of freedom has provided a tremendous stimulus for the physics, optics and engineering communities to investigate how these new ideas can be utilized. Many interesting and potentially important effects not possible in positive refracting materials, such as near-field refocusing and subdiffraction limited imaging, have been predicted to occur when the refractive index changes sign. In this talk, I will give a historical appraisal of the field and also review our own work on negative refraction in metamaterials, and describe the possible impact of them as new types of optical elements. In particular, I will present theoretical and experimental results on engineered microstructures designed to have both *epsilon* and *mμ* negative. Results for different polarizations and propagation directions will be presented. Recent results on microstructures operating at 100-200 THz will be discussed - and the role of losses will also be examined.



▲**Fig. 1:** (A) Schematic representation of one unit cell of the later long-wire-pair structure. (B) The ratio of real part to imaginary part of *n* (Red solid) and Real part of *n* (Blue dashed). The horizontal black line corresponds to n=-1. (The sign of n was changed to positive in order to improve visibility). The real part to imaginary part ratio of n can be as high as 15 at *n=-1*.

Most of the negative index materials (NIMs) sample implementations to date have utilized the topology proposed by Pendry, consisting of split ring resonators (SRRs) and continuous wires. Many groups have been able to fabrication NIMs with an index of refraction *n=-1* – and with losses of less than 1dB/cm [1]. Recently different groups observed indirectly negative *mμ* at the THz region. In most of the THz experiments, only one layer of SRRs was fabricated on a substrate and the transmission, T, was measured only for propagation perpendicular to the plane of the SRRs, exploiting the coupling of the electric field to the magnetic resonance of the SRR via asymmetry. This way it is not possible to drive the magnetic permeability negative. Also, no negative n with small imaginary part has yet been observed in the THz region. One reason is that is very difficult to measure with the existing topology of SRRs and continuous wires both the transmission, *T*, and reflection, *R*, along the direction parallel to the plane of the SRRs. So there is a need for alternative, improved and simplified designs that can be fabricated easily and characterized experimentally, especially in the infrared and optical regions of the spectrum. Such designs are offered by pairs of finite length wires (short-wire-pairs) and the fish-net structure, which will be discussed below.

A short-wire-pair can behave like an SRR, exhibiting a magnetic resonance followed by a negative permeability regime. Moreover, short-wire-pairs can give simultaneously a negative epsilon in the same frequency range, and therefore a negative n, without the need for additional continuous wires. Recent experiments have however not shown evidence of negative n at THz frequencies in the short wires-pair cases that were studied. This is in contrast with some claims that one can get negative *n* at THz frequencies. The negative n obtained at THz frequencies is most probably due to the large imaginary parts of *epsilon* and *mμ*. Very recent work [1, 2] introduced new designs of short-wire-pair based metallic structures to obtain negative index of refraction in the microwaves regime. In addition, the fish-net structure was used and demonstrated [2] negative *n* experimentally at 1.5 microns with low losses. The basic structure of a single unit cell of this NIM was build from H-shaped wires or fish-net structures.

Work supported by US-DOE, DARPA, MURI and EU (PHOREMOST, and METAMORPHOSE projects).

References

[1] For a recent review C. M. Soukoulis, M. Kafesaki and E. N. Economou. *Adv. Matt.* **18**, 1941 2006); C. M. Soukoulis, S.Linden and M. Wegener. *Science*, **315**, 47 (2007); C. M. Soukoulis, *Optics & Photonics News*, June 2006, p.16. [2] G. Dolling et. al. *Science* **312**, 892 (2006); *Opt. Lett.* **31**, 1800 (2006); *Opt. Lett.* **32**, 53 (2007)

Biography:
Costas Soukoulis is a Distinguished Professor of Liberal Arts and Sciences in the Department of Physics and Astronomy at Iowa State University and Senior Physicist at Ames Laboratory.

Research Interests:
Development of theoretical understanding of the properties of disordered systems, with emphasis on electron and photon localization, photonic crystals, random lasers, left-handed materials, random magnetic systems, nonlinear systems, and amorphous semiconductors. The theoretical models developed are often quite sophisticated, in order to accurately reflect the complexity of real materials.

Short Curriculum Vitae:
Costas Soukoulis received his B.S. in Physics from Univ. of Athens in 1974. He obtained his doctoral degree in Physics from the Univ. of Chicago in 1978. From 1978 to 1981 he was visiting Assistant Professor at the Physics Dept. at Univ. of Virginia. He spent 3 years (1981-84) at Exxon Research and Engineering Co. and since 1984 has been at Iowa State Univ. (ISU) and Ames Laboratory. He has been an associated member of FORTH since 1983 and since 2001 has been a Professor (part time) at Dept. of Materials Science and Engineering at Univ. of Crete. He has approximately 300 publications, more than 70 invited lectures at national and international conferences, and about 100 invited talks at institutions. More than 9000 citations, an h-factor of 50 and 3 patents for PBGs and LHMs. Graduated 12 PhD students and co-advised 4 others. Has obtained several grants to support his research from DOE, NSF, DARPA, NATO, EPRI, and European Community. Has been a member or a chairman of various International Scientific Committees responsible for various International Conferences. Prof. Soukoulis is Fellow of the American Physical Society, Optical Society of America, and American Association for the Advancement of Science. He received the ISU Outstanding Achievement in Research in 2001, and the senior Humboldt Research Award in 2002; he shared the Descartes award for collaborative research on left-handed materials in 2005. He is the senior Editor of the new Journal "Photonic Nanostructures: Fundamentals and Applications"

Tuesday, 16:30 – 17:30, Room 14b

CK6-1-TUE

New directions in photonic crystal fibres

Philip Russell,
Max-Planck Research Group, Erlangen, Germany

Photonic crystal fibres are in many ways a success story [1]. Solid core versions have achieved losses that closely approach the best seen in conventional single-mode telecommunications fibre, and have been used in long-haul systems demonstrations in Japan. The lowest loss reported in hollow core PCF, which guides by the photonic band gap effect, is 1.1 dB/km at 1550 nm (as reported by BlazePhotonics Ltd in 2004), and there are good reasons to believe that with further development this could ultimately drop to 0.2 dB/km. The advantages of optical fiber made from just one material – usually pure silica glass – are seen in the ~100× better stability of optical properties such as birefringence against changes in temperature; this is important for example in optical strain sensing and for in-fiber components made by thermal post-processing. The endlessly single-mode (ESM) PCF design permits one to operate at wavelengths shorter than the LP11 cut-off, where conventional single-mode fiber turns multimode; this allows access to unique flattened dispersion landscapes while offering a new way to design ultra-large mode area single-mode fibres with improved bend losses. The ability to control higher order dispersion in ESM-PCF has led to a new generation of entangled photon pair sources using four-wave mixing – by moving the modulational-instability sidebands far away from the pump frequency, Raman-induced noise is averted.

The large air-glass index difference allows design of solid-core silica PCFs with small modal areas, offering very high nonlinearity along with the ability to place the dispersion zero at any point between ~500 nm and 1300 nm. These fibers have multiple applications, the most celebrated being supercontinuum generation. Although the first SC sources used fs Ti:sapphire lasers as pump, an approach that yielded the octave-spanning frequency comb used by Hänsch for ultra-high precision frequency metrology [2], PCF-based SC sources based on microchip or fiber lasers are becoming commonplace and indeed are now commercial products. These ultra-compact sources operate using ESM-PCF with a dispersion zero at 1064 nm; this has the remarkable advantage that all the wavelengths generated are in the fundamental mode. High power fibre lasers and amplifiers are now sometimes designed using microstructuring either to create a high-numerical-aperture inner-cladding waveguide for the diode-bar pump-light, or to form a large mode area lasing core.

Being able to keep single-mode laser light trapped over long distances in a tiny hollow core means that interactions with gases and vapours can be vastly enhanced – by six or seven orders of magnitude. For nonlinear optics – a traditionally "difficult" field – such a scale of improvement is simply unprecedented; for the first time, efficient Raman wavelength conversion is possible in gases even at low power levels. The recent demonstration of hermetically sealed inline gas cells with standard single-mode fibre pigtails may lead to the incorporation of laser-gas devices in telecommunications and even consumer products. Many other applications are emerging, for example ultrahigh sensitivity gas/vapour monitoring, absorption-based optical frequency references and electromagnetically induced transparency using, e.g., acetylene.

Hollow core PCF also uniquely offers the possibility of guiding small particles, molecules or atoms along a curved path, trapped and propelled by laser dipole forces; these "laser tweezer" effects are commonly used to manipulate micro- and nano-scale objects in many fields, from biology and nanoscience to optical lattices for trapping arrays of cold atoms. Many intriguing possibilities exist for combining micro-fluidics with optical tweezer control of particles, cells and vesicles in the tightly constrained reaction volume inside a liquid-filled hollow core PCF.

The air-glass cladding structure has quite unique acoustic properties at frequencies of a few GHz. It can support phononic band gaps if appropriately designed, resulting in very high acoustic energy densities in the core – which acts as a resonator for sound. New forms of optically-pumped acoustic "sasers" may become a realistic possibility.

The tricky and difficult business of launching light efficiently into cores as small as 500 nm in diameter has now been solved by thermal post-processing of PCF using a combination of pressure, vacuum and heat. Ultra-low loss adiabatic transitions can be created that funnel the light from a large input core into a very small nonlinear core and back out again. Finally, there have recently appeared new all-solid versions of PCF. Made from two different glasses, guiding by photonic band gap effects is possible even at very low index contrasts. Unique wavelength filtering effects can be achieved by judicious design, permitting e.g. removal of unwanted emission in fibre lasers or amplifiers.

It is clear that PCF has given rise to successful applications spanning many fields of science and technology, and opened up a number of new research directions. It seems set to continue to do so.

References:

[1] P. St.J. Russell, "Photonic crystal fibers," *J. Lightwave Tech.* **24**, December (2006).

[2] T. W. Hänsch: http://nobelprize.org/nobel_prizes/physics/laureates/2005/hansch-lecture.html

TECHNICAL PROGRAMME

Biography:
Philip Russell holds the Alfried Krupp Chair in experimental physics at the University of Erlangen-Nuremberg, and is Director in the Max-Planck Research Group for Optics, Information and Photonics. From 1996 to 2005 he was professor in the Department of Physics at the University of Bath, where he founded and led the Photonics & Photonic Materials Group, which under his leadership became the Centre for Photonics & Photonic Materials in 2005. He obtained his M.A. (1976) and D.Phil. (1979) degrees at the University of Oxford, subsequently working as a Humboldt Fellow in Hamburg, at IBM Yorktown in the USA and at the universities of Nice, Southampton and Kent. Since 1977 he has specialized in the behaviour of light in periodic structures as well as nonlinear optics, waveguides and optical fibres. He was the founder of the start-up company BlazePhotonics Ltd (April 2001 to August 2004), whose aim was the development and commercial exploitation of photonic crystal fibre. He has over 600 publications and is inventor on 37 patents in many aspects of photonics. A Fellow of the Optical Society of America, in 2000 he won its Joseph Fraunhofer Award/Robert M. Burley Prize for the invention of photonic crystal fibre, which he first proposed in 1991. He is the founding chair of the Optical Society of America's Topical Meeting Series on Bragg Gratings, Photosensitivity and Poling in Glass. In 2002 he won the Applied Optics Division Prize of the UK Institute of Physics. In 2004 he received a Royal Society/Wolfson Research Merit Award and in 2005 won the Thomas Young Prize of the Institute of Physics. In May 2005 he was elected Fellow of the Royal Society and in September he received the 2005 Körber Prize for European Science at a ceremony in Hamburg. From 2004 to 2006 he was an IEEE-LEOS Distinguished Lecturer, and he was elected Director-at-Large of the Optical Society of America in 2006.

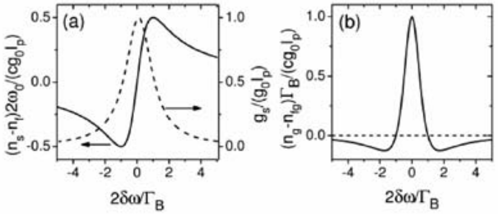
Wednesday, 08:30 – 09:30, Room 13a

IE4-1-WED

Slow light in room-temperature optical waveguides

Daniel Gauthier,
Duke University, Durham,
North Carolina, USA

Over the last decade, there has been great progress in devising methods for tailoring the dispersion of optical materials, such as electromagnetically induced transparency, photonic crystals, and nano-optic resonators [1]. By tailoring the dispersion using all-optical methods, it is possible to adjust the group velocity v_g of a pulse. Large normal dispersion, where the refractive index of the material increases with frequency over some range, results in slow light, where the group index n_g is greater than one and v_g is less than the speed of light in vacuum. Slow light has potential applications for optical buffering, data synchronization, optical memories, and optical signal processing.



▲**Fig. 1:** Slow light in an optical fiber due to stimulated Brillouin scattering. **(a)** The Stokes amplification resonance of width $2\Gamma_B$ (dashed line) and the associated change in refractive index (solid line). **(b)** Large normal dispersion near the center of the line shown in panel **(a)** gives rise to a positive group index (slow light) at line centre.

Most slow light techniques rely on resonant effects that cause large normal dispersion in a narrow spectral region (approximately equal to the resonance width), as shown in Fig. 1. Much of the early slow-light research was conducted near an atomic resonance in a gas of atoms, where large changes in n_g where obtained by creating large optical coherence in the gas. More recently, it has been shown that simulated scattering process (such as stimulated Brillouin scattering [2, 3]) in laser-pumped optical waveguides gives rise to slow light at any wavelength where the material is transparent. This research has attracted considerable interest due to the inherent advantages with optical waveguides, such as compatibility with fiber-optic communication systems, room temperature operation, and the potential for large bandwidths [4].

Over the past year, researchers studying slow light via stimulated Brillouin scattering have demonstrated that it is possible to minimize pulse distortion by tailoring the higher-order dispersion of the material, operate at data rates over 10 Gb/s using broad-band pump light, obtain controllable delays exceeding one pulse width, and delaying pulses with minimal change in the pulse amplitude. Spurred by this work, there is active research in obtaining slow light in optical wave guides by stimulated Raman scattering and by the four-wave mixing process. Also, researchers are moving into the nonlinear regime to study slow-light with optical solitons. Simultaneously, results from the basic science laboratories are transitioning to applications-oriented laboratories that are integrating slow-light sub-assemblies into functional telecommunication components.

References:

[1] R.W. Boyd and D.J. Gauthier, "'Slow' and 'Fast' Light," in *Progress in Optics*, *Vol. 43*, E. Wolf, Ed. (Elsevier, Amsterdam, 2002), Ch. 6, pp. 497-530.

[2] Y. Okawachi, M.S. Bigelow, J.E. Sharping, Z. Zhu, A. Schweinsberg, D.J. Gauthier, R.W. Boyd, and A.L. Gaeta, "Tunable All-Optical Delays via Brillouin Slow Light in an Optical Fiber," *Phys. Rev. Lett.* **94**, 153902 (2005).

[3] K. Y. Song, M. G. Herráez, and L. Thévenaz, "Observation of pulse delaying and advancement in optical fibers using stimulated Brillouin scattering," *Opt. Express* **13**, 82–88 (2005).

[4] R.W. Boyd, D.J. Gauthier, and A.L. Gaeta, "Applications of slow light in telecommunications," *Optics and Photonics News* 7, 18-23 (2006).

Biography:
Daniel J. Gauthier received the B.S., M.S., and Ph.D. degrees from the University of Rochester, Rochester, NY, in 1982, 1983, and 1989, respectively. His Ph.D. research on "Instabilities and chaos of laser beams propagating through nonlinear optical media" was supervised by Prof. R. W. Boyd and supported in part through a University Research Initiative Fellowship. From 1989 to 1991, he developed the first CW two-photon optical laser as a Post-Doctoral Research Associate under the mentorship of Prof. T. W. Mossberg at the University of Oregon. In 1991, he joined the faculty of Duke University, Durham, NC, as an Assistant Professor of Physics and was named a Young Investigator of the U.S. Army Research Office in 1992 and the National Science Foundation in 1993. He is currently the Anne T. and Robert M. Bass Professor of Physics and Biomedical Engineering at Duke. His research interests include: applications of slow light in classical and quantum information processing and controlling and synchronizing the dynamics of complex electronic, optical, and biological systems. Prof. Gauthier is a Fellow of the Optical Society of America and the American Physical Society.

Wednesday, 14:30 – 15:30, Room BOR1

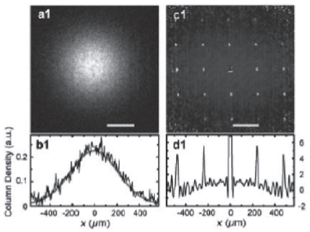
IB2-1-WED

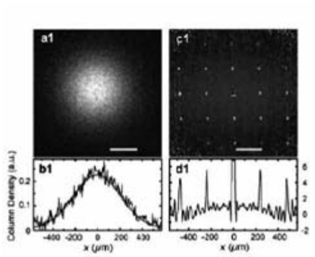
Ultracold atoms in optical lattices

Immanuel Bloch,
Johannes Gutenberg University, Mainz, Germany

Ultracold atoms in optical lattices are proving to be powerful novel model systems for investigations in condensed matter physics, quantum information processing and atomic and molecular physics. They have begun to serve as versatile quantum simulators with novel and outstanding control possibilities. The underlying lattice geometry, the lattice strength and the interactions between the atoms can be tuned almost freely over a wider parameter range. Such a clean model environment – without lattice defects - can be used as a testbed for the investigation of strongly interacting quantum systems [1,2], which lie at the heart of e.g. High-Tc superconductivity and could possibly make it possible to elucidate many fundamental questions in these highly complex many-body phenomena. Furthermore, ultracold atoms in optical lattices have enabled unique opportunities for quantum information processing, where several massively parallel acting quantum gates can enable the generation of large scale entanglement and offer a unique environment for the realization of "one-way" quantum computers. Recent progress in high resolution addressing of single atoms on single lattice sites, is encouraging for the realization of such systems in the near future.

Optical lattices also offer the possibility to perform controlled "chemical reactions" at the quantum limit, between two or more particles stored on different lattice sites on several thousands of lattice sites in parallel. They thus form a novel micro-laboratory for the creation of e.g. hetero-nuclear molecules or more exotic bound states of particles, such as the recently discovered Efimov states. Since such molecules are isolated from each other on different lattice sites and any collisonal broadening mechanisms are absent, high precision spectroscopy can be carried out on them to realize novel atomic clocks or perform tests on the time variation of fundamental constants.





▲**Fig. 1:** Hanbury-Brown & Twiss type noise correlation analysis of ultra-cold atom clouds released from an optical lattices. A statistical analysis of the fluctuations in the single shot absorption images (top left in each image set) reveals both the quantum statistics through a bunching (left image series) or antibunching (right image series) effect and the ordering of the particles in the lattice.

The talk will give an introduction and an overview of the status of this field and outline perspectives for future research.

References:

[1] D. Jaksch and P. Zoller, "The cold atom Hubbard toolbox", *Ann. Phys.* **315**, 52 (2005)

[2] I. Bloch. "Ultracold quantum gases in optical lattices", *Nature Phys.* **1**, 23 (2005)

Biography:
Immanuel Bloch, Dr. rer. nat., Professor (C4) at the Institute for Physics, Johannes Gutenberg-University, Mainz; 1991-1996 physics studies, University of Bonn; 1997-98 research visit to Stanford University, USA (group of Prof. M.A. Kasevich); 1998-2000 graduate studies LMU Munich (group of Prof. T.W. Hänsch), 1991-98 scholarship of Studienstiftung des deutschen Volkes, 2000-2003 senior scientist at the Max-Planck-Institute for Quantum Optics and the LMU Munich, since October 2003 Professor of Physics, Institute for Physics, University of Mainz: 2000 Philip Morris Research Prize, 2002 Otto-Hahn Medal, 2003 Rudolf Kaiser Prize; 2005 National Merit Medal, 2005 Gottfried-Wilhelm-Leibniz Prize of the DFG, 2005 International Commission of Optics Prize, over 50 articles in refereed magazines.

Keynote talks

The CLEO®/Europe – IQEC 2007 programme includes 7 Keynote Talks

Tuesday, 09:00 – 10:00, Room 1

IB1-3-TUE

Cold quantum gases: when atomic physics meets condensed matter

Jean Dalibard, Ecole Normale Supérieure, Paris, France

A decade ago, when Bose-Einstein condensation was achieved in a cold atomic vapour, it came as a nice confirmation of the well established theory of the ideal gas. Since this initial discovery, the research on cold quantum gases has undergone a tremendous advance. It provides experimentalists with a wide variety of tools allowing one to study many-body and strongly correlated quantum systems, with the high control and precision achievable in atomic physics and quantum optics. Atomic motion in the periodic potential of an optical lattice simulates the physics of electrons in solid-state devices. Feshbach resonances are specific tools of atomic physics which enable one to adjust the sign and strength of the interaction between atoms. Quantized vortices in rotating gases lead to physical phenomena strongly connected with the Quantum Hall effect. The talk will review some recent advances in the domain, and show how these cold atomic assemblies can be considered as quantum simulators, mimicking the rich dynamics of condensed-matter systems.

Biography:
Jean Dalibard is director of research at the CNRS and professor at the Ecole Polytechnique. He leads an experimental research group at the Ecole Normale Supérieure in Paris.

Jean Dalibard graduated at the Ecole Normale Supérieure in 1986 under the supervision of Claude Cohen-Tannoudji. In his PhD work he investigated methods to cool and trap atoms with light. Over the years his research activities have covered topics ranging from quantum optics to condensed matter physics. At the beginning of his career he worked with Alain Aspect on the violation of Bell's inequality by correlated pairs of photons. Together with Claude Cohen-Tannoudji he proposed some novel cooling mechanisms, such as the Sisyphus effect, to elucidate the behaviour of optical molasses. At the beginning of the 90's he developed with Yvan Castin and Klaus Moelmer a theoretical method that enables one to treat dissipative processes using wave functions, by incorporating some random elements in their evolution. More recently his research has been centred on the physics of quantum gases, in particular Bose-Einstein condensates. He has studied in particular the properties of quantized vortices in rotating systems, and investigated some specific features of low dimensional gases. Jean Dalibard is the author of 100 publications and is a member of the French Academy of Sciences.

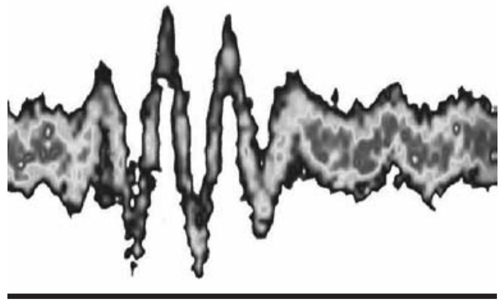
Tuesday, 14:30 – 15:30, Room 14a

CG2-1-TUE

Attosecond spectroscopy comes of age

Reinhard Kienberger, Max-Planck-Institut für Quantenoptik, Garching, Germany

Fundamental processes in atoms, molecules, as well as condensed matter are triggered or mediated by the motion of electrons inside or between atoms. Electronic dynamics on atomic length scales tends to unfold within tens to thousands of attoseconds (1 attosecond [as] = 10^{-18} s). Recent breakthroughs in laser science are now opening the door to watching and controlling these hitherto inaccessible microscopic dynamics.
The key to accessing the attosecond time domain is the control of the electric field of (visible) light, which varies its strength and direction within less than a femtosecond (1 femtosecond = 1000 attoseconds). Atoms exposed to a few oscillations cycles of intense laser light are able to emit a single extreme ultraviolet (xuv) burst lasting less than one femtosecond [1,2]. Full control of the evolution of the electromagnetic field in laser pulses comprising a few wave cycles [3] have recently allowed the reproducible generation and measurement of isolated sub-femtosecond xuv pulses [4], demonstrating the control of microscopic processes (electron motion and photon emission) on an attosecond time scale. These tools have enabled us to visualize the oscillating electric field of visible light with an attosecond "oscilloscope" [5] (fig. 1), to control single-electron and probe multi-electron dynamics in atoms [6,7], molecules [8] and solids [9].



▲Fig. 1: Electric field of a few-cycle laser pulse probed with attosecond xuv pulses.

References:

[1] M. Hentschel et al., *Nature* **414**, 509 (2001); [2] R. Kienberger et al., Science 291, 1923 (2002);

[3] A. Baltuska *et al.*, *Nature* **421**, 611 (2003);

[4] R. Kienberger *et al.*, *Nature* **427**, 817 (2004);

[5] E. Goulielmakis *et al.*, *Science* **305**, 1267 (2004);

[6] M. Drescher *et al.*, *Nature* **419**, 803 (2002).

[7] M. Uiberacker *et al.*, to be published;

[8] M. Kling*et al.*, *Science* **312**, 246 (2006);

[9] A. Cavalieri *et al.*, to be published.

Biography:
Reinhard Kienberger obtained his MSc. and Ph.D. degrees from Vienna University of Technology (TU Wien) in 1999 and 2002 respectively. Since then he has spent periods of research at Stanford and Vienna, and he is currently Leader of the Max-Planck Independent Junior Research Group on "Attosecond Dynamics" at the Max-Planck-Institut für Quantenoptik (MPQ) in Garching, Germany. He has received a number of prestigious fellowships and awards, including the APART fellowship of the Austrian Academy of Sciences and the Sofja Kovalevskaja Award of the Alexander-von-Humboldt Foundation. His research interests cover diverse topics in attosecond science, including the generation and characterization of attosecond XUV pulses, attosecond pulse metrology and applications - and the synthesis of tailored harmonic waveforms.

Wednesday, 11:00 – 12:00, Room 14b

CJ2-3-WED

The diversity of fibre laser technology

David Richardson,
Southampton University,
United Kingdom

High power fibre laser technology has come of age over the past five years or so, due primarily to developments in fibre design and fabrication and semiconductor pump lasers. Fibre is now emerging as the technology of choice for a wide range of laser applications. Nowhere has the progress been more striking than in terms of the maximum continuous wave output power achievable from a single-mode fibre laser. Until the start of 2001 the maximum reported output power from such a laser was ~110W. However, since then the reported power levels have risen rapidly and steadily such that, by late 2006, values as high as 2.5kW were achieved with great prospects for further extension to the 10kW regime. Far higher power levels than this should be achievable, in due course, by using beam combination technology. Fibre lasers are thus consequently now strong competitors to KW-class 'bulk' and thin-disk solid state lasers (for example, Nd:YAG and Yb:YAG) and CO2 lasers for a wide range of industrial applications including materials processing, aerospace and defense. Relative to these competing technologies fibre lasers benefit from the advantages of compactness, efficiency, beam quality and, arguably most importantly, ready thermal management due to the large surface-area to volume ratio of the fibre geometry. The fibre laser is thus seen to have the potential to revolutionize both the range of uses and economics of high power laser systems.

Equally as impressive as the advances in average power scaling - and perhaps just as important from an end application perspective - have been the developments with regard to extending the versatility and diversity of the format of the output radiation, both in terms of temporal and frequency characteristics. Central to this progress has been the onward development of the fibre MOPA concept which allows the faithful and ready power scaling of the output from stable, high performance but generally low power seed lasers. Due to the excellent gain characteristics of fibres it is straightforward to achieve net signal gains in excess of 60dB using just a few simple amplification stages, with even higher gains becoming possible when employing techniques such as in-line filtering and time-gating to reduce the build up of ASE through the system. For example, using this approach, fibre systems providing >400W of single frequency output in a single polarization, and single transverse mode, have been achieved. Such MOPAs represent a suitable fundamental building block for the construction of even higher power coherently combined systems. Progress in the pulsed regime is equally striking. Femtosecond systems incorporating nonlinearity management techniques such as chirped pulse amplification (CPA) and Parabolic Pulse Amplification (PPA) can now be operated in the multi-10 W to multi-100 W regime. Moreover, pulse energies approaching 1mJ for CPA, and 1μJ for PPA have been reached, opening a host of potential further applications as diverse as materials processing through to X-ray generation. Likewise, the use of pulsed diode seed lasers operating in the GHz regime has enabled the development of picosecond systems operating at multi- 100W power levels. These lasers represent excellent sources for frequency conversion using external frequency converters - and have been used, for example, to obtain power levels of nearly 100W in the visible regions of the spectrum. In the nanosecond regime multi-100W systems have also been achieved with single mode pulse energies as high as 10mJ - and, by relaxing the mode quality, pulse energies approaching 100mJ are possible. The above examples, which in most instances can be achieved simply by changing the seed laser or by adding additional components to a suitable MOPA chain, emphasize the inherent flexibility, versatility and real power of the fibre approach.

To date most high power fibre laser work has focused on the Yb-doped system which operates at wavelengths around 1.1mm. This is mainly due to its high efficiency and the availability of high power semiconductor pump sources at the pump wavelengths of 915 and 976nm. Indeed, essentially all of the results referred to above were achieved with Yb-based systems. However, high-power fibre lasers operating in the eye-safe region (1.5 – 2 mm) are also now attracting a lot of attention for use in important free-space applications such as remote optical sensing, range-finding, and free-space optical communications. Eye-safe lasers are significantly less efficient than Yb-doped fibre lasers at 1.1 μm. Nevertheless output powers around 300 W have been reported recently at 1.57 μm from an erbium-ytterbium codoped fibre laser (EYDFL), and 200W around 2 μm using Thulium. Power levels will undoubtedly also scale further in due course.

In summary, fibre lasers are now competitive in terms of pure average output power performance relative to the more conventional bulk and disk high-power laser systems - and with potential for yet higher power levels. However, there is far more to this technology than raw power, as the above performance specifications show. The versatility and flexibility of the fibre approach from a truly unique combination – and, as a consequence, fibre lasers have a very bright future indeed.

Biography:
David J. Richardson was born in Southampton, England in 1964 and obtained his B.Sc. and PhD in fundamental physics from Sussex University U.K. in 1985 and 1989 respectively. He joined the then recently formed Optoelectronics Research Centre (ORC) at Southampton University as a Research Fellow in May 1989. He was awarded a Royal Society University Fellowship in 1991 in recognition of his pioneering work on short pulsed fibre lasers. David J. Richardson is now a Deputy Director of the ORC, where he is responsible for Optical Fibre Device and Systems research. His current research interests include, amongst others: microstructured fibres, high-power fibre lasers, short pulse lasers, optical fibre communications, and nonlinear fibre optics. Prof Richardson has published more than 550 conference and journal papers in his time at the ORC, and produced over 20 patents. He is a frequent invited speaker at the leading international optics conferences in the optical communications, laser and nonlinear optics fields and is an active member of both the national and international optics communities. Prof. Richardson was made a Fellow of the Optical Society of America in 2005.

Wednesday, 16:30 – 17:30, Room 13a

CD6-1-WED

The all-photonic chip

Benjamin Eggleton,
University of Sydney,
Australia

This talk will overview the research highlights of CUDOS, an Australian Research Council Centre of Excellence. CUDOS is a research consortium between five Australian Universities: The University of Sydney, Macquarie University, University of Technology Sydney, Australian National University and Swinburne University of Technology. The CUDOS research program has two central themes: nanophotonics and nonlinear photonics. Our goal of achieving ultra-high-speed, all-optical signal processing on a single photonic chip is addressed by combining these two themes to develop micron-scale photonic components incorporating nonlinear photonics processes. This talk will review progress on CUDOS flagship projects that represent ambitious cross-node collaborations toward this goal: (I) Dispersionless slow light in photonic crystals; (II) Chalcogenide-based all-optical switching and regeneration schemes based on low-loss waveguides and photonic crystals; and (III) optofluidic integration.

Biography:
Benjamin Eggleton is currently a Federation Fellow and Professor of Physics at the University of Sydney. He is Director of the Centre for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), an ARC Centre of Excellence. He studied at the University of Sydney, obtaining his BSc (Hons 1) in 1992 and his PhD in Physics in 1996. After graduation, he went to the United States to join Bell Laboratories, as a Postdoctoral Fellow in the Optical Physics Department. He then transferred to the Optical Fiber Research Department as a Member of Technical Staff and was subsequently promoted to Technical Manager of the Optical Fibre Grating group. Soon after this, he became the Research Director of the Specialty Fiber Business Division of Bell Lab's parent company, Lucent Technologies; here, he drove Lucent's research program in optical fibre devices. He has co-authored more than 160 journal papers, has presented more than 40 invited and plenary presentations at international conferences, and has filed 35 patents. He has received several significant awards. Most notably, in 2004 he received the Prime Minister's Malcolm McIntosh Science Prize for Physical Scientist of the Year, in 2003 the ICO Prize (International Commission for Optics), and in 1998 was awarded the Adolph Lomb Medal from the Optical Society of America. Other achievements include the award of the distinguished lecturer award from the IEEE/LEOS, a R&D100 award, and being made an OSA fellow in 2003. He is an Associate Editor for IEEE Photonic Technology Letters, a member of the editorial advisory board for Optics Communications and serves as Vice-President of the Australian Optical Society.

TECHNICAL PROGRAMME

Thursday, 08:30 – 09:30, Room BOR2

JSII1-1-THU

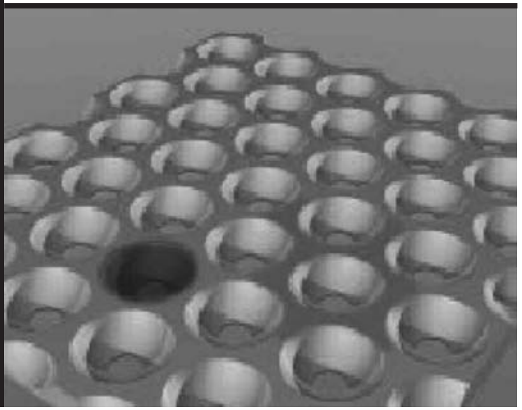
Tailoring NanoMaterials for light-matter interactions

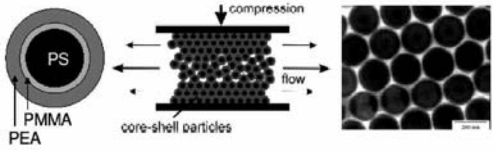
Jeremy Baumberg,
University of Southampton,
United Kingdom

When it comes to making sophisticated 3D nanostructures to enhance light-matter interactions, traditional fabrication routes become problematic. We will demonstrate new routes to confined electronic and confined photonic structures on the 100nm length-scale and nm-scale and reveal some of their new properties, as well as showing the prospects for metamaterials with novel NanoPhotonic properties.

Metal nanostructures exhibit many unusual optical effects due to their size scale, including supporting plasmonic bandgaps and localised plasmons. Surface plasmons are efficiently excited due to the regular array of close-packed dishes; localized plasmons on the other hand reside in the deep cavities at larger sample thicknesses. By measuring the spectral response of the samples at different thickness and incident angles the full dispersion is revealed. We reveal a new strong coupling between

▼Fig. 1: plasmonic substrate for SERS





▲Fig. **2:** Core-shell polymer nanoparticles shear-force assemble into mono-domain large-area opaline films

the plasmonic-crystal modes and the localized plasmons, which allows 'plasmonic atoms' to communicate. We show that such nanostructured plasmonic substrates have widespread application in molecular sensing.

We also show a new development for making nano-materials with structural colour on a potentially-industrial scale [6,7]. This exploits the shear-force assembly of polymer core-shell nanoparticles into elastomeric films during compression moulding or extrusion (Fig.2). By adding absorbing nanoparticles into the fabrication process which sit in the interstices of this structure, we create strongly coloured films with unusual properties.

Such nanomaterials are at the heart of designing new interactions between light and matter, and reveal the promising state of such materials for unusual applications.

References:

[1] S. Coyle *et al., Phys. Rev. Lett.* **87**, 176801 (2001)

[2] J.J. Baumberg, *Nature Materials* **5**, 2 (2006)

[3] T.A. Kelf *et al., Phys. Rev. Lett.* **95** 116802 (2005)

[4] J.J. Baumberg *et al., Nano. Lett.* **5**, 2262 (2005)

[5] R. Cole *et al., Phys. Rev. Lett.* **97**, 137401 (2006)

[6] T. Ruhl, P. Spahn, G.P. Hellmann, *Polymer* **44**, 7625 (2003).

[7] O.L.J. Pursiainen, J.J. Baumberg, *et al., Appl. Phys. Lett.* **87**, 101902 (2005).

Biography:

Jeremy J. Baumberg is the Director of NanoScience and NanoTechnology at the University of Southampton and a Professor in both the Schools of Physics and Electronics & Computer Science. He is an established innovator in NanoPhotonics, opening new areas for exploitation. As a result, he was awarded the 2004 Royal Society Mullard Prize, the 2004 Mott Lectureship of the Institute of Physics, as well as the Charles Vernon Boys medal in 2000. Strong experience in Hitachi (5 years), as an IBM Fellow (2 years) and recently with his $14M spin-off, Mesophotonics (based on NanoPhotonics patents), gives him a unique position to combine academic insight with industry application in a two-way flow. He has a strong track record in the ultrafast properties of novel NanoMaterials such as photonic crystals, single semiconductor quantum dots, semiconductor microcavities, and self-assembled photonic and plasmonic nano-structures. He also frequently talks on NanoScience to the media, and is a strategic advisor to the UK Research Councils. He is a Fellow of the Optical Society of America, the Institute of Physics, and the Institute of NanoTechnology.

Thursday, 14:30 – 15:30, Room BOR2

ID1-1-THU

The new high-Q physics: photonic clocks and back-action cooling on a chip

Kerry Vahala,
Caltech, Pasadena,
CA, USA

Recent years have witnessed a series of developments at the intersection of two, previously distinct subjects. Optical microcavities and micro (nano) mechanical resonators, each a subject in its own right with a rich scientific and technological history [1,2], have, in a sense, become entangled experimentally. The results have implications in a wide range of subjects including improved gravity-wave detection [3] and new tests of quantum theory [4]. They also suggest the beginning of an exciting period of experimental science.

Central to these new results have been two device geometries that enable structural coexistence of micro-mechanical and optical resonators. In one geometry, a micro-cantilever mechanical resonator also functions as a mirror in a high-finesse optical cavity. In a second, opto-mechanical coexistence takes the form of a micron-scale silica toroid that exhibits both high-Q radio-frequency mechanical resonances and optical resonances with Q's as high as 500 million [5]. In both cases, the pressure of photons circulating within the optical resonator couples the mechanical and optical degrees of freedom. Although the static effect of this coupling was measured nearly two decades ago [6], there exist dynamical phenomena that have only recently been observed and that enable new, opto-mechanical physics. The first of these is the onset of regenerative *mechanical* oscillation caused by radiation pressure. This so-called parametric instability [3] was first observed in silica microtoroids [7] and the resulting mechanical oscillations have now been observed from radio-frequency to micro-wave rates. This oscillation phenomenon is a manifestation of the more general principle of dynamic back action [3], and has a counterpart in which laser cooling of the mechanical mode is possible [3,7]. Recent demonstrations in cantilevers [8] and microtoroids [9] of radiation-pressurecooling from room temperature to 10°K will be reviewed. These techniques can potentially achieve ground-state cooling of a macro-scale oscillator.

In addition to providing a powerful set of tools for nano-mechanics [2], these results establish a new direction of basic studies in opto-mechanics. Beyond the new science, cooling and regenerative oscillation on a silicon chip (as in the case of a microtoroid) may also one day lead to applications in micro-chip technologies.

References:

[1] K. Vahala, "Optical Microcavities," *Nature*, **424**, 6950, August 2003.

[2] K. Schwab and M L Roukes, "Putting Mechanics into Quantum Mechanics," *Physics Today*, July 2005.

[3] V. B. Braginsky, S. P. Vyatchanin, *Phys. Lett. A*, **293**, 228 (2002).

[4] S. Mancini *et. al., Phys. Rev Lett.*, **88**, no. 12, 120401-1 (2002); Marshall, W. *et. al. Phys. Rev. Lett.*, **91**, 130401 (2003).

[5] D. K. Armani, *et. al. Nature,* **421**, pp. 925-929, 27 February (2003).

[6] Dorsel, A, McCullen, J., Meystre, P., Vignes, E. & Walther, H., *Phys. Rev. Lett.* **51**, 1550-1553 (1983).

[7] T. Carmon, *et. al., Phys. Rev. Lett.,* **94**, 223902, June 2005.; T. J. Kippenberg, *et. al. Phys. Rev. Lett.* **95**, 033901, 2005. ; H. Rokhsari, *et. al. Optics Express*, **13**, No. 14, July 2005.

[8] S. Gigan, H.R. *et. al., Nature* (London) **444**, 67 (2006); O. Arcizet, *et. al., Nature* (London) **444**, 71 (2006).

[9] A. Schliesser, N. Nooshi, P. Del'Haye, K. Vahala, T.J. Kippenberg, *Phys. Rev. Lett.*, **97**, 243905, Dec 15, 2006

Biography:
Kerry Vahala is Ted and Ginger Jenkins Professor of Information Science and Technology and Professor of Applied Physics at Caltech. He also received his Ph. D. (85) in Applied Physics at Caltech. His research on micro-resonators has led to wafer-based devices operating in the Q regime above 100 million and has also provided low-loss methods for coupling directly to optical fiber. These devices have enabled micro-scale Raman and Parametric sources as well as cavity QED on-a-chip systems. His current research is focused on a range of opto-mechanical phenomena associated with radiation pressure in microresonators. Kerry Vahala is a Fellow of the Optical Society of America, was the first recipient of the Richard P. Feynman Hughes Fellowship and has also received both the Presidential Young Investigator and Office of Naval Research Young Investigator Awards. He has been a topical editor for the Journal of the Optical Society of America and Photonics Technology Letters, and was program co-chair for CLEO 99 and General Chair for CLEO 2001. Vahala also co-founded, Xponent Photonics, a manufacturer of photonic access modules.

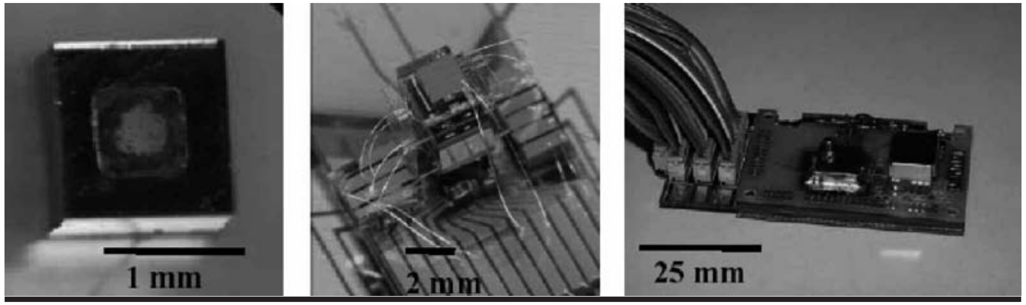
Thursday, 16:30 – 17:30, Room BOR2

IA2-1-THU

Chip-scale atomic devices based on microfabricated alkali vapor cells

John Kitching, NIST, Boulder, CO, USA

We describe recent progress in the development of millimeter-scale instruments based on alkali atom vapour cells implemented with microfabrication techniques. Because of their small size and correspondingly low power requirements, these "chip-scale" atomic clocks and magnetometers have the potential to bring atomically precise instrumentation to portable, battery-operated systems such as GPS receivers, remote sensors and wireless communication devices. In addition, the use of wafer-level processing and assembly potentially allows for very low cost per instrument, if high volumes are produced.



(a) (b) (c)

At the heart of the chip-scale atomic devices being developed in our group is an alkali vapor cell, shown in Figure 1(a). It is fabricated by injecting alkali atoms into a small etched hole in a Si wafer, and then bonding glass on the upper and lower surfaces to seal the cell [1]. These cells can be integrated into stacked physics packages [2], shown in Figure 1(b), in which a low-power semiconductor laser is used to probe the frequency of various atomic transitions. Finally, the physics package can be integrated with low-power RF oscillators and miniature control electronics to create a complete instrument, shown in Figure 1(c). Frequency references fabricated in this manner have been shown to be able to support a fractional frequency stability of $4x10^{-11}$ at 1 second and near 10^{-11}, for one hour of integration. Magnetometer sensors can have sensitivities in the range of a few pT/√Hz.

We will describe the design, fabrication and performance of these types of instruments as well as the underlying optical and atomic physics on which their operation is based. Applications for such instruments will be discussed as well as prospects for further improvement, with regard to size, power and performance. Figure 1 (a) Microfabricated alkali vapor cell. (b) Chip-scale atomic magnetometer physics package. (c) Complete atomic frequency reference.

References:

1. L. A. Liew, S. Knappe, J. Moreland, H. Robinson, L. Hollberg, and J. Kitching, "Microfabricated alkali atom vapour cells," *Appl. Phys. Lett.* **84**, 2694-2696 (2004).

2. S. Knappe, V. Shah, P. D. D. Schwindt, L. Hollberg, J. Kitching, L. A. Liew, and J. Moreland, "A microfabricated atomic clock," *Appl. Phys. Lett.* **85**, 1460-1462 (2004). (a) (b) (c)

Biography:
John Kitching received his BSc. in physics from McGill University in 1990. He went on to obtain an MSc and PhD in Applied Physics from the California Institute of Technology in 1992 and 1995, respectively. His thesis topic was an investigation of the amplitude and frequency noise properties of semiconductor lasers subjected to optical feedback. From 1995 to 2003, he was with JILA/The University of Colorado and also held a guest-researcher appointment in the Time and Frequency Division at the National Institute of Standards and Technology, NIST. Since 2003, he has been a physicist in the Time and Frequency Division at NIST. His research interests include atomic clocks and frequency standards, quantum interference effects in atomic systems, and applications of semiconductor lasers to problems in atomic physics and frequency control. Most recently, he and his team pioneered the development of microfabricated atomic devices for use as frequency references, magnetometers and other sensors. He has received several awards including the 2005 EFTF European Young Scientist Award, the 2006 ISSCC Jack Raper Award for Outstanding Technology Directions and the Department of Commerce Silver Medal. He has published over 40 papers in refereed journals, has given numerous invited talks and has been awarded two patents.

NOTES

MONDAY / ORAL

ROOM 1

09:00 – 10:30

PL1 Session: CLEO®/Europe-IQEC 2007 Plenary 1

Chair: *Ursula Keller, ETH Zürich, Switzerland*

Opening Ceremony 09:00

PL1-1-MON (Plenary) 09:30

The Exawatt laser: from relativistic to ultra relativistic optics

G. Mourou, ENSTA, Laboratoire d'Optique Appliquée, Palaiseau, France

We will describe a laser system that will produce peak power at the exawatt 10^{18}W/cm^2 level. It will usher in a new regime in optics: the ultra-relativistic regime that will succeed to the already successful regime of relativistic optics.

ROOM 2

10:45 – 12:15

IG1 Session: Semiconductor cavity solitons

Chair: *Jorge Tredicce, Institut Non Linéaire de Nice, Valbonne, France*

IG1-1-MON 10:45

Interplay of external gradients and material defects in the dynamics of semiconductor cavity solitons

G. Tissoni, L.A. Lugiato, Università dell' Insubria, Como, Italy; F. Pedaci, S. Barland, E. Caboche, P. Genevet, M. Giudici, J.R. Tredicce, CNRS-Université de Nice Sophia Antipolis, Valbonne, France

A local defect in the device behaves as a source of cavity solitons, put in motion by a phase gradient. A continuous soliton flux is generated; whose frequency/velocity is controllable acting on system parameters.

IG1-2-MON 11:00

Cavity solitons in a broad-area vertical-cavity surface-emitting lasers with frequency-selective feedback

Y. Tanguy, T. Ackemann, University of Strathclyde, Glasgow, UK; R. Jäger, Ulm Photonics GmbH, Ulm, Germany

Cavity solitons are obtained in a broad-area vertical-cavity surface-emitting lasers, with frequency-selective feedback. These solitons can be independently switched on and off with an incoherent injected field, and are spatially shifted due to a phase gradient.

ROOM 3

10:45 – 12:15

IF1 Session: Joint session IC&IF Quantum repeaters and memory

Chair: *Hideo Mabuchi, Caltech, Pasadena, USA*

IF1-1-MON 10:45

Quantum networking with atomic ensembles in the single excitation regime

J. Laurat, C.W. Chou, H. Deng, K.S. Choi, H. de Riedmatten, D. Felinto, H.J. Kimble, California Institute of Technology, Pasadena, USA

Quantum networks hold the promise for revolutionary advances in information processing with entanglement distributed over remote locations via quantum repeaters. We report two milestones in this direction: the conditional control of memories and the implementation of functional nodes.

IF1-2-MON 11:00

Optimal quantum storage of broadband single photons

J. Nunn, K. Surmacz, Z. Wang, F.C. Waldermann, D. Jaksch, I.A. Walmsley, University of Oxford, United Kingdom

We optimize a quantum memory for broadband photons based on an off-resonant Raman interaction in a lambda-type ensemble. We consider non-colinear geometries and various practical implementations.

ROOM 11

10:45 – 12:15

CE1 Session: Nonlinear organic materials

Chair: *Roberta Ramponi, Politecnico di Milano, Italy*

CE1-1-MON 10:45

Extended conjugation and its effect on the high third-order nonlinearities of charge transfer chromophores

J.C. May, I. Biaggio, Lehigh University, Bethlehem, USA; F. Bures, F. Diederich, Laboratorium für Organische Chemie, Zurich, Switzerland

The use of donors and acceptors around a compact conjugated electron system allows obtaining extraordinarily large third-order polarizabilities both when compared to the size of the molecules and to the fundamental quantum limit.

CE1-2-MON 11:00

Fluorescence enhancement of MEH-PPV by temperature dependent energy transfer in an inorganic-organic composite system

A.A.R. Neves, A. Camposeo, R. Cingolani, D. Pisignano, National Nanotechnology Laboratory, Lecce, Italy

The nonradiative energy transfer as a function of temperature of a blend of PMMA/MEH-PPV with ZnO is investigated and was found to be well represented by a surface-dipole model.

ROOM 12

10:45 – 12:15

CD1 Session: Applications of solitons

Chair: *Ulf Peschel, University of Erlangen, Germany*

CD1-1-MON 10:45

Non local solitons and filamentation in soft matter

C. Conti, N. Ghofraniha, G. Ruocco, Università La Sapienza, Rome, Italy; S. Trillo, University of Ferrara and Università La Sapienza, Rome, Italy

The propagation of non-paraxial self-trapped beams and modulational instability are theoretically investigated in a structured complex soft-material, as fractal colloidal aggregates.

CD1-2-MON 11:00

Enhanced stability of nonlocal solitons in saturable focusing media

S. Skupin, Département de Physique Théorique et Appliquée, CEA/DIF, Paris, France; W.Z. Krolikowski, Australian National University, Canberra, Australia; M. Saffman, University of Wisconsin, Madison, USA; O. Bang, Technical University Denmark, Lyngby, Denmark

We show theoretically that optical media with the nonlinear response characterized by the combined action of nonlocality and nonlinear saturation, such as hot atomic vapors, support existence of stable high-order spatial solitons.

ROOM 13a

10:45 – 12:15

CA1 session: Yb-doped basers and amplifiers

Chair: *Andy Clarkson, University of Southampton, United Kingdom*

CA1-1-MON (Invited) 10:45

Thin disk lasers

A. Giesen, University of Stuttgart, Germany

The latest status of the thin disk laser results will be discussed including cw and pulsed operation.

ROOM 13b

10:45 – 12:15

CB1 Session: Vertical external cavity surface emitting lasers

Chair: *Wolfang Stolz, Philipps-University Marburg, Germany*

CB1-1-MON 10:45

Microchip vertical-external cavity surface emitting laser using a concave-shaped diamond micromirror

N. Laurand, C.L. Lee, E. Gu, S. Calvez, M.D. Dawson, S. Giet, J.E. Hastie, University of Strathclyde, Glasgow, United Kingdom; S. Suomalainen, M. Guina, M. Pessa, O. Okhotnikov, Tampere University of Technology, ORC, Tampere, Finland

This paper reports the operation of a 1050-nm microchip VECSEL, which uses a concave-shaped diamond acting both as the heatspreader and the output mirror. Full description and characterisation of the device are reported.

CB1-2-MON 11:00

High power optically In-well pumped 850nm VECSEL

W. Zhang, T. Ackemann, E. Riis, A.I. Ferguson, University of Strathclyde, Glasgow, United Kingdom

A significant improvement of high-power (> 1W) vertical-external-cavity surface-emitting lasers is demonstrated by using optical pumping directly into quantum-well states. The emission properties are characterized.

ROOM 14a

10:45 – 12:15

CF1 Session: Femtosecond filamentation

Chair: *Günter Steinmeyer, Max-Born Institute, Berlin, Germany*

CF1-1-MON 10:45

Spatio-temporally induced pulse self-compression in a white-light filament

S. Skupin, L. Bergé, CEA/DAM Ile de France, Bruyères-le-Châtel, France; G. Stibenz, T. Sokollik, M. Schnürer, N. Zhavoronkov, G. Steinmeyer, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Berlin, Germany; F. Lederer, Friedrich-Schiller-Universität, Jena, Germany

Self-compression in white-light filaments offers a remarkably simple way for generation of multi-mJ pulses with sub-10-fs duration. We show that both spatial and temporal dynamics are important for the compression mechanism.

CF1-2-MON 11:00

Tunable ultrashort laser pulses generated through filamentation in gases

A. Becker, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany; F. Théberge, W. Liu, S.L. Chin, Université Laval, Québec, Canada; N. Aközbek, Time Domain Corporation, Huntsville, Alabama, USA

Tunable and ultrashort laser pulses in the visible spectrum are generated with high efficiency by four-wave mixing process during the filamentation of near-infrared and infrared laser pulses in gases.

ROOM 14b

10:45 – 12:15

CK1 Session: Negative index materials

Chair: *Nikolay Zheludev, University of Southampton, United Kingdom*

CK1-1-MON (Tutorial) 10:45

Negative index materials

C.M. Soukoulis, Iowa State University, Ames, USA and FORTH, Heraklion, Crete, Greece

I will review and present the most recent advances of the field of negative index materials. Results on engineered microstructures designed to have both and negative, at THz and optical frequencies, will be presented.

NOTES

MONDAY / ORAL

ROOM 2

IG1-3-MON 11:15

Reduced dynamical equations for solid-state lasers and VCSELs

G.-L. Oppo, F. Papoff, University of Strathclyde, Glasgow, United Kingdom; F. Prati, Univ. dell' Insubria, Como, Italy; G. de Valcarcel, Universitat de Valencia, Burjassot, Spain

Novel reduced equations describing the dynamics of broad-area solid-state lasers and VCSELs with separable time scales are obtained. Excellent agreement with full models and gain factors up to 400 in CPU time are demonstrated.

IG1-4-MON 11:30

Effects of the radiative recombination of carriers on the properties of a cavity soliton laser

K. Aghdami, R. Kheradmand, H. Tajalli, University of Tabriz, Iran; G. Tissoni, P. Caccia, F. Prati, L.A. Lugiato, Università dell'Insubria, Como, Italy

Including carriers' radiative recombination in the equations of a VCSEL with saturable absorber we show that the device can work as a cavity soliton laser under a realistic choice of the parameters.

IG1-5-MON 11:45

Incoherent switching of Cavity Solitons in a vertical-cavity semiconductor optical amplifier: experimental observations and physical mechanisms

S. Barbay, R. Kuszelewicz, T. Elsass, X. Hachair, Y. Ménesguen, I. Sagnes, Lab. de Photonique et de Nanostructures-CNRS, Marcoussis, France

We show experimentally the incoherent writing and erasure of Cavity Solitons in an optically-pumped vertical-cavity semiconductor optical amplifier, discuss the physical mechanisms involved, including local heating effects, and show numerical simulations.

ROOM 3

IF1-3-MON 11:15

Remote preparation of an atomic quantum memory

W. Rosenfeld, S. Berner, J. Volz, M. Weber, University of Munich, Germany; H. Weinfurter, University of Munich and Max-Planck Institut für Quantenoptik, Garching, Germany

We apply quantum teleportation protocol to a single trapped Rb atom entangled with a single photon. Here we imprint arbitrary quantum states on the photon which are then transferred to the distant atomic qubit.

IF1-4-MON 11:30

Toward memory-insensitive quantum repeaters with dual species matter qubits

S.D. Jenkins [1], O.A. Collins, S.-Y. Lan, C.J. Campbell, R. Zhao, H.-H. Jen, A. Kuzmich, T.A.B. Kennedy, T. Chanelière[2], D.N. Matsukevich [3], Georgia Institute of Technology, Atlanta, Georgia, USA; [1] and Univ. dell'Insubria, Como, Italy; [2] and Lab. A. Cotton, Orsay, France; [3] and Univ. of Michigan, Ann Arbor, Michigan

We propose and demonstrate an atomic qubit based on a cold rubidium isotopic mixture, entangled with a frequency-encoded optical qubit. We discuss the use of such matter qubits in memory-insensitive multiplexed quantum repeaters.

IF1-5-MON (Invited) 11:45

Quantum teleportation between light and matter

E. Polzik, Niels Bohr Institute, Copenhagen, Denmark

Teleportation between light and matter, which respectively represent flying and stationary media, is demonstrated. A quantum state of a few-photon pulse is teleported onto a macroscopic object - an atomic ensemble containing billions of caesium atoms.

ROOM 11

CE1-3-MON 11:15

Optical waveguides in the highly nonlinear optical organic crystal DAST by ion implantation and e-beam structuring

L. Mutter, M. Köchlin, A. Guarino, M. Zgonik, M. Jazbinsek, P. Günter, ETH Zurich, Switzerland

The results of two different waveguide structuring techniques: ion implantation for the production of planar optical waveguides and direct e-beam patterning of channel waveguides in the nonlinear optical organic crystal DAST are presented.

CE1-4-MON 11:30

Surface-Enhanced Raman Spectroscopy using silver impregnated polycarbonate substrates

L. Lagonigro, A.C. Peacock, P.J.A. Sazio, Optoelectronics Research Centre, Southampton, United Kingdom; T. Hasell, P.D. Brown, S.M. Howdle, University of Nottingham, United Kingdom

We report the fabrication of silver impregnated polycarbonate films for surface enhanced Raman spectroscopy. The structural and plasmonic properties of the nanoparticle composites are investigated, demonstrating robust, flexible and inexpensive SERS substrates.

CE1-5-MON 11:45

Photochromic damage in nonlinear crystals for high-peak power blue light generation

V. Pasiskevicius, J. Hirohashi, F. Laurell, Royal Institute of Technology, Stockholm, Sweden; N. Saito, S. Wada, RIKEN, Saitama, Japan; M. Kato, MegaOpto Co., Ltd., Saitama, Japan

Susceptibility to high-peak power blue-light induced infrared absorption is investigated in periodically poled and birefringence phase-matched nonlinear crystals most promising for blue-light generation. Physical meachnisms resposible for the photochromic damage are discussed.

ROOM 12

CD1-3-MON 11:15

Refraction and total internal reflection of nematicons at a voltage controlled dielectric interface

M. Peccianti, G. Assanto, University Roma Tre, Rome, Italy; A. Dyadyusha, M. Kaczmarek, University of Southampton, United Kingdom

We report refraction and total internal reflection of spatial solitons in nematic liquid crystals at the interface between two dielectric regions, being both refractive index and nonlinearity tunable by external voltages.

CD1-4-MON 11:30

Gradient-induced position trapping and guiding of solitary structures in an LCLV single feedback experiment

C. Cleff, B. Gütlich, C. Denz, Westfälische Wilhelms-Universität, Munich, Germany

We report on the incoherent external amplitude control of stationary and drifting solitary structures. We demonstrate the possibility to lateraly position stationary solitary structures in arbitrary geometries and the guiding of drifting solitary structures.

CD1-5-MON 11:45

Soliton compression in short lengths of microstructured fibres

P. Horak, M.L.V. Tse, F. Poletti, D.J. Richardson, University of Southampton, United Kingdom

We investigate the compression of femtosecond solitons in microstructured fibres with decreasing dispersion and effective mode area. Significant compression can be achieved over few metres of fibre in both the adiabatic and the nonadiabatic regimes.

ROOM 13a

CA1-2-MON 11:15

Continuous-wave and mode-locked laser operation of segmented grown $Yb:KY(WO_4)_2/KY(WO_4)_2$

S. Rivier, V. Petrov, U. Griebner, Max-Born-Institute, Berlin, Germany; A. Gross, S. Vernay, V. Wesemann, D. Rytz, FEE GmbH, Idar-Oberstein, Germany

Highly efficient continuous-wave laser operation and pulses as short as 99 fs in the mode-locked regime were demonstrated with a segmented grown 200-micron-thick Yb:KYW segment on undoped KYW.

CA1-3-MON 11:30

Frequency-doubled picosecond regenerative Yb:YAG thin disk amplifier

C. Stolzenburg, A. Giesen, University of Stuttgart, Germany

We report on a picosecond regenerative Yb:YAG amplifier with repetition rates up to 200 kHz and nearly diffraction limited beam quality. Using extracavity frequency conversion 28.5 W of average power at 515 nm is demonstrated.

CA1-4-MON 11:45

Diode-pumped Yb-doped fluoride lasers widely tunable around 1.03 µm

G. Galzerano, N. Coluccelli, P. Laporta, Politecnico di Milano, Italy; L. Bonelli, A. Toncelli, A. Di Lieto, M. Tonelli, Università di Pisa, Italy

We report on widely tunable laser emission from 1.02 to 1.07 micron in diode-pumped $Yb:KYF_4$ and $Yb:LiYF_4$ crystals. A comparative analysis on the laser performance and spectroscopic properties of the active crystals is presented.

ROOM 13b

CB1-3-MON 11:15

High-power RT CW operation of an OP-VECSEL at 1.56 µm with hybrid metallic-metamorphic mirrors

J.P. Tourrenc, S. Bouchoule, A. Khadour, A. Miard, J.C. Harmand, J.L. Oudar, LPN-CNRS, Marcoussis, France; J. Decobert, Alcatel-Thales III-V Lab, Marcoussis, France

We demonstrate room-temperature continuous-wave operation of an optically-pumped vertical-external-cavity surface-emitting laser including hybrid metallic-metamorphic mirror with 27mW single transverse-mode output power and 80mW total power at 1.56µm.

CB1-4-MON 11:30

Dynamic behavior of 1050nm semiconductor disk lasers on a nanosecond to microsecond time scale

W. Diehl, OSRAM Opto Semiconductors, Regensburg and Philipps-Universität Marburg, Germany; I. Pietzonka, P. Brick, M. Furitsch, S. Illek, J. Luft, OSRAM Opto Semiconductors, Regensburg, Germany; S. Chatterjee, S. Horst, K. Hantke, W. Stolz, S. W. Koch, A. Thränhardt, W.W. Rühle, Philipps-University Marburg, Germany

We report on the lasing and photoluminescence dynamics of 1050nm semiconductor disk lasers using well and barrier pumping. Spectral and temporal features are explained using a rate equation model including microscopic gain and luminescence.

CB1-5-MON (Invited) 11:45

High-power, high-brightness, tunable GaSb-based VECSEL at 2.3 µm

M. Rattunde, N. Schulz, C. Ritzenthaler, B. Rösener, C. Manz, K. Köhler, J. Wagner, Fraunhofer IAF, Freiburg, Germany; D. Burns, J.-M. Hopkins, A.J. Kemp, A.J. Maclean, M.D. Dawson, Institute of Photonics, Glasgow, United Kingdom

We will present an overview of our results on high-brightness GaSb-based VECSELs emitting in the 2.0-2.4µm wavelength range. Output powers exceeding 1W CW at 10C heatsink temperature and a single mode tuning range of over 70nm were achieved.

ROOM 14a

CF1-3-MON 11:15

Spatio-spectral-shaping for pulse compression via sequential filamentation

L.T. Vuong, A.L. Gaeta, M.A. Foster, Cornell University, Ithaca, USA; R.B. Lopez-Martens, C.P. Hauri, ENSTA-CNRS-École Polytechnique, Palaiseau, France; T. Ruchon, A. L'Huillier, Lund University, Sweden

We demonstrate theoretically and experimentally the spatial and spectral reshaping that occurs via sequential filamentation which leads to optimal compression of high-energy pulses in gases.

CF1-4-MON 11:30

Filament seeded high-energy IR parametric source with self stabilization of carrier-envelope phase

C. Vozzi, F. Calegari, E. Benedetti, S. Gasilov, G. Sansone, G. Cerullo, S. De Silvestri, M. Nisoli, S. Stagira, INFM - CNR Politecnico di Milano, Italy

We obtain passively carrier-envelope-phase stabilized pulses at 1.5 micron by difference-frequency generation driven by supercontinuum filament. The broadband IR pulses are amplified up to 15-microJ energy by optical parametric amplification.

CF1-5-MON 11:45

Intense deep-ultraviolet 10-fs pulses generated through filamentation in gases

T. Fuji, T. Horio, T. Suzuki, RIKEN, Chemical Dynamics Laboratory, Saitama, Japan

Generation of intense and broadband deep-ultraviolet pulses by four-wave mixing through filamentation in neon gas is demonstrated. The pulses are successfully compressed down to 13 fs by a grating-based compressor.

ROOM 14b

CK1-2-MON 11:45

Broadband super-resolving lens with high transparency in the visible range

G. D'Aguanno, M.J. Bloemer, N. Mattiucci, M. Scalora, N. Akozbek, Department of the Army, Charles M. Bowden Facility, Redstone Arsenal, USA

We analyze a super-resolving lens based on one-dimensional metallo-dielectric photonic crystals composed of Ag/GaP multilayers. The lens maintains a normal incidence transmittance of ~50% for propagating waves over the super-resolving wavelength range of 500-650 nm.

NOTES

MONDAY / ORAL

ROOM 1

14:00 – 15:30

JSIII1 Session: Optical frequency comb generation

Chair: *Thomas Udem, Max Planck Institute for Quantum Optics, Garching, Germany*

JSIII1-1-MON 14:00

Lasers, clocks and combs

J.L. Hall, JILA, University of Colorado and NIST, Boulder, USA

On the origin and success of optical precision frequency measurements. The symposium on frequency combs will be opened with scientific and personal reminiscences.

ROOM 2

IG1-6-MON 12:00

Controlling position and motion of cavity solitons

F. Pedaci, M. Giudici, S. Barland, P. Genevet, J.R. Tredicce, Institut Non Linéaire de Nice, Valbonne, France

We show experimentally that cavity solitons can be controlled by means of parameter gradients. Using this control, we take advantage of the sensitivity of localized structures to inhomogenities to probe the host medium.

ROOM 11

CE1-6-MON 12:00

High-quality organic electro-optic single crystalline thin films for integrated optics based on configurationally locked polyene

O.P. Kwon, M. Jazbinsek, S.J. Kwon, H. Figi, A. Choubey, L. Mutter, P. Günter, ETH Zurich, Switzerland

We present crystal-engineering approaches for newly developed configurationally locked polyene nonlinear optical crystals for integrated optics. We produced thin-film electro-optic single crystals with sharp and flat edges, area of up to $5x3mm^2$, and 0.2-5-micron thickness.

ROOM 12

CD1-6-MON 12:00

Supercontinuum spatial gap solitons

A.A. Sukhorukov, D.N. Neshev, R. Fischer, S. Ha, W. Krolikowski, Yu.S. Kivshar, Australian National University, Canberra, Australia; A. Dreischuh, Sofia University, Sofia, Bulgaria and Australian National University, Canberra, Australia; J. Bolger, B.J. Eggleton, University of Sydney, Australia; A. Mitchell, M.W. Austin, L. Bui, RMIT University, Melbourne, Australia

We predict theoretically and observe experimentally simultaneous spatio-spectral localization and formation of supercontinuum gap solitons in an optical waveguide array, demonstrating new possibilities for tunable reshaping of supercontinuum light in nonlinear periodic photonic structures.

14:00 – 15:30

CD2 Session: Photon phonon interaction

Chair: *Luc Thevenaz, Swiss Federal Institute of Technology, Lausanne, Switzerland*

CD2-1-MON 14:00

Modes with kHz scale spacing in raman fibre lasers with ultra-long cavity

V. Karalekas, S.K. Turitsyn, J.D. Ania-Castanon, P. Harper, V.K. Mezentsev, Aston University, Birmingham, United Kingdom; S.A. Babin, E.V. Podivilov, Institute of Automation and Electrometry, Novosibirsk, Russia

We present the first experimental demonstration of resolvable mode structure in the radio-frequency spectra of ultra-long Raman fibre lasers (up to 84km) and the linear increase of the peak widths with growing intracavity power.

ROOM 13a

CA1-5-MON 12:00

Ytterbium-based regenerative amplification at 1053 nm

J. Wemans, G. Figueira, N. Lopes, L. Cardoso, Instituto Superior Tecnico, Lisbon, Portugal; M. Siebold, J. Hein, Friedrich-Schiller-University, Jena, Germany; F. Diaz, Universitat Rovira i Virgili, Tarragona, Spain

We evaluate diode pumped ytterbium-doped regenerative amplifiers as alternative pre-amplifiers for Nd:glass systems. Pump modeling and testing of Yb:KYW, Yb:glass and $Yb:CaF_2$ allowed for suitable 1053 nm operation.

14:00 – 15:30

CA2 Session: Femtosecond laser sources

Chair: Patrick Georges, Institut d'Optique, Palaiseau, France

CA2-1-MON 14:00

70-fs Yb:Glass-Yb:KGW laser with high average power

I. Manek-Hönninger, CELIA-PALA, Université Bordeaux I, Talence, France; M. Delaigue, CELIA-PALA, Université Bordeaux I, Talence and Amplitude Systèmes, Pessac, France.

We report a broadband mode-locked diode-pumped femtosecond laser using two different ytterbium-doped materials in the same cavity. Up to 440 mW average output power and pulse durations down to 70 fs are demonstrated.

ROOM 13b

ROOM 14a

ROOM 14b

ROOM B11

NOTES

ROOM 14a

CF1-6-MON 12:00

Organizing and characterizing multiple femtosecond filaments

C.P. Hauri, A. Trisorio, G. Mourou, Laboratoire d'Optique Appliquée, Palaiseau, France

Multiple femtosecond filamentation (MF) are spatially organized by polarization control. Spatiotemporal characterization demonstrates a stable multi-filament pattern and compression to ultrashort pulses in individual co-propagating filaments.

ROOM 14b

CK1-3-MON 12:00

Surface plasmon resonance effects in the magneto optical activity of noble metal-ferromagnet ultrathin films

J.B. González-Díaz, A. García-Martín, G. Armelles, J.M. Garcia-Martin, C. Clavero, Instituto de Microelectronica de Madrid, CSIC, Tres Cantos, Spain; A. Cebollada, Instituto de Microelectronica de Madrid, CSIC, Tres Cantos, Spain and University of Michigan, Ann Arbor, USA; R. Clarke, D. Kumah, University of Michigan, Ann Arbor, USA; R.A. Lukaszew, J. Skuza, University of Toledo, USA

We present a combined experimental and theoretical study elucidating the role of surface plasmon resonances in the enhancement of magneto optical activity. A comprehensive structural, magnetic and magneto-optical characterization of the different layers is provided.

ROOM 13b

14:00 – 15:30

CB2 Session: Nonlinear dynamics

Chair: *Cristina Masoller, Universitat Poltècnica de Catalunya, Terrassa, Spain*

CB2-1-MON 14:00

Bifurcation and nonlinear dynamics accompanying polarization switching in a VCSEL subject to orthogonal optical injection

I. Gatare, Supélec-LMOPS CNRS-UMR 7132, Metz, France and Vrije Universiteit Brussel, Brussels, Belgium; K. Panajotov, Vrije Universiteit Brussel, Brussels, Belgium; M. Sciamanna, Supélec-LMOPS CNRS-UMR 7132, Metz, France; M. Nizette, Université Libre de Bruxelles, Brussels, Belgium

We analyze the interplay between polarization switching and nonlinear dynamics in a vertical-cavity surface emitting laser subject to orthogonal optical injection. Particularly, the contribution of a new Hopf bifurcation to the switching mechanism is investigated.

ROOM 14a

14:00 – 15:30

CF2 Session: Parametric processes and supercontinuum generation

Chair: *Derryck Reid, Heriot-Watts University, Edinburgh, United Kingdom*

CF2-1-MON 14:00

Tunable pulses from below 300 to 950 nm with durations down to 12 fs from a 2 MHz Yb-doped fiber system

C. Schriever, E. Riedle, S. Lochbrunner, P. Krok, LS für BioMolekulare Optik, Munich, Germany

With a noncollinear optical parametric amplifier pumped by 10µJ pulses at 1035nm we efficiently generate sub 20fs pulses tunable from 600 to 950 nm and demonstrate their frequency conversion into the UV.

ROOM 14b

14:00 – 15:30

CK2 Session: 3D photonic crystals

Chair: Cefe Lopez, Instituto de Ciencia de Materiales, Madrid, Spain

CK2-1-MON (Invited) 14:00

P-Ink: Intelligent color

G.A. Ozin, A.C. Arsenault, D.P. Puzzo, University of Toronto, Ontario, Canada; I. Manners, University of Bristol, United Kingdom

P-Ink has enabled the assembly of a prototype full color photonic crystal display from a single material, in stark contrast to displays that obtain full color by pixel color mixing or color filters.

ROOM B11

14:00 – 15:15

CH1 Session: Bio and environmental sensing technology

Chair: *Andreas Erdmann, Fraunhofer Institute, Erlangen, Germany*

CH1-1-MON 14:00

Optical sensing based on simultaneous ellipsometry, reflectivity and spectrometry profiles in sub-microholes structures for bio-applications

M. Holgado, R. Casquel, C. Molpeceres, M. Morales, J. Ocana, Laser Centre, Universidad Politecnica de Madrid, Spain

We have developed a refractive index sensor consisting of a submicron holes lattice. Simultaneous Reflectivity and Ellipsometry patterns are performed through a submicron spot laser in a single hole. Spectrometry profiles are also accomplished.

ROOM 1

JSIII1-2-MON 14:15

Harmonic-frequency-comb spectroscopy in the mid-infrared and THz regions

F. Keilmann, H. Hans-Georg von Ribbeck, M. Brehm, MPI für Biochemie, Martinsried, Germany; A. Schliesser, MPI für Quantenoptik, Garching, Germany

The high definition of comb frequencies enables a multi-heterodyne detection of each mode's amplitude and phase, and thus a fast spectrometer spanning multi-octave bands. Coherent FTIR and THz frequency-comb spectrometers are combined with near-field microscopy.

JSIII1-3-MON 14:30

Kerr nonlinearity induced optical frequency comb generation in microcavities

P. Del'Haye, A. Schliesser, T. Wilken, R. Holzwarth, T.J. Kippenberg, Max-Planck-Institute for Quantum Optics, Garching, Germany

It is shown that the optical sidebands generated via optical parametric oscillations in a monolithic silica microcavity are equidistant thus overcoming the intrinsic cavity dispersion. This can lead to the generation of optical frequency combs.

JSIII1-4-MON 14:45

Mid-infrared frequency synthesizers: novel precise rulers for molecular spectroscopy

P. Maddaloni, G. Gagliardi, P. Malara, P. De Natale, Consiglio Nazionale delle Ricerche, Pozzuoli (Naples), Italy

An optical frequency synthesizer is demonstrated from 2.9 to 3.5 micron, by difference frequency generation between a fiber-based comb and a continuous-wave laser, providing both an absolute frequency ruler and a novel phase-coherent spectroscopic source.

ROOM 12

CD2-2-MON 14:15

Turbulent spectral broadening in ultra-long raman fibre lasers

S. A. Babin, E.V. Podivilov, Institute of Automation and Electrometry, Novosibirsk, Russia; V. Karalekas, V.K. Mezentsev, P. Harper, S.K. Turitsyn, Aston University, Birmingham, United Kingdom

Intra-cavity power and spectra of ultra-long (up to 84 km) Raman lasers have been measured and simulated. The results demonstrate FWM-induced turbulent-like (involving up to 108 cavity modes) broadening of the spectrum with clear exponential tails.

CD2-3-MON 14:30

Spectral broadening in Raman fiber amplifier pumped by partially coherent wave

G. Ravet, A. A. Fotiadi, P. Mégret, Faculté Polytechnique de Mons, Belgium

Cross phase modulation induced by a partially coherent pump on the signal can cause a drastic spectral broadening in co-propagating Raman fiber amplifiers. First experimental observation and numerical simulation of this phenomenon is reported.

CD2-4-MON 14:45

Threshold for stimulated Brillouin scattering in optical fibres

V.I. Kovalev, Heriot-Watt University, Edinburgh, United Kingdom and Lebedev Physical Institute, Moscow, Russia; R.G. Harrison, Heriot-Watt University, Edinburgh, United Kingdom

The threshold exponential gain is considered thoroughly for noise-initiated stimulated Brillouin scattering. We show that in particular in silica fibres it varies from ~5 to ~25 subject to fibre length, numerical aperture and radiation wavelength.

ROOM 13a

CA2-2-MON 14:15

Versatile high power, high repetition rate Yb femtosecond system

L. Giniunas, R. Danielius, Light Conversion Ltd., Vilnius, Lithuania; J. Pocius, University of Vilnius, Lithuania

We demonstrate a new Yb:KGW based femtosecond CPA system capable of delivering ~170fs pulses with repetition rates up to 350kHz and average output power exceeding 6W. The system was used to pump collinear and non-collinear OPAs.

CA2-3-MON (Invited) 14:30

Tunable CW and Q-switched operation in Yb:CaF_2 and Yb:SrF_2

M. Siebold, J. Hein, R. Bödefeld, M. Hornung, A. Jochmann, C. Wandt, S. Bock, S. Podleska, M. Schnepp, M. Hellwing, M.C. Kaluza, Institute for Optics and Quantum Electronics, Jena, Germany; J. Wemans, Instituto Superior Tecnico, Lisbon, Portugal

60 mJ pulse energy was achieved in a diode-pumped Q-switched Yb:CaF_2-laser with 1 Hz repetition rate. Applying Yb:SrF_2 a tuning range of 73 nm in quasi CW operation was observed.

ROOM 13b

CB2-2-MON 14:15

Synchronization via clustering in a small semiconductor laser network

C.M. González, C. Masoller, M.C. Torrent, J. Garcia-Ojalvo, Universitat Politecnica de Catalunya, Terrassa, Spain

We study experimentally the route to synchronization in three coupled lasers. As coupling increases, a cluster of two synchronized lasers arises, followed by full synchronization of all lasers. A simple model agrees well with observations.

CB2-3-MON (Invited) 14:30

Nonlinear dynamics in semiconductor lasers and VCSELs

J. Ohtsubo, Shizuoka University, Johoku, Hamamatsu, Japan

Nonlinear dynamics in narrow stripe edge-emitting semiconductor lasers and vertical-cavity surface-emitting lasers (VCSELs) are discussed. I focus on the effects of optical feedback and optical injection both for edge-emitting semiconductor lasers and VCSELs.

ROOM 14a

CF2-2-MON 14:15

Parametric amplification and phase management of arbitrarily shaped PCF-supercontinuum

J. Möhring, B. von Vacano, T. Buckup, M. Motzkus, Philipps-Universität Marburg, Germany

Parametric amplification of a photonic crystal fiber supercontinuum source is shown. The combination of SPIDER phase characterization and a pulse shaper enables compression and additional tailoring of the generated femtosecond pulses.

CF2-3-MON 14:30

100 THz bandwidth of optical parametric amplification in the near-IR using bismuth triborate crystals pumped at 800 nm

I. Nikolov, I. Buchvarov, Sofia University, Bulgaria; F. Noack, V. Petrov, P. Tzankov, Max-Born-Institute, Berlin, Germany

Ultrabroadband amplification of white-light continuum in the near-IR (~100 THz, 1.2-2.4 microns) is demonstrated in BiB_3O_6, pumped by 45 fs long pulses at 800 nm, achieving energy of 50 μJ at 1 kHz.

CF2-4-MON 14:45

Microjoule supercontinuum generation by stretched megawatt femtosecond laser pulses in a large-mode-area photonic-crystal fiber

A.M. Zheltikov, A.V. Mitrofanov, A.A. Podshivalov, Moscow State University, Russia; A.A. Ivanov, Moscow State University and Russian Academy of Sciences, Moscow, Russia; M.V. Alfimov, Russian Academy of Sciences, Moscow, Russia

A photonic-crystal fiber with a mode area of 380 μm^2 transforms an amplified prechirped output of a femtosecond Cr: forsterite laser into supercontinuum radiation with a spectrum spanning from 700 to 1800 nm and a total energy of 1.15 μJ.

ROOM 14b

CK2-2-MON 14:30

Electronically tunable photonic crystals

P.S. Ivanov, D.R.E. Snoswell, M.J. Cryan, N. Elsner, J.G. Rarity, B. Vincent, University of Bristol, United Kingdom; C.L. Bower, Kodak European Research, Cambridge, United Kingdom

Electronically tunable diffraction gratings based on 2D arrays of colloidal particles are presented and measured and modelled results show good agreement. Modelled results for 3D arrays show tunable reflectivity is possible the visible wavelength range.

CK2-3-MON 14:45

Tunable, elastic, crack-free photonic crystals and polymer opal templates with pre-determined orientation for defect inscription

W. Wohlleben, S. Altmann, F. Bartels, S. Fischer, R.J. Leyrer, BASF Aktiengesellschaft, Ludwigshafen, Germany; M. Boyle, R. Kiyan, Laserzentrum Hannover e.V., Germany; K. Heggarty, N. Dissaux, GET-ENST Bretagne, Brest, France

We produce robust tunable photonic crystals in a single-step self-assembly of core-shell polymer dispersions. They feature 100% elongation (one optical octave) and crack-freeness. Laser diffraction finds cm-monocrystals also with templates for defect inscription.

ROOM B11

CH1-2-MON 14:15

Laser-based isomer identification in the vapor phase

R. Bartlome, M. W. Sigrist, ETH Zurich, Switzerland

A continuously tunable laser between 3.2 and 3.6 micrometers and a novel high-temperature multipass cell are used to probe molecules in the vapor phase. This spectrometer enables differentiation between diastereoisomers like Ephedrine and Pseudoephedrine.

CH1-3-MON (Invited) 14:30

Fiber-optic nerve systems for materials that can feel pain

K. Hotate, The University of Tokyo, Japan

Fiber optic nerve systems have been studied to realize structures and materials that can feel pain. We have developed the nerve systems with mm-order spatial resolution or kHz-order measurement speed, using optical correlation domain techniques.

NOTES

MONDAY / ORAL

ROOM 1

JSIII1-5-MON (Invited) 15:00

Frequency comb laser spectroscopy at vacuum-ultraviolet wavelengths and beyond

K.S.E. Eikema, R. Th. Zinkstok, S. Witte, A. Reanault, D. Kandula, A.L. Wolf, W. Hogervorst, W. Ubachs , Laser Center Vrije Universiteit, Amsterdam, Netherlands

High-resolution direct frequency comb spectroscopy with amplified pulses has been demonstrated at 125 nm in xenon. Extension to extreme ultraviolet is discussed for excitation of ground state helium and helium ions.

16:00 – 17:30

JSIII-2 Session: Applications of

ROOM 12

CD2-5-MON (Invited) 15:00

Stimulated Brillouin scattering beam cleanup of a pulsed multimode fiber master-oscillator power-amplifier at 1.55µm

B. Steinhausser, A. Brignon, E. Lallier, J.-P. Huignard, Thales Research and Technology, Palaiseau, France; P. Georges, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France

We present a large core Er:Yb fiber amplifier whose multimode output is converted in a good quality beam through stimulated Brillouin scattering beam cleanup. A single-mode and narrow-linewidth pulse of 110 microjoules energy is obtained.

ROOM 13a

CA2-4-MON 15:00

Energy-scalable mid-infrared femtosecond oscillators: positive vs. negative dispersion regimes

V.L. Kalashnikov, E. Sorokin, I.T. Sorokina, Technical University, Vienna, Austria

Energy-scaling of mid-IR femtosecond Cr^{2+}-oscillators is being analyzed in negative and positive dispersion regimes. The latter is shown to pave the way towards microjoule energy level and to be advantageous above 25-50 nJ pulse energies.

CA2-5-MON 15:15

1-µm and 1.3-µm femtosecond lasers mode-locked using quantum-dot-based saturable absorbers

A.A. Lagatsky, F. Bain, C.T.A. Brown, W. Sibbett, University of St Andrews, United Kingdom; D.A. Livshits, NL-Nanosemiconductor, Dortmund, Germany; A.E. Zhukov, V.M. Ustinov, Ioffe Physico-Technical Institute, St Petersburg, Russia; E.U. Rafailov, University of Dundee, United Kingdom

InAs/InGaAs quantum-dot-based saturable absorber mirrors have been used for femtosecond pulse generation in the near-IR. Transform-limited pulses of 114fs and 160fs were generated around 1040nm and 1280nm from Yb:KYW and Cr:forsterite lasers, respectively.

ROOM 13b

CB2-4-MON 15:00

All-optical time-delayed feedback control of semiconductor lasers

S. Schikora, H.-J. Wünsche, F. Henneberger, Humboldt-Universität zu Berlin, Germany

In proof-of-concept experiments, unstable regimes of a multisection laser are noninvasively stabilized by coherent optical feedback from a Fabry-Perot cavity. This approach is well adapted to devices with ultrashort timescales.

CB2-5-MON 15:15

Influence of current noise on delayed feedback dynamics vertical-cavity surface-emitting lasers

T. Berkvens, M.C. Soriano, G. Van der Sande, G. Verschaffelt, J. Danckaert, Vrije Universiteit Brussel, Brussels, Belgium

We investigate the impact of current noise on the delayed feedback dynamics of a single-mode vertical-cavity surface-emitting laser. We find suppression of feedback instabilities and a nontrivial interplay between the two external perturbations.

ROOM 14a

CF2-5-MON (Invited) 15:00

Generation of terawatt sub-8 fs laser pulses using noncollinear optical parametric chirped pulse amplification

A. Renault, D. Kandula, S. Witte, R.Th. Zinkstok, A.L. Wolf, W. Hogervorst, W. Ubachs, K.S.E. Eikema, Laser Centre Vrije Universiteit, Amsterdam, Netherlands

Generation of 2 TW few-cycle laser pulses (7.6 fs) is demonstrated using parametric chirped pulse amplification at a 30 Hz repetition rate. Aspects such as fluorescence, pulse contrast, phase stability, and applications are discussed.

ROOM 14b

CK2-4-MON 15:00

Spectral redistribution in spontaneous emission from quantum dot infiltrated three-dimensional photonic crystals

J. Li, B. Jia, C. Bullen, J. Serbin, G. Zhou, M. Gu, Swinburne University of Technology, Melbourne, Australia

We infiltrated PbSe quantum dots into three-dimensional photonic crystals with a simple method. Band gaps of photonic crystals were tuned and spectral redistribution in spontaneous emission from quantum dots inside the photonic crystal was investigated.

CK2-5-MON 15:15

Formation of high index three-dimensional inverse woodpile photonic crystals by single infiltration

B. Jia, S. Wu, J. Li, M. Gu, Swinburne University of Technology, Melbourne, Australia

We demonstrate a novel method to achieve high index inverse three-dimensional photonic crystals formed by a simple sol-gel process, which involves a single step infiltration of the TiO2 precursor into polymeric templates generated by two-photon polymerization.

ROOM B11

CH1-4-MON 15:00

Mid-IR laser-spectroscopic determination of isotope ratios at trace levels

H. Waechter, M.W. Sigrist, ETH Zurich, Switzerland

A high-precision mid-IR laser-spectrometer based on difference frequency generation is presented for determination of isotope ratios of N_2O, CO and CO_2 at concentrations in the ppm-range with a precision of a few per mille.

NOTES

MONDAY / ORAL

ROOM 1

optical frequency combs

***Chair:** Lijun Wang, Max-Planck Research Group, Erlangen, Germany*

JSIII2-1-MON 16:00

Frequency comparisons of optical frequency standards and new results on a long-distance carrier-phase optical fiber link

H. Schnatz, G. Grosche, B. Lipphardt, T. Nazarova, E. Peik, U. Sterr, Chr. Tamm, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; G. Santarelli, LNE-SYRTE, Paris, France

The transmission of frequency information via fibre optic telecommunication networks offers an attractive option for long distance frequency comparisons, as required to com-pare optical clocks at different locations. Our concept is based on using a femtosecond frequency comb to convert the output of an optical frequency standard to an ultra-stable optical frequency in the telecom band at 200 THz, which is then transmitted through an optical fibre network. With relative uncertainty around 10^{-17} or better, both the conversion process and the transmission through a long-distance fibre link outperform most available clocks.

JSIII2-2-MON 16:15

Precision measurement of the refractive indices of air and carbon dioxide using frequency comb

J. Zhang, Z.H. Lu, L.J. Wang, Max-Planck Research Group, Erlangen, Germany

We report high precision refractive index measurement of air and CO^2 using a Michelson interferometer setup with frequency combs as the light source. Our experiment has a sensitivity of $9.6x10^{-9}$.

JSIII2-3-MON (Invited) 16:30

Spectral line-by-line pulse shaping

ROOM 12

16:00 – 17:30

CD3 session: Optical parametric devices

***Chair:** Peter Smith, University of Southampton, United Kingdom*

CD3-1-MON 16:00

High-energy noncollinear optical parametric amplifier in the visible

D. Polli, C. Manzoni, G. Cerullo, Politecnico di Milano, Italy; M. Mero, J. Zheng, P. Tzankov, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

Scaling of the pulse energy of a white-light-continuum-seeded two-stage noncollinear optical parametric amplifier to the 500 µJ level is demonstrated. Sub-25-fs pulses tunable between 520 and 650 nm were generated at 1 kHz.

CD3-2-MON 16:15

Near-IR femtosecond optical parametric amplifier at 1 MHz seeded by parametrically generated light

M. Marangoni, R. Osellame, R. Ramponi, G. Cerullo, Politecnico di Milano, Italy; U. Morgner, Leibniz University, Hannover, Germany

An optical parametric amplifier at 1 MHz repetition rate delivering 190 nJ, 220 fs pulses tunable in the 1.3-1.6 micron range is realized starting from an Yb: KYW cavity-dumped oscillator.

ROOM 13a

16:00 – 17:30

CA3 Session: High-power laser systems

***Chair:** Thomas Graf, Stuttgart University, Germany*

CA3-1-MON 16:00

High-pulse-energy, rep.-rated diode-pumped slab laser technology: scalable architecture, thermal management, and wavefront correction

T. Kurita, T. Sekine, R. Yasuhara, T. Ikegawa, T. Kawashima, O. Matsumoto, M. Miyamoto, H. Kan, Hamamatsu Photonics K.K., Shizuoka, Japan; H. Yoshida, J. Kawanaka, M. Nakatsuka, Y. Izawa, Osaka University, Japan; T. Kanabe, University of Fukui, Japan

21-J output energy of 8.9-ns pulse with 213-W average power was demonstrated from a scalable diode-pumped slab laser with the technology of thermally-edge-management and wavefront correction. A SBS phase conjugator exhibited the diffraction-limited beam quality.

CA3-2-MON 16:15

Power scalability as a precise concept for the evaluation of laser architectures

R. Paschotta, RP Photonics Consulting GmbH, Zurich, Switzerland

This paper introduces power scalability as a precisely defined concept, and demonstrates that this creates important insight particularly concerning the potential of architectures and isolated measures to be implemented at very high power levels.

ROOM 13b

16:00 – 17:30

CB3 Session: Microcavity and ring lasers

***Chair:** Guido Giuliani, Università di Pavia, Italy*

CB3-1-MON 16:00

Noise properties of semiconductor ring lasers

A. Pérez S., A. Scirè, P. Colet, R. Zambrini, IMEDEA, Palma de Mallorca, Spain

Semiconductor Ring Lasers show bidirectional static emission, alternate oscillations (AOs), and bistability, with correspondent noise properties. Which we have theoretically investigated enlightening the interplay of AOs, Relaxation Oscillations, quantum fluctuations and squeezing effects.

CB3-2-MON 16:15

The effect of delayed optical feedback on semiconductor ring lasers

G. Van der Sande, J. Danckaert, Vrije Universiteit Brussel, Brussels, Belgium; A. Scirè, Universitat de les Illes Balears, Palma de Mallorca, Spain

We theoretically analyze the influence of double time-delayed optical feedback on the emergence of unidirectional solutions in a two-mode model for a semiconductor ring laser. Both symmetric and asymmetric bidirectional feedbacks are investigated.

ROOM 14a

16:00 – 17:30

CF3 Session: Mode-locked oscillators

***Chair:** Uwe Morgner, Laserzentrum Hannover, Germany*

CF3-1-MON (Invited) 16:00

Octave spanning 1GHz Ti:sapphire oscillator for HeNe CH4-based frequency combs and clocks

A. Benedick, R. Ell, J. Birge, O.D. Mücke, F.X. Kärtner, M. Sander, Massachusetts Institute of Technology, Cambridge, USA

An octave spanning 1GHz Ti:Sapphire laser is demonstrated that generates simultaneously f-2f beatnotes with >55dB SNR and difference frequency radiation at 3.39µm for locking to a methane stabilized HeNe laser with a 30dB SNR beatnote.

ROOM 14b

16:00 – 17:30

CK3 Session: Photonic nanostructures and devices

Chair: Gerd Leuchs, University of Erlangen-Nuremberg, Germany

CK3-1-MON (Invited) 16:00

Monolithic integrated Raman silicon lasers and amplifiers

H. Rong, S. Xu, Y.-H. Kuo, V. Sih, M. Paniccia, Intel Corporation, Santa Clara, CA, USA; O. Cohen, O. Raday, Intel Corporation, Jerusalem, Israel

We present an efficient ring resonator Raman silicon laser and amplifier based on a silicon-on-insulator p-i-n rib waveguide, which allows for on-chip integration with other silicon photonics components to provide a monolithic integrated photonic device.

ROOM B11

16:00 – 17:15

CH2 Session: Photonic sensor technologies and applications

Chair: Luc Thevenaz, Swiss Federal Institute of Technology, Lausanne, Switzerland

CH2-1-MON (Invited) 16:00

New technologies in fiber sensors

M. Digonnet, Stanford University, USA

This presentation will discuss a few important technologies that have recently emerged in the context of fiber sensors, including Bragg and photonic-bandgap fibers, micro-machined fiber tips, photonic crystals, and the potentials of slow light.

NOTES

MONDAY / ORAL

ROOM 1

A.M. Weiner, Z. Jiang, D.E. Leaird, C.-B. Huang, J. Caraquitena, Purdue University, West Lafayette, IN, USA

We discuss experiments in which pulse shapers resolve and address individual lines in a frequency comb. Included are examples of waveforms, data demonstrating sensitivity to comb offset frequency, and requirements for high fidelity waveform generation.

JSIII2-4-MON 17:00

Referencing mid-IR radiation to an optical frequency comb

D. Mazzotti, P. Cancio, G. Giusfredi, P. De Natale, Istituto Nazionale di Ottica Applicata - C.N.R., Firenze FI and European Laboratory for Nonlinear Spectroscopy, Sesto Fiorentino, Italy; S. Borri, I. Galli, Universita di Firenze, Sesto Fiorentino, Italy; S. Bartalini, Istituto Nazionale di Ottica Applicata – C.N.R., Firenze FI, Italy

Different configurations for precision molecular spectroscopy in the mid-IR spectral region have been implemented. The key component is a Cs-traceable optical frequency comb that also guarantees high detection sensitivity. The latest results will be shown.

JSIII2-5-MON 17:15

Direct carrier-envelope phase

ROOM 12

CD3-3-MON 16:30

Fine frequency tuning and micro-laser pumping

A. Berrou, A. Godard, E. Rosencher, M. Lefebvre, Office National d'Etudes et de Recherches Aérospatiales, Palaiseau, France

Mid-infrared entangled cavity doubly resonant optical parametric oscillator is a powerful device for high resolution spectroscopy. Recent developments are reported here: micro-laser pumping and fully automatic fine frequency tuning.

CD3-4-MON 16:45

Spectral bandwidth enhancement and pulse compression in a nanosecond monolithic optical parametric oscillator using chirped quasi-phase-matching

K.A. Tillman, D.T. Reid, Heriot-Watt University, Edinburgh, United Kingdom

A monolithic, Q-switched, nanosecond MgO:PPLN OPO is reported at 1.55µm. Chirped gratings enable a signal spectral bandwidth up to 20nm, and sonogram traces indicate the effect of crystal chirp on the temporal and spectral performance.

CD3-5-MON 17:00

High-power, single-frequency, continuous-wave/ optical parametric oscillator based on MgO:sPPLT

G.K. Samanta, M. Ebrahim-Zadeh, G.R. Fayaz, Z. Sun, ICFO-The Institute of Photonic Sciences, Castelldefels, Barcelona, Spain

A high-power, continuous-wave, singly-resonant optical parametric oscillator based on MgO:sPPLT pumped in the green at 532 nm is described. Single-frequency idler powers of up to 1.4 W and continuous tuning across 848-1430 nm are demonstrated.

ROOM 13a

CA3-3-MON (Invited) 16:30

High power, tunable microchip lasers

T. Taira, Institute for Molecular Science, Okazaki, Japan

Widely tunable microchip laser system has been demonstrated by the recent progress in micro solid-state photonics with efficient nonlinear wavelength conversion owing to its extremely high brightness-temperature. Fruitful giant micro photonics should be expected.

CA3-4-MON 17:00

Compact high-power, pulsed, single-frequency MOPA laser system with 20 W average output power

M. Frede, D. Kracht, B. Schulz, Laser Zentrum Hannover, Germany; P. Burdack, M. Hunnekuhl, I. Freitag, InnoLight GmbH, Hannover, Germany

We present a compact and reliable MOPA laser system with a small laser line width and an average output power of 20 W. The system is based on a passively q-switched, monolithic single-frequency master oscillator (NPRO) and a four stage Nd:YVO4 power amplifier.

ROOM 13b

CB3-3-MON 16:30

Vertically coupled microring laser devices based on InP using BCB waferbonding

M. Hamacher, U. Troppenz, H. Heidrich, Heinrich-Hertz-Institute, Berlin, Germany; V. Dragoi, EV Group, E. Thallner GmbH, Schaerding, Austria

Processing and first operation of active ring resonators vertically coupled to passive bus waveguides are presented. The integration process and challenges (stress, tolerances) will be discussed. Measurements verify the successful implementation of the integration concept.

CB3-4-MON 16:45

Coherence properties of high-beta semiconductor micropillar lasers

S. Ates, S.M. Ulrich, P. Michler, Stuttgart University, Germany; S. Reitzenstein, A. Forchel, A. Löffler, Würzburg University, Germany

Coherence properties of high-beta micropillar lasers have been investigated by microphotoluminescence, first- and second-order correlation measurements. A strong increase in coherence time of the lasing mode is traced within the transition regime into stimulated emission.

CB3-5-MON (Invited) 17:00

Coupled nanocavity arrays

D. Englund, J. Vuckovic, B. Ellis, Stanford University, USA; H. Altug, Boston University, USA

We will discuss our experimental and theoretical work on coupled photonic crystal nanocavity arrays, and their applications ranging from low-threshold, high speed lasers to nonlinear optical devices.

ROOM 14a

CF3-2-MON 16:30

Passively mode-locked thin disk lasers reach 10 microjoules pulse energy at megahertz repetition rate and drive high field physics experiments

S.V. Marchese, M.S. Ruosch, S. Hashimoto, C.R.E. Baer, R. Grange, M. Golling, T. Südmeyer, U. Keller, ETH Zurich, Switzerland; G. Lépine, G. Gingras, B. Witzel, Université Laval, Québec, Canada

We increased the pulse energy of a thin disk laser to 10 microjoules and show first electron spectroscopy measurements driven by such a laser, demonstrating its suitability for high field experiments at megahertz repetition rates.

CF3-3-MON 16:45

Mode-locking of the Yb:NaY(WO_4)$_2$ laser

S. Rivier, V. Petrov, U. Griebner, X. Mateos, Max-Born-Institute, Berlin, Germany; A. Garcia-Cortes, J. Cano-Torres, M. Serrano, C. Cascales, C. Zaldo, Instituto de Ciencia de Materiales, Madrid, Spain

We demonstrate SESAM mode-locking of the disordered tetragonal crystal Yb:NaY(WO_4)$_2$ using intracavity and extracavity chirp compensation to achieve pulses as short as 53 fs near 1030 nm, with an average power of 91 mW.

CF3-4-MON 17:00

High-energy, high-repetition rate Ti:sapphire chirped pulse oscillators

A.J. Verhoef, A. Fernández, Technical University, Vienna, Austria; F. Krausz, Max-Planck Institute of Quantum Optics and Ludwig Maximilians University, Garching, Germany; A. Apolonski, Ludwig Maximilians University, Garching, Germany

By careful dispersion optimization in a pure Kerr-lens mode-locked Ti:sapphire chirped pulse oscillator we demonstrate 60-nJ pulses at 70-MHz repetition rate. We demonstrate central wavelength tunability of such a system.

ROOM 14b

CK3-2-MON 16:30

Polymer photonic crystal band edge laser fabricated by nanoimprint lithography

V. Reboud, C.M. Sotomayor Torres, P. Lovera, N. Kehagias, G. Redmond, Tyndall National Ins., Cork, Ireland; M. Zelsmann, LTM – CEA, Grenoble, France; M. Fink, F. Reuther, G. Gruetzner, Micro Resist Technology GmbH, Berlin, Germany

We report the demonstration of a low-threshold, edge-emitting polymer distributed feedback laser fabricated by nanoimprint lithography. Our results show advantages of using nanoimprinted polymer photonic crystals for precise, simple tuning of lasing action.

CK3-3-MON 16:45

Enhanced electro-optic tuning in lithium niobate photonic crystals: the role of slow light

M.P. Bernal Artajona, M. Roussey, J. Amet, F.I. Baida, Institut FEMTO-ST, Besançon, France; G.W. Burr, IBM Almaden Research Center, San Jose, USA

Experimental measurements, FDTD simulations, and effective susceptibilities are combined to show that the unexpectedly large electrooptic tunability found in lithium niobate photonic crystals can be quantitatively explained by the field-enhancement associated with slow light.

CK3-4-MON 17:00

Electro-optically tunable microring resonators in LiNbO3 thin films

G. Poberaj, A. Guarino, P. Günter, ETH Zurich, Institute of Quantum Electronics, Zurich, Switzerland

We present the first demonstration of electro-optically tunable microring wavelength filters in submicrometer-thick $LiNbO_3$ films fabricated by crystal ion slicing and wafer bonding techniques. A tunability of 0.14 GHz/V has been measured at 1550 nm.

ROOM B11

CH2-2-MON 16:30

THz grating sensors for investigation of thin dielectric layers

T. Goebel, D. Schoenherr, M. Feiginov, P. Meissner, H.L. Hartnagel, Technical University of Darmstadt, Germany

Dielectric layers sandwiching a thin-film metal grating are studied theoretically. The resonant features of such stuctures are highly sensitive to the permittivity of the dielectric films. This allows the characterization of the attached dielectic material.

CH2-3-MON 16:45

THz sensing of doping concentrations in epitaxial semi-conductors and 2-D electron gases: theory and experiment

D.P. Kelly, J. Darmo, K. Unterrainer, Vienna University of Technology, Vienna, Austria

THz pulses are used to determine the doping concentration in an epitaxial semi-conductor and 2-D electron gas confined at the interface between a GaAs/AlGaAs interface. Theoretical analysis and experimental results are provided.

CH2-4-MON 17:00

All-organic waveguide coupled solid-state distributed feedback laser

M. Punke, T. Woggon, M. Stroisch, M.P. Heinrich, C. Karnutsch, U. Lemmer, University of Karlsruhe, Germany; S. Mozer, Technical University, Braunschweig, Germany; M. Bruendel, Forschungszentrum Kalrsruhe, Germany; D.G. Rabus, University of California, Santa Cruz, USA; T. Weimann, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

The coupling of an organic semiconductor solid-state distributed feedback laser into polymeric waveguides is demonstrated. By combining nanoimprint lithography, deep-UV waveguide patterning and vacuum deposition techniques the fabrication process is optimized regarding wafer-scale production.

NOTES

MONDAY / ORAL

ROOM 1

control for coherent synthesis with a dual-color femtosecond optical parametric oscillator

J.H. Sun, B.J.S. Gale, D. T. Reid, Heriot-Watt University, Edinburgh, United Kingdom

A coherent waveform is synthesized from two co-resonant optical parametric signal pulses with different center wavelengths and independent carrier-envelope phase-slip frequencies. XFROG measurements confirm the synthesized waveform is a train of high-contrast 30 femtosecond pulses.

ROOM 12

CD3-6-MON 17:15

Fast-scanning fibre-amplified diode laser pumped cw OPO for sensitive, multi-component trace gas detection

S.T. Persijn, A.K.Y. Ngai, F.J.M. Harren, Radboud University, Nijmegen, Netherlands; I.D. Lindsay, P. Gross, K.J. Boller, B. Adhimoolam, University of Twente, Enschede, Netherlands

An 800 mW, fast scanning (100 THz/s), continuous wave optical parametric oscillator (3000-4000 nm) pumped by a fibre-amplified diode laser is used for sensitive ($1.5x10^{-8}$ cm^{-1} $Hz^{-1/2}$), multi-component trace gas detection

ROOM 13a

CA3-5-MON 17:15

Passively Q-switched core-doped ceramic Nd:YAG laser with Sm:YAG cladding

R. Huss, R. Wilhelm, J. Neumann, D. Kracht, Laser Zentrum Hannover e.V., Germany

A core-doped ceramic Nd:YAG laser longitudinally pumped by a q-cw laser diode stack is presented. Applying passive Q-switching a pulse energy of 5.9 mJ in 3.9 ns was achieved.

ROOM 14a

CF3-5-MON 17:15

Effect of higher-order dispersions on the chirped-pulse oscillator stability

V.L. Kalashnikov, Technical University, Vienna, Austria; A. Apolonski, Ludwig Maximilians University, Garching, Germany

We found that higher-order dispersions cause irregular pulsations of the chirped-pulse oscillator. The negative fourth-order dispersion improves substantially the oscillator stability and reduces its dependence on the pulse energy.

ROOM 14b

CK3-5-MON 17:15

Highly-directional sources by periodic and non-periodic dielectric rods

J. Sánchez-Dehesa, A. Martínez, M.A. Piqueras, R. García, Polytechnic University of Valencia, Spain; A. Håkansson, International Center for Young Scientist, Tsukuba, Japan

Omnidirectional point sources emit highly-directional radiation by two different mechanisms. The first made use of a photonic crystal designed to posses a small and negative index of refraction. The second made use of inverse design.

NOTES

POSTERS

ICM Foyer 13:00-14:00
CLEO®/Europe Poster Session

CA-1-MON

Diode side-pumped, high efficiency $Nd:YVO_4$ laser and improvement in beam quality

F. A. Camargo, U. Wetter, IPEN/USP, Sao Paulo, Brazil

We demonstrate high efficiency with a side-pumped $Nd:YVO_4$ laser using total internal reflection at grazing incidence and improved beam quality, with a novel laser cavity with joint stability zones.

CA-2-MON

The quantum noise limits to simultaneous intensity and frequency stabilization of solid-state lasers

E.H. Huntington, University of New South Wales, Canberra, Australia; M. Heurs, Max-Planck-Institut für Gravitationphysik, Hannover, Germany; T.C. Ralph University of Queensland, St Lucia, Australia; C.C. Harb, University of New South Wales and Australian National University, Canberra, Australia

We incorporate the coupling between pump intensity and laser frequency noise into a quantum mechanical model for a solid-state laser. A frequency feedback loop can reduce laser intensity noise to below the quantum noise limit.

CA-3-MON

Improved saturation in side pumped rod amplifiers using core doped Nd:YAG ceramic rods

A. Sträßer, M. Ostermeyer, University of Potsdam, Germany

Core doped Nd:YAG ceramic rods are employed in an amplifier setup. SBS-phase conjugating mirrors are applied to compensate phase distortion of rods refractive index step. Brightness enhancement of two is demonstrated compared to crystal rod.

CA-4-MON

Simultaneous dual-wavelength emission on the $^4F_{3/2}$ to $^4I_{9/2}$ and $^4F_{3/2}$ to $^4I_{11/2}$ transitions employing Nd-based thin-disk lasers

N. Pavel, Solid-State Quantum Electronics Laboratory, Bucharest, Romania; K. Lünstedt, K. Petermann, G. Huber, University of Hamburg, Germany

Simultaneous dual-wavelength emission at 0.9-microns and 1.06-microns is demonstrated with Nd-laser materials in thin-disk configuration. Output powers of 1.7-W at 912-nm and 1.6-W at 1063-nm were obtained simultaneously from a 300-microns-thick $Nd:GdVO_4$ crystal disk.

CA-5-MON

Compact, high peak power, diode pumped , Q-switched Tm:YLF laser

J.K. Jabczynski, W. Zendzian, J. Kwiatkowski, Military University of Technology, Warsaw, Poland; H. Jelinkova, M. Nemec, J.K. Sulc, Czech Technical University Prague, Czech Republic

Using acousto-optic modulator the stable Q-switch regime was obtained with Tm:YLF diode pumped laser. Pulses 15-ns long up to 300-kW peak power were generated on 1903-nm wavelength.

CA-6-MON

Highly thermal-shock-resistant operation of diode edge-pumped, composite all-ceramic Yb:YAG microchip lasers

M. Tsunekane, T. Taira, Institute for Molecular Science, Okazaki, Japan

414 W cw output power was obtained from a 3-mm-diameter, Yb-doped ceramic YAG core in diode edge-pumped microchip lasers and the thermal stress is estimated to be twice the tensile stress limit of single-crystal YAG.

CA-7-MON

Enhancing sun-pumped laser performance by a truncated fused silica elliptical pump cavity

L. Liang, R. Pereira, P. Bernardes, New University of Lisbon, Campus de Caparica, Portugal

Solar laser power is significantly enhanced by pumping a 4mm Nd:YAG rod within a truncated fused silica elliptical pump cavity, resulting in the calculated collection efficiency of $10.5W/m^2$ and a nearly symmetrical laser beam profile.

CA-8-MON

2-mJ picosecond Nd:YAG slab laser passively Q-switched and mode-locked using multiple quantum well saturable absorbers

V. Kubecek, H. Jelinkova, Czech Technical University, Prague, Czech Republic; W. Zendzian, J.K. Jabczynski, J. Kwiatkowski, Military University of Technology, Warsaw, Poland; A. Stintz, J.-C. Diels, University of New Mexico, Albuquerque, USA

Operation of Nd:YAG slab laser side pumped by quasi-continuous laser diode passively mode locked using semiconductor saturable absorber is reported. Trains with energy up to 2 mJ and pulse duration of 65 ps were generated.

CA-9-MON

High-power end-pumped lasers with $Yb:GdCa_4O(BO_3)_3$ and $Yb:KGd(WO_4)_2$

J.E. Hellström, V. Pasiskevicius, F. Laurell, KTH - Royal Institute of Technology, Stockholm, Sweden; V. Horvath, Research Institute for Solid State Physics and Optics, Budapest, Hungary; B. Denker, B. Galagan, L. Ivleva, S. Sergey, General Physics Institute, Moscow, Russia

A comparative experimental and theoretical study between Yb:GdCOB and Yb:KGW under diode-bar pumping has been performed. Output powers of 7.3W and 9W were obtained from 4.34mm and 3mm long crystals, respectively. Self-frequency-doubling experiments are also discussed.

CA-10-MON

Development of 1kJ PW laser beamline in SG-II facility

G. Xu, J.Q. Zhu, Z.Q. Lin, Shanghai Institute of Optics and Fine Mechanics, Shanghai, China; T. Wang, Y.P. Dai, Y. Gu, Shanghai Institute of Laser Plasma, Shanghai, China

With energy upgrade program of SG-II laser facility in Shanghai, a Petawatt laser system is under construction. According to the schedule, the installation of optics and mechanics will be finished by the middle of 2009.

CA-11-MON

Multichannel laser system with phase conjugation and interchannel phase locking by laser gain hologram

T.T. Basiev, V.V. Osiko, Laser Materials and Technology Research Center of GPI, Moscow, Russia; S.N. Smetanin, A. V. Fedin, A. V. Gavrilov, Kovrov State Technological Academy, Kovrov, Russia

A method of phase locking of multichannel laser system by gain holograms in active media is developed. For different architecture of the multichannel laser system the oscillation dynamics and interchannel phase-locking conditions at a variation of the laser-channels gain mismatch are considered.

CA-12-MON

Laser operation at 1.3µm of 2at.% doped crystalline Nd:YAG in a bounce geometry and second harmonic generation

D. Sauder, A. Minassian, M.J. Damzen, Imperial College London, United Kingdom

Laser operation of 2at.% doped crystalline Nd:YAG in a bounce amplifier geometry at 1.3 micron is demonstrated with 16.7W multimode and 11W single mode as well as Q-switched operation and second harmonic generation.

CA-13-MON

Pulse dynamics of Raman microchip-lasers

V.A. Orlovich, S.V. Voitikov, A.S. Grabtchikov, V.A. Lisinetskii, Stepanov Institute of Physics Minsk Belarus; A.A. Demidovich, M.B. Danailov, Laser Lab Sincrotrone, Trieste, Italy

Pulse dynamics of microchip-lasers with intracavity stimulated Raman scattering has been investigated experimentally and theoretically. 90 to 180 ps two Stokes pulses with peak power up to 50 kW were generated and described theoretically

CA-14-MON

New methods of mode conversion and brightness enhancement in high-power lasers

G. Machavariani, Y. Lumer, I. Moshe, A. Meir, S. Jackel, Soreq NRC, Yavne, Israel; N. Davidson, Weizmann Institute of Science, Rehovot, Israel

We present two new methods for conversion of a radially-polarized LG(0,1)* mode to a linearly-polarized nearly-Gaussian beam. As result of mode conversion, the laser beam brightness was enhanced by factors of ~2.5 and ~1.86.

CA-15-MON

Unstable resonator for diode pumped 300W CW Nd:Yag laser

I.V. Glukhikh, S.S. Polikarpov, A.V. Stepanov, S.V. Frolov, D.V.Efremov Institute, St.-Petersburg, Russia

The original unstable resonator for diode pumped CW Nd-Yag laser is presented. Two diffraction limited laser beam divergence was achieved. The output power of laser beam is 300W.

CA-16-MON

$Tm^{3+}:LiLuF_4$ 2-µm laser material: growth, spectroscopy and laser results

F. Cornacchia, D. Parisi, M. Tonelli, Università di Pisa, Italy

We report the growth, spectroscopy and laser results of Tm:LLF single crystals (doping density 0.3%, 8%, 12%, 16%). We obtained 55.7% as maximum slope efficiency with a maximum output power of 280 mW and a minimum threshold of 50 mW.

CA-17-MON

Synthetic diamond as an intracavity heatspreader in compact solid-state lasers

P. Millar, A. J. Kemp, F. van Loon, A.J. Maclean, D. Burns, University of Strathclyde, Glasgow, United Kingdom

Intracavity use of synthetic diamond for thermal management in compact diode-pumped lasers is studied experimentally and theoretically. The birefringence of chemical vapour deposition grown and high-temperature, high-pressure grown synthetic diamond is measured.

CA-18-MON
Laser operation of highly doped TGT grown Nd:YAG in a bounce geometry
A. Minassian, D. Sauder, M.J. Damzen, Imperial College London, United Kingdom; B. Jiang, H. Li, J. Xu, Shanghai Institute of Optics and Fine Mechanics, Shanghai, China
We demonstrate for the first time laser operation of highly-doped temperature-Gradient-Technique grown 2-3 at.% Nd:YAG samples in the bounce amplifier geometry. 20W multimode and 11.6W of high beam quality output at 1064nm was obtained.

CA-19-MON
Efficient high energy Raman laser for troposphere ozone lidar
V.A. Orlovich, A.S. Grabtchikov, V.A. Lisinetskii, P.V. Shpak, National Academy of Sciences, Minsk, Belarus
Raman laser generated 563 nm radiation was developed. Output energy was up to 90 mJ, quantum efficiency was 70%. Frequency doubling produced 281 nm radiation with energy up to 13 mJ for ozone lidar.

CA-20-MON
Quasi-continuous wave solid-state Raman laser system generating 22 lines from the ultraviolet to near infrared
A. I. Vodchits, D. N. Busko, V. A. Orlovich, V. A. Lisinetskii, A. S. Grabtchikov, P. A. Apanasevich, B. I. Stepanov, Institute of Physics, Minsk, Belarus; H. J. Eichler, Tecnical University, Berlin, Germany
Low-threshold and efficient Raman laser based system generating highly repetitive nanosecond pulses from the ultraviolet to infrared is developed.

CA-21-MON
Quasi three level laser operation below 946 nm in Nd:YAG and blue light generation
M. Castaing, E. Hérault, F. Balembois, P. Georges, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France
We present the first demonstration of a 899-nm-laser-emission in a Nd:YAG-crystal, on the $^4F_{3/2}$-$^4I_{3/2}$ transition. Average power of 630mW at 899nm and 100mW at 450nm after SHG operation have been performed.

CA-22-MON
Low-threshold deep-blue organic thin-film distributed feedback laser Cheng
H.C. Cheng, H.W. Lin, C.C. Wu, K.T. Wong, C.H. Kuan, National Taiwan University, Taipei, Taiwan
A low-threshold deep-blue distributed feedback organic solid-state lasers based on the terfluorene was made.

CA-23-MON
Factors affecting tunable second harmonic generation in a semiconductor disk laser with an intracavity diamond heatspreader
A. J. Maclean, A. J. Kemp, M. D. Dawson, D. Burns University of Strathclyde, Glasgow, United Kingdom; K.S. Kim, J.Y. Kim, T. Kim, Samsung Advanced Institute of Technology, Gyeonggi-Do, South Korea
Second harmonic generation allows the design wavelength of the semiconductor disk laser to be extended to the visible and UV. Issues such as polarisation and tuning have been investigated to improve performance.

CA-24-MON
Diode-pumped 1.06-μm Nd_{3+}:$NaLa(MoO_4)_2$ laser without pump-wavelength stabilization
K.A. Subbotin, D.A. Lis, M.N. Chromov, S.N. Ushakov, A.M. Prokhorov General Physics Institute of RAS, Moscow, Russia; A.M. Onishchenko, V.A. Romanyuk, A.V. Shestakov, M.F. Stel'makh Polyus Research & Development Institute, Moscow, Russia; E.V. Zharikov, D.I. Mendeleyev University of Chemical Technology, Moscow, Russia
The laser action of Nd^{3+}:$NaLa(MoO_4)_2$ crystal was obtained in free-running and Q-switch regimes with longitudinally diode pumping. Very low sensitivity of lasing efficiency to diode pumping wavelength fluctuations has been demonstrated.

CA-25-MON
A direct generation of a high power (>7W) Laguerre-Gaussian output from a diode-pumped $Nd:YVO_4$ 1.3 μm bounce laser
M. Okida, M. Itoh, T. Yatagai, University of Tsukuba, Japan; A. Tonouchi, T. Omatsu Chiba University, Chiba, Japan
We demonstrated a direct production of a high power LG mode from a diode-pumped $Nd:YVO_4$ 1.3μm bounce amplifier with an asymmetric cavity configuration. The maximum LG output of 7.7W was obtained.

CA-26-MON
Fourier-transform limited ns-pulses tunable over a wide spectral range using a Ti:Sapphire laser and non-linear frequency conversion processes
D.D. Depenheuer, H. Glässer, T. Walther, Technical University, Darmstadt, Germany
We report on a Fourier transform limited nanosecond Ti:Sapphire laser system with high conversion efficiencies in higher harmonic generation as well as stable and efficient sum frequency mixing with the pump pulse.

CA-27-MON
Magneto-optical elements shortening - the way towards Faraday isolators for high average laser power
D.S. Zheleznov, E.A. Khazanov, I.B. Mukhin, O.V. Palashov, A.V. Voitovich, Institute of Applied Physics RAS, Nizhny Novgorod, Russia
The effect of the thermally induced depolarization of laser radiation in Faraday isolators suppression by the magneto-optical element shortening is investigated. The advantages of using the disk-shaped magneto-optical elements are shown.

CA-28-MON
Direct pumping of Nd:YAG at 946nm
S.G. Goldring, R.L. Lavi, Soreq NRC, Yavne, Israel
Pumping of Nd:YAG at 946nm and lasing at 1064nm was demonstrated. A 20cm long 1% at. Nd:YAG rod along with end-pumping with Ti:Sapphire were used in order to over come the absorption coefficient of $0.06cm^{-1}$.

CA-29-MON
High-energy diode-pumped picosecond multi-pass $Nd:GdVO_4$ laser source for nonlinear optical spectroscopy
V.I. Shcheslavskiy, R. Leitgeb, T. Lasser, Ecole Polytechnique Fédérale de Lausanne, Switzerland; W.A. Clarkson, University of Southampton, United Kingdom
We report CW passive mode-loking in a laser-diode-pumped $Nd:GdVO_4$ laser. The system produces up to 500nJ, 4-ps pulses with an average power of 6W. High-power broadband continuum generation is demonstrated in a highly GeO_2 doped fiber.

CA-30-MON
Eye-safe $Nd:SrMoO_4$ Raman laser
J. Šulc, H. Jelínková, Czech Technical University, Prague, Czech Republic; T.T. Basiev, L.I. Ivleva, M.E. Doroshenko, V.V. Osiko, P.G. Zverev, General Physics Institute, Moscow, Russia
Raman laser was constructed on the base of $Nd:SrMoO_4$ material lasing at 1378.1 nm and Q-switched by V:YAG crystal. Emission at 1569.8 nm was obtained in 8.7 ns long pulse with peak power 92 kW.

CA-31-MON
Solid-state optical parametric oscillator with a closed-loop wavelength stabilization as a front-end of a high-power iodine laser system
L. Kral, Academy of Sciences, Prague, Czech Republic
We describe an automated wavelength stabilization system for a solid-state optical parametric oscillator. The stabilization enables us to use the oscillator as a front-end of a high-power gas laser system.

CA-32-MON
Thermally induced birefringence in edge-pumped microchip Yb:YAG ceramic
T. Dascalu, Institute of Molecular Science Okazaki, Japan and Solid-State Quantum Electronics Laboratory, Bucharest, Romania;O. Oishi, Institute of Molecular Science Okazaki and RIKEN, Tokyo, Japan; M. Tsunekane, T. Taira, Institute for Molecular Science, Okazaki, Japan; K. Midorikawa, RIKEN, Tokyo, Japan
Thermal-induced-birefringence in edge-pumped ceramic composite gain media was investigated. The depolarization was 0.02 under non-pumping condition and increases to 0.09 at 437W pump power. Local variations of depolarization values were observed due to grains orientation.

CA-33-MON
Laser gain dependence on Yb:YAG ceramics temperature
J. Kawanaka, A. Yoshida, Osaka University, Osaka, Japan; M. Fujita, Institute for Laser Technology, Osaka, Japan; T. Kawashima, Hamamatsu Photonics, Shizuoka, Japan; H. Yagi, T. Yanagitani, Konoshima Chemical Co. Ltd., Kagawa, Japan
Laser gain of a diode-pumped Yb:YAG ceramics has been measured at low pump intensity for various material temperatures by using a regenerative amplifier. A high small signal gain of g0=1.5cm-1 was obtained at $2kW/cm^2$.

CA-34-MON
Continuous wave dual-wavelength operation at 1048 and 1386 nm in Nd^{3+}:$LaBGeO_5$ for yellow laser light generation
M.L. Rico-Soliveres, Universidad de Alicante, Spain; J.L. Valdes, J. Martínez-Pastor, Instituto de Ciencia de Materiales, Valencia, Spain; J.A. Pereda, J. Capmany, Universidad Miguel Hernandez, Elche, Spain
We report continuous-wave simultaneous oscillation at 1048 and 1386 nm in a Nd^{3+}:$LaBGeO_5$ nonliner crystal with potential application in

yellow laser light generaton at 597 nm through intracavity sum-frequency mixing or by self-frequency conversion.

CA-35-MON

Intracavity second harmonic generation of rapid and random wavelength tuned picosecond pulsed laser and its biological applications

Y. Maeda, M. Yumoto, M. Yamashita, Tokyo University of Science, Chiba, Japan; N. Norihito, T. Ogawa, S. Wada, RIKEN, Saitama, Japan

We have achieved rapid and random wavelength tuned picosecond pulsed laser and intracavity second harmonic generation in the wavelength region from ultraviolet to blue region. The laser system was applied to the laser microscope with fluorescence protein.

CA-36-MON

Frequency doubling of visible Pr-laser radiation in continuous wave and pulsed mode

A. Richter, G. Huber, E. Heumann, University of Hamburg, Germany; V. Ostroumov, W. Seelert, Coherent Lübeck GmbH, Lübeck, Germany

We report on efficient UV generation using visible Pr-lasers in cw and pulsed mode. 364 mW cw and 4.7 W UV peak power were achieved recently corresponding to conversion efficiencies of 61% and 43%, respectively.

CA-37-MON

Power control of a low noise CW diode-pumped solid-state UV laser

N. Aubert, T. Georges, C. Chauzat, R. Le Bras, Oxxius SA R&D Dpt, Lannion, France; P. Féron, ENSSAT, Lannion, France

Low noise lasers in the UV spectrum are important for many analytical applications. We report in this paper power control of a low noise Diode-Pumped-Solid-States-Laser operating at 355 nm by intra-cavity third harmonic.

CA-38-MON

Fast eigenmode solution with a saturable-gain ABCD matrix

E. J. Grace, Imperial College London, UK

An ABCD matrix based on an explicit solution to the gain saturation equation is reviewed. Acceleration of the steady-state solution for mode shape and power is demonstrated.

CA-39-MON

Er,Yb:YAB laser with high output power

N.A. Tolstik, V.E. Kisel, S.V. Kurilchik, N.V. Kuleshov, Institute for Optical Material and Technologies BNTU, Minsk, Belarus; V.V. Maltsev, OV. Pilipenko, E.V. Koporulina, N.I. Leonyuk, Moscow State University, Moscow Russia

Absorption and emission cross-sections, emission lifetimes and Yb-Er energy transfer efficiency were determined for Er,Yb:YAB crystal grown by flux method. High-power cw and Q-switched laser operation was demonstrated.

CA-40-MON

Simple technique for measuring the energy-transfer-upconversion parameter in solid-state laser materials

J. W. Kim, I.O. Musgrave, W.A. Clarkson, M.J. Yarrow, University of Southampton, United Kingdom

An analytical model for threshold pump power and its dependence on energy-transfer-upconversion in four-level and quasi-three-level lasers is presented. Using this model, we demonstrate a simple method for measuring the upconversion parameter in solid-state lasers.

CF-1-MON

Tunable plasma wave resonant detection of optical beating in high electron mobility transistor

J. Torres, P. Nouvel, L. Chusseau, Institut d'Electronique du Sud, Montpellier, France; F. Teppe, Groupe d'Etude des Semiconducteurs, Montpellier, France; A. Shchepetov, S. Bollaert, IEMN,Université Lille 1, France

Tunable terahertz resonant detection of 1550 nm cw lasers beating by plasma waves in nanotransistor is reported. This detection can be easily tuned in the range 100 600 GHz with applied gate voltage.

CF-2-MON

Characteristics of a series connected two metal wire waveguide in THz frequency range

Y.B. Ji, T.-I. Jeon, E.S. Lee, J.S. Jang, Korea Maritime University, Busan, South Korea; M.H. Kwak, K.Y. Kwang, Basic Research Laboratory, ETRI, Daejeon, South Korea

We report the guidance properties on the surface of metal wires in the terahertz frequency range. A series connected copper and stainless wires have 24% improved to the amplitude of THz pulse compare with only copper wire.

CF-3-MON

Interplay between soliton fission and modulation instability

A. Demircan, U. Bandelow, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany

Soliton fission and modulation instability represent fundamental mechanisms for the supercontinuum generation. Their interplay leads to various characteristics of the resulting spectra, which are modified to the relative impact of the modulation instability.

CF-4-MON

Experimental analysis of an all optical gate based in gain clamping semiconductor amplifier chip

S.L. Stevan Jr, A. Teixeira, R. Nogueira, P. André, M.C. Fugihara, Telecommunications Institute, Aveiro, Portugal; G. Tosi Beleffi, ISCOM, Rome, Italy; A. Pohl, UTFPR, Curitiba, Brazil; T. Silveira, Telecommunications Institute, Aveiro and Siemens Networks S.A, Amadora, Portugal

A simple structure to achieve gain clamping is presented. Experimental characterization suggests application as a Not gate or as a saturable device: output power variation of 20dB is verified for 2dB input power variation.

CF-5-MON

Adjustable, non-sinusoidal transmission characteristics of a NOLM with an output polarizer for ultrafast transmission systems

O. Pottiez, Centro de Investigaciones en Optica, León, Guanajuato, Mexico; B. Ibarra-Escamilla, E. Kuzin, INAOE, Puebla, Mexico

We show that a wide variety of switching characteristics can be obtained with a NOLM and a polariser. This arrangement is proposed for applications like ultrafast optical signal processing, regeneration, and passive mode locking.

CF-6-MON

Temperature dependence of electro-absorption dynamics in an InAs quantum dot saturable absorber at 1.3µm

D.B. Malins, A. Gomez-Iglesias, M.A. Cataluna, W. Sibbett, A. Miller, University of St Andrews, United Kingdom; E.U. Rafailov, University of Dundee, United Kingdom

We report temperature dependent absorption recovery times in a quantum dot waveguide modulator, in excellent agreement with a thermionic emission model. A similar trend in pulse duration is observed from a monolithic modelocked laser.

CF-7-MON

Ultrafast phase transition of Si by femtosecond laser pulse irradiation

M. Fujita, C. Yamanaka, Institute for Laser Technology, Suita, Japan; Yu. Izawa, Y. Izawa, S. Tokita, Osaka University, Suita, Japan

We investigated amorphization of crystalline Si and crystallization of amorphous Si by femtosecond laser irradiation at lower fluence than the ablation threshold. The interaction process was investigated by imaging pump-probe technique.

CF-8-MON

Broad-spectrum frequency comb generation from two continuous waves

B. Barviau, C. Finot, J. Fatome, G. Millot, Institut Carnot de Bourgogne, Dijon, France

We experimentally and numerically study Raman intrapulse shifting in highly non-linear fiber after compression of two continuous waves by multiple four-wave-mixing or induced modulation instability, leading to 1.5 to 1.7µm frequency comb.

CF-9-MON

Spectral modifications of femtosecond laser pulses induced by phase-matched optical rectification in $LiNbO_3$

A.G. Stepanov, V. O. Kompanets, S.V. Chekalin, Institute of Spectroscopy RAS, Troitsk, Russia

We demonstrate that the measured red-shift and narrowing of the laser pulse spectrum can be used to evaluate the absolute energy of generated THz pulses. Abilities to obtain >100% optical-to-THz quantum conversion efficiency are discussed.

CF-10-MON

Dispersion-free and low-loss propagation of THz signals in a metallic slit waveguide

M. Wächter, M. Nagel, H. Kurz, RWTH Aachen University, Aachen, Germany

A metallic slit waveguide is presented that combines low-loss propagation characteristics with two-dimensional mode confinement and negligible dispersion in the frequency range from 0.1 THz to 1.0 THz.

CF-11-MON

A bandwidth independent linear method for detection of carrier envelope phase drift

K. Osvay, University of Szeged, Hungary and Max Born Institute, Berlin, Germany; M. Görbe, University of Szeged, Hungary

We introduce a novel linear optical device, consisting of the combination of a Mach-Zehnder-interferometer and a ring resonator that allows characterizing the carrier-envelope phase drift of mode-locked oscillators with arbitrary bandwidth and power levels.

CF-12-MON

Enhancement of supercontinuum generation in microstructured optical fibers with periodical modulation of the core diameter

Y.A. Mazhirina, L.A. Melnikov, A.I. Konyukhov, Saratov State University, Saratov, Russia

A new approach is proposed to enhance supercontinuum generation by periodical modulation of the diameter of microstructured optical fiber. Simulations show that this scheme allows to remove spectral gaps and to increase bandwidth of supercontinuum.

CF-13-MON

Highly-chirped similaritons generation from a mode-locked fiber laser

C. Chédot, G. Martel, A. Hideur, Groupe d'Optique et d'Optronique, Saint Etienne du Rouvray, France; Ph. Grelu, Université de Bourgogne, Dijon, France

Using a two coupled nonlinear Schrodinger equations to model a high-power Yb-doped double-clad fiber laser in a positive net dispersion regime, we show that highly-chirped similaritons could be generated for a broad range of parameters.

CF-14-MON

Highly dispersive mirrors for Ti:sapphire laser compressors

V. Pervak, F. Krausz, S. Naumov, A. Cavalieri, X. Gu, Max Plank Institute of Quantum Optics, Garching, Germany; A. Apolonski, Ludwig Maximilian University, Garching, Germany

We report on two types of dispersive mirrors for kHz Ti:Sa oscillator-amplifier system and Ti:Sa CPO compressors. The mirrors have dispersion of -400 fs^2 (730-860 nm) and -1300 fs^2 (770-820 nm).

CF-15-MON

Pressure dependent dispersion of inert gases at 800 nm

A. Börzsönyi, A. Kovács, University of Szeged, Hungary; M.P. Kalashnikov, Max Born Institute, Berlin, Germany; K. Osvay, University of Szeged, Hungary and Max Born Institute, Berlin, Germany; Zs. Heiner, University of Szeged and Biological Research Center, Szeged, Hungary

Dispersion of Ar, He, Kr, N2, Ne, Xe, and air has been determined from the spectral phase shift of femtosecond pulses propagating 9m in a tube at various pressures between 1 bar and 0.05 mbar.

CF-16-MON

Toward programmable ultrashort pulse characterization

N. Forget, T. Oksenhendler, S. Coudreau, Fastlite, Palaiseau, France; M. Joffre, Ecole Polytechnique, Palaiseau, France

We demonstrate a programmable pulse characterization device based on an acousto-optic programmable dispersive filter. Both SH-FROG and SPIDER signals are obtained with a single optical setup. Experimental demonstration is provided on an amplified femtosecond system.

CF-17-MON

Transverse phase-matched second-harmonic generation from counter-propagating beams for characterising ultrashort pulses

R. Fischer, A.A. Sukhorukov, D.N. Neshev, W. Krolikowski, Yu.S. Kivshar, Australian National University, Canberra, Australia; S.M. Saltiel, Australian National University, Canberra, Australia and Sofia University, Sofia, Bulgaria

We demonstrate a novel technique for the characterisation of ultra-short pulses based on transverse phase-matched second-harmonic generation from counter propagating beams in crystals with random ferroelectric domains. Our technique proves simplicity, cost-effectiveness and compactness.

CF-18-MON

Holographic bulk grating in a photopolymer for pulse stretching in a CPA laser

S. Laux, V. Rachet, B. Loiseaux, JP. Huignard, Thales Research and Technology, Palaiseau, France; G. Cheriaux, M. Merano, Laboratoire d'Optique Appliquée, Palaiseau, France

We report large-aperture volume Holographic Chirped Bragg Reflector recorded in a photopolymer material. It permits to realize compact optical pulse stretchers (230-ps) for femtoseconds lasers.

CF-19-MON

Chirped-pulse supercontinuum generation with a 200-nJ Ti:sapphire oscillator

P. Dombi, Research Institute for Solid-State Physics and Optics, Budapest, Hungary and Tecnical University, Wien, Austria; P. Antal, R. Szipöcs, J. Fekete, Research Institute for Solid-State Physics and Optics, Budapest, Hungary; Z. Várallyay, FETI Ltd., Budapest, Hungary

We experimentally demonstrate efficient spectral broadening of 200-nJ, chirped, 150-fs pulses in a single-mode fibre without damage problems. The achieved spectrum (also supported by simulations) corresponds to a 7-8 fs transform limited pulse duration.

CF-20-MON

MEFISTO characterization of broadband pulse from a single mode fiber for in situ nonlinear microscopy

A. Thayil, E. J. Gualda, I. Amat-Roldán, D. Zalvidea, I. Cormack, D. Artigas, P. Loza-Alvarez, ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain

Standard single mode fiber is used to increase the available bandwidth of the pulses from a pulsed laser. These pulses were then fully characterized at the sample plane of a nonlinear microscope using MEFISTO.

CF-21-MON

Thin-film dispersion compensator for mode-locked fiber lasers

L. Orsila, R. Herda, T. Hakulinen, O.G. Okhotnikov, Tampere University of Technology, Finland

We demonstrate a thin-film Fabry-Perot glass etalon operated as compact, easy to align and tunable dispersion compensator in a mode-locked ytterbium fiber-laser cavity. The anomalous group-delay dispersion is sufficient to ensure soliton operation.

CF-22-MON

Electroabsorption modulation based on intersubband transitions

K.-M. Wong, D.W.E Allsopp, University of Bath, United Kingdom

The scope for using intersubband absorption for electroabsorption modulation has been investigated. Rapid changes in intersubband absorption coefficient with electric field are predicted for modulation doped In0.53Ga0.47As/AlAs deep single and coupled quantum wells.

CF-23-MON

Towards an understanding of white-light generation in cubic media-polarization properties across the entire spectral range

I. Buchvarov, A. Trifonov, T. Fiebig, Boston College, Chestnut Hill, USA

The polarization of the white-light generated in CaF_2 shows strong spectral dependence which reveals the self-transformation dynamics of ultrashort laser pulses into white-light

CF-24-MON

Coherent detection of few-cycle terahertz pulses with a minimum number of optical elements

A. Schneider, P. Günter, ETH Zurich, Switzerland

We present how few-cycle terahertz pulses can be coherently detected with nothing but two photodiodes after the electro-optic sampling crystal. Two-photon absorption is used in a silicon photodiode in combination with terahertz-induced lensing.

CF-26-MON

Transient effects in phase-matched excitation of a Terahertz surface wave by a short laser pulse with tilted intensity front

M.I. Bakunov, M.V. Tsarev, University of Nizhny Novgorod and Russian Academy of Sciences, Nizhny Novgorod, Russia; A.V. Maslov, NASA Ames Research Center, Moffett Field, USA

We consider transient effects influencing generation of a terahertz surface wave on the surface of a semiconductor in the recently proposed technique of phase-matched excitation by a short optical pulse with tilted intensity front

CF-27-MON

Micro structuring of photoresist with femtosecond laser pulses

S. Zoppe, Vienna University of Technology and Vorarlberg University of Applied Sciences, Dornbirn, Austria; C. Choleva, S. Partel, P. Hudek, Vorarlberg University of Applied Sciences, Dornbirn, Austria; G.A. Reider, Vienna University of Technology, Vienna, Austria; H. Huber, M. Lederer, J. Aus der Au, HighQLaser Production GmbH, Hohenems, Austria

We present recent results on selective laser ablation of thick photoresists from dielectric substrates as a critical process step in MEMS prototyping. The laser used was a ultrafast Yb:Glass regenerative amplifier (HighQLaser Inc).

CH-1-MON

Inline cryogenic temperature sensors based on photonic crystal fiber bragg gratings infiltrated with noble gases for Harsh space applications

J. Florous, S. Varsheney, K. Saitoh, Y. Tsuchida, T. Murao, M. Koshiba, Hokkaido University, Sapporo, Japan

We propose the use of photonic-crystal-fiber-Bragg-gratings as platforms for remote monitoring of cryogenic temperature variations especially for space applications. The overall performance was found to be superior compared to conventional fiber-Bragg-gratings.

CH-2-MON

Simultaneous three-wavelength depolarization Lidar using a coherent white light continuum

T. Somekawa, C. Yamanaka, Osaka University, Osaka, Japan; M. Fujita, Institute for Laser Technology, Osaka, Japan; M.C. Galvez, De La Salle University, Manila, Philippines

A white light continuum generated in a krypton gas cell at the atmospheric pressure was used as a lidar light source. We have successfully performed simultaneous 3-wavelength depolarization measurements of aerosols and clouds.

CH-3-MON

Low insertion-loss (1.8 dB) and vacuum-pressure all-fiber gas cell based on hollow-core PCF

F. Benabid, P.S. Light, F. Couny, University of Bath, United Kingdom

A novel Hollow-Core-PCF acetylene-cell fabrication-technique based on helium-diffusion through silica is reported. The gas cell combines low insertion loss (1.8 dB) and low pressure (0.001 mbar). Electromagnetically-Induced Transparency was used to determine the final acetylene-pressure.

CH-4-MON

Dynamic properties of integrated ring laser gyroscopes

S. Mikroulis, H. Simos, D. Syvridis, University of Athens, Greece; M. Hamacher, U. Tropenz, H. Heidrich, Fraunhofer Institute for Telecommunications, Berlin, Germany

The ring laser properties related to the single mode bidirectional operation and the lock-in limit, are investigated for angular velocity sensor applications using a multimode rate equation model

CH-5-MON

Frequency measurement of the Iodine transitions at 515 nm with a Cr:Forsterite comb

S.V Chepurov, V.I Denisov, S.A Kuznetsov, M.V Okhapkin, V.S Pivtsov, M.N Skvortsov, V.M Klementyev, V.F Zakharyash, Institute of Laser Physics SB RAS, Novosibirsk, Russia

We present initial results on the frequency measurement of molecular iodine transitions in the wavelength range of 515 nm by means of a frequency comb generated from mode-locked Cr:Forsterite laser in highly nonlinear optical fiber.

CH-6-MON

Thermal lens spectroscopy gas sensing based on etalon-stabilized wavelength sweep technique for fiber ring laser

A. Yarai, T. Nakanishi, Osaka Sangyo University, Osaka, Japan

We propose the gas-sensing apparatus based on an etaron-stabilized wavelength sweep technique for fiber laser. Our apparatus offers high performance compared with our conventional, especially in the measured dynamic range, which is ten times greater.

CH-7-MON

Laser-spectroscopic detection of methylamines for human breath analysis

D. Marinov, J. M Rey, M. W Sigrist, ETH Zurich, Switzerland

Comparison between near-IR (based on CRDS) and mid-IR (based on DFG and multipass absorption) laser-spectroscopic techniques for detection of methylamines in multi-component gas mixtures is presented. Possible improvements for in-situ human breath analysis are discussed.

CH-8-MON

Doppler global velocimetry with sinusoidal laser frequency modulation and a molecular absorption cell: error investigation

A. Fischer, L. Büttner, J. Czarske, Dresden University of Technology, Dresden, Germany; M. Eggert, H. Müller, PTB Braunschweig, Germany

For measuring flow velocity fields, the Doppler frequency shift of scattered light is detected using a laser with sinusoidal frequency modulation and a molecular absorption cell. The influence of scattered light fluctuations is described.

CH-9-MON

Flexible lock-in detection system based on synchronized computer plug-in boards applied in sensitive diode-laser gas spectroscopy

M. Andersson, L. Persson, T. Svensson, M. Cassel-Engquist, S. Svanberg, Lund University, Sweden

A computer- and software-based lock-in measurement system with balanced detection for sensitive diode laser spectroscopy is described. Application to the monitoring of gas in solid scattering media, such as plants, is demonstrated.

CH-10-MON

Remote gas detection in solid scattering media using differential absorption lidar

M. Cassel-Engquist, M. Andersson, R. Grönlund, L. Persson, S. Svanberg, Lund University, Sweden

We propose remote monitoring of free gas inside scattering solid media, detected with differential absorption lidar (DIAL). Possible applications include avalanche victim localization and monitoring of snow-covered natural-gas pipes.

CH-11-MON

Vectorial characterization of single-shot high power microwave pulses using pigtailed electro-optic sensors under outdoors conditions

M. Bernier, L. Duvillaret, IMEP, Grenoble, France; G. Martin, J.L. Coutaz, G. Gaborit, Université de Savoie, Chambery, France; J.L Lasserre, Centre d'Etudes de Gramat, France

We present pigtailed electro-optic sensors and first results of high power microwave pulses obtained in outdoor with long fibre links (> 20 m) and constraining environmental conditions (temperature variations and mechanical vibrations).

CH-12-MON

All-cavity-driven cw ringdown spectrometer with regulation of intracavity doppler frequency shifts

J.Y Lee, Y.S Yoo, E.S Lee, Korea Research Institute of Standards and Science, Daejeon, South Korea

We presents a new design of all-cavity-driven cw-CRDS to minimize the intracavity Doppler shift of a probe light in a controllable fashion, as well as a firm theoretical background for the ringdown signal formation.

CH-13-MON

Characterization of particulates using ultra-short laser pulses

C.J Lee, P. Gross, P.J.M van der Slot, K.J Boller, University of Twente, Enschede, Netherlands

We analyze the optical dispersion of random media for the purposes of characterizing pharmaceutical powders. The random walk model shows that the time-dependent photon flux depends on the particle size distribution, and density.

CH-14-MON

Micro-resonator-array for high-resolution spectroscopy

G. Schweiger, R. Nett, Ruhr-University Bochum, Germany

It is shown that an array of microspheres placed on a microscope glass, that serves as waveguide can be used to determine wavelength differences with a resolution better than 0,1 nm.

CH-15-MON

Detection of H2S based on off-axis integrated cavity output spectroscopy

W. Chen, D. Boucher, Université du Littoral, Dunkerque, France; A.A Kosterev, F.K Tittel, Rice Quantum Institute, Houston, TX, USA

Spectroscopic detection of H2S has been demonstrated by means of DFB diode laser-based off-axis integrated cavity output spectroscopy (OA-ICOS) at ~ 1571.6 nm. A minimum detectable H2S concentration of 700 ppb (SNR=3) was achieved.

CH-16-MON

Polymer optical coatings for moisture monitoring

J. Vaughan, P.J Scully, N.P Woodyatt, The University of Manchester, United Kingdom

Polymer optical coatings to detect moisture were developed to clad polymer optical fibres (POF). Claddings were sensitized to moisture to affect the evanescent field and thus the light guided within the fibre, for measuring sweat.

CK-1-MON

Frequency and time domain analysis of cavity plasmon waveguides

G. Gantzounis, N. Stefanou, University of Athens, Greece

Guiding of light through surface plasmons in chains of weakly coupled dielectric (silicon) spheroidal nanoparticles in a metallic material (gold) is studied by means of multiple-scattering frequency- and time-domain calculations.

CK-2-MON

Optical modes in coupled pillar microcavities

M. Karl, S. Li, T. Passow, W. Löffler, E. Müller, D. Gerthsen, H. Kalt, M. Hetterich, University of Karlsruhe, Germany

We report on the fabrication and investigation of microcavities consisting of unequal coupled pillars with embedded quantum dots achieving optical modes either localized in one of the pillars or delocalized over the whole photonic structure.

CK-3-MON

Iridescent coleoptera as templates for fabrication of versatile SiO_2/TiO_2 multilayer mirrors and filters

O. Deparis, C. Vandenbem, V. Welch, M. Rassart, V. Lousse, J.P. Vigneron, V. De Vriendt, S. Lucas, Facultés Universitaires Notre-Dame de la Paix, Namur, Belgium

We report on reflectance of biology-inspired SiO_2/TiO_2 multilayer films deposited on glass substrate by dc magnetron sputtering. We show how radically different visual aspects can be obtained using the same materials but different multilayer designs.

CK-4-MON

Stable optical kinks at the edge of harmonic photonic lattice

V.A. Vysloukh, Universidad de las Americas, Puebla, Mexico; Y.V Kartashov, L. Torner, Institut de Ciencies Fotoniques, Barcelona, Spain

We report formation of stable optical kinks at the edge of harmonic lattice imprinted in a defocusing cubic Kerr-type medium. Increasing of the lattice depth results in a kink steepening at fixed propagation constant.

CK-5-MON

Photonic effect study on polystyrene 3D-photonic crystals at near-field range: dependence on the wavelength and on the lattice parameter

J. Canet-Ferrer, J. Martinez-Pastor, J. Marques, Valencia University, Paterna, Spain; F. Meseguer, Valencia Politecnica University, Valencia, Spain; H.J Shöpe, T. Palberg Johannes Gutenberg University, Mainz, Germany

A scanning near-field optical microscope is used to acquire reflection and transmission images of 3D-photonic crystals. As a result, the near-field photonic effects can be compared with the far-field measurements at different wavelengths.

CK-6-MON

Interplay of major mechanisms of the light-induced transmission in one-dimensional Cu/SiO_2 photonic crystals

M. Halonen, A. Lehmuskero, M. Kuittinen, Y. Svirko, University of Joensuu, Finland

Femtosecond time-resolved measurements in Cu/SiO_2 layered structure reveal that the difference in the response time of major mechanisms of optical nonlinearity results in the pronounced dependence of the nonlinear transmission spectrum on the pump-probe delay.

CK-7-MON

Random laser action in ZnO nanohybrids

A.S. Stassinopoulos, Foundation for Research and Technology and Crete University, Heraklion, Greece;, D.P. Papazoglou, Crete University, Heraklion, Greece; S.A. Anastasiadis, D.A. Anglos, Foundation for Research and Technology, Heraklion, Greece; E.P.G. Giannelis, E.T. Tsagarakis, R.N. Das, Cornell University, Ithaca, NY, USA

Random laser action is demonstrated in organic/inorganic disordered hybrid materials consisting of ZnO semiconductor nanoparticles. Critical laser and materials parameters, which influence the observed laser-like emission behavior, are investigated in a series of nanocomposites.

CK-8-MON

Effect of lithography stitching errors on Silicon-on-Insulator photonic wires

M. Gnan, University of Glasgow, United Kingdom and University of Ferrara, Italy; M. Sorel, D.S. Macintyre, P. Pottier, S. Thoms, R.M De La Rue, University of Glasgow, United Kingdom

The effect of lateral offsets in Silicon-on-Insulator photonic wires was assessed by 3D-FDTD simulations and experimental transmission measurements. The results show that the device performance can be greatly enhanced by using lithography stitching correction techniques.

CK-9-MON

Transverse mode structure of hemispherical microcavities

G. D'Alessandro, R.C. Pennington, M. Kaczmarek, J.J. Baumberg, University of Southampton, United Kingdom

We can grow arrays of micro-cavities formed by a hemi-spherical dimple and a planar mirror. We report the experimental and theoretical analysis of their mode structure and spectrum.

CK-10-MON

Dynamics and instabilities of nonlinear Fano resonances in photonic crystals

A.E. Miroshnichenko, Y. Kivshar, Australian National University, Canberra, Australia; R. Iliew, C. Etrich, F. Lederer, Friedrich Schiller University, Jena ,Germany

We study the dynamics of nonlinear Fano resonances in photonic crystals. We recover the bistable transmission curves predicted in the stationary regime and show that the time-dependent problem demonstrates many novel phenomena including modulational instability.

CK-11-MON

Light emitting polymer nanofibers: energy transfer, waveguiding and photostability

A. Camposeo, R. Cingolani, E. Mele, F. Di Benedetto, L. Persano, D. Pisignano, National Nanotechnology Laboratory, Lecce, Italy

Conjugated polymer nanofibers are fabricated by electrospinning technique and their optical properties investigated. Nanofibers show photoluminescence in the whole visible and near infrared range, self-waveguding of the emission and color tunability through Foerster energy transfer.

CK-12-MON

Modification of planar waveguide facet reflectivity with subwavelength gratings

J.H. Schmid, P. Cheben, S. Janz, J. Lapointe, E. Post, A. Delâge, A. Densmore, B. Lamontagne, P. Waldron, D.X. Xu, National Research Council of Canada, Ottawa, Ontario, Canada

We demonstrate experimentally and by simulations the use of subwavelength gratings etched into the facets of planar waveguides as a means to control facet reflectivity over a wide range from antireflective to highly reflective.

CK-13-MON

Nanostructured metallic electrodes for optoelectronic devices

J. Hetterich, K. Huska, U. Geyer, U. Lemmer, Karlsruhe University, Germany; G. Bastian, Fachhochschule Trier, Germany; S.G. Tikhodeev, N.A. Gippius, A.M. Prokhorov General Physics Institute RAS, Moscow, Russia; G. von Plessen, RWTH Aachen University, Germany

We present an optimized design of subwavelength metallic electrodes for enhanced detection in metal-semiconductor-metal photodetectors and efficient light extraction from light emitting diodes by means of coupling of light to the plasmonic resonances.

CK-14-MON

Amplified spontaneous emission from a microtube cavity with whispering gallery modes

Y.P. Rakovich, S. Balakrishnan, Y. Gunko, T.S. Perova, A. Moore, J.F. Donegan, Trinity College Dublin, Ireland

A detailed study of the modes in small microtube cavity with quality factor up to 3500 is presented. Intensity dependent modification of the emission decay confirms the occurrence of amplified spontaneous emission from single microcavity.

CK-15-MON

Photonic bandgap guiding in an opal clad fibre

L.A. Stewart, G.D. Marshall, M.J. Withford, J.M. Dawes, A. Rahmani, Macquarie University, Sydney, Australia

We demonstrate bandgap guiding in a single mode optical fibre that is clad with a self-assembled photonic crystal. Increased transmission is observed for wavelengths within the photonic bandgap for light travelling down the cladding.

CK-16-MON

Near-field mapping of three-dimensional woodpile photonic crystals by using supercontinuum generation

B. Jia, J. Li, M. Gu, Swinburne University of Technology, Victoria, Australia

In this paper we demonstrate highly localized near-field characterization of three-dimensional woodpile photonic crystals by using supercontinuum generation in a multi-mode fiber as a bright broadband source in the near infrared region.

CK-17-MON

High band anomalous group velocity dispersion for the enhancement of the nonlinear interaction.

M. Maymo, J. Martorell, ICFO- Institut de Ciencies Fotoniques, Castelldefels (Barcelona) and Universitat Politécnica de Catalunya, Terrassa, Spain; A. Molinos-Gomez, ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; A. Mihi, H. Miguez, Instituto de Ciencia de Materiales de Sevilla, Spain

SHG in a centrosymmetric polystyrene opal is demonstrated. Taking advantage of the slow group velocity found at the flat bands opened at high energy levels, enhancement of this second order nonlinear interaction is possible.

CK-18-MON

Direct and inverse lattices of magneto-optical materials: a theoretical analysis

A. Garcia-Martin, J.B Gonzalez-Diaz, G. Armelles, Instituto de Microelectronica de Madrid, CSIC, Tres Cantos, Spain

In this work we analyze the dependence of the magneto-optical properties of a system consisting on periodically arranged Ni nanowires embedded in a dielectric environment as well as its counterpart: a perforated membrane.

CK-19-MON

Analytic photonic crystal cavity design

D. Englund, I. Fushman, J. Vuckovic, Stanford University, USA

We describe an inverse-approach method for deriving photonic crystal structures and apply it to high-Q cavities. Beginning with a Bloch mode of a photonic crystal or waveguide, we derive a perturbative two-dimensional structure to confine a targeted mode.

CK-20-MON

Measurement of the brillouin gain spectrum of hollow-core photonic band-gap fibers

E. Benkler, H.R. Telle, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

We measured Brillouin gain spectra of hollow-core photonic band-gap fibers. They consist of several lines around 7.5 GHz, which are 4-5 orders of magnitude weaker than the prominent 11 GHz line of standard fibers.

CK-21-MON

Optical forces on quantum dots in the near field region of resonant metallic nano-structures

POSTERS

C. Dineen, M. Reichelt, A.R. Zakharian, J.V. Moloney, University of Arizona, Tucson, USA; S.W Koch, University of Marburg, Tucson, USA

We use an adaptive-mesh-refinement version of the Finite Difference Time Domain 3D Maxwell solver to study the forces on quantum dots induced by near-field excitations in the vicinity of nano-metallic structures.

CK-22-MON

Self-starting superradiant lasing in photonic crystals

E.R. Kocharovskaya, N.S. Ginzburg, A.S. Sergeev, Institute of Applied Physics of Russian Academy of Science, Nizhny Novgorod, Russia

Self-starting superradiant lasing and modified superfluorescence regimes in a two-level active sample of one-dimensional photonic crystal responsible for resonance back-scattering are found and investigated numerically for various values of the light bandgap and amplification bandwidth.

CK-23-MON

Terahertz time-domain spectroscopy of surface plasmon polaritons on periodic metal arrays

M. Martl, J. Darmo, J. Kröll, K. Unterrainer, Vienna University of Technology, Vienna, Austria

We studied terahertz surface plasmon polaritons on periodic metal arrays. Their generation and propagation with respect to different geometries were investigated.

CK-24-MON

Reversal of asymmetry of the resonance in the reflectivity of 2-D photonic crystals

E.F.C. Driessen, D. Stolwijk, M.J.A. de Dood, Leiden University, Netherlands

Measured angle-dependent reflection spectra of two-dimensional GaAs photonic crystals show typical asymmetric line shapes. A Fano analysis using a 3x3 scattering matrix naturally includes the observed reversal of the asymmetry for angles beyond Brewster's angle.

CK-25-MON

Sidewall roughness measurement of photonic wires and photonic crystals

M. Svalgaard, L.H. Frandsen, COM-DTU, Lyngby, Denmark; J. Garnaes, A. Kühle, Danish Fundamental Metrology Ltd., Lyngby, Denmark

Atomic force microscopy on tilted samples is used to obtain detailed sidewall roughness measurements on photonic wires and photonic crystals. Point-like defects, vertical curtains and horizontal bands are revealed with sub-nm vertical resolution.

CK-26-MON

Fabrication of Er^{3+} active silica direct and inverse opals with high quantum efficiency

A. Chiappini, C. Armellini, A. Chiasera, M. Ferrari, Y. Jestin, CNR-IFN, Institute of Photonics & Nanotechnology, Povo-Trento, Italy; E. Moser, Trento University, Povo-Trento, Italy; G. Nunzi Conti, Centro Fermi & CNR-IFAC, Roma, Italy; S. Pelli, G.C Righini,, CNR-IFAC, Firenze, Italy; G.C Righini, CNR, Materials and Devices Dept, Roma, Italy

Er^{3+} active 3D photonic crystal in direct and inverse opal configuration were realized, on silica substrate, by sol-gel routes. Optical and spectroscopic properties were investigated and a high quantum efficiency of the systems were estimated.

CK-27-MON

Thermal and optical properties of SiO2/GaN opals by photothermal deflection technique

G. Leahu, R. Li Voti, C. Sibilia, M. Bertolotti, Universita di Roma La Sapienza, Roma, Italy; S. Kaplan, V. Golubev, D. Kurdyukov, Ioffe Physicothecnical Institute, Russian Academy of sciences, St.Petersburg, Russia

The thermal and optical properties of the SiO_2/GaN synthetic opals are studied by photothermal deflection technique. This technique, used in different configurations, allows to determine the effective thermal diffusivity and the absorption spectra.

CK-28-MON

Femtosecond versus picosecond all-optical switching of 3D silicon photonic crystals near telecom wavelengths

P.J Harding, T.G Euser, W.L Vos, FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, Netherlands; W.L Vos, University of Twente, Amsterdam, Netherlands

We present time-resolved reflectivity spectra of optically switched three-dimensional Si photonic crystals. A surprising competition between non-degenerate two-photon absorption and Kerr non-linearity is observed within femtoseconds, while dispersive free carrier effects occur at picosecond times.

CK-29-MON

Distribution and emission properties of fluorescing nanospheres on 2D photonic crystal slabs

Y. Nazirizadeh, R. Bornemann, J.G Müller, U. Lemmer, M. Gerken, G. Bastian, Light Technology Institute Karlsruhe, Germany; D. Schelle, A. Tünnermann, E.B Kley, Institut für Angewandte Physik, Jena, Germany

We prepared and characterized a sparse distribution of fluorescing nanospheres on two-dimensional Nb2O5-photonic crystal slabs. The spontaneous emission properties of single nanospheres are measured using confocal microscopy combined with time correlated single photon counting.

CK-30-MON

Resonant Zener tunnelling in triangular two-dimensional photonic lattices

A.S Desyatnikov, Y.S Kivshar, Australian National University, Canberra, Australia; V.S Shchesnovich, J.M Hickmann, S.B Cavalcanti, Universidade Federal de Alagoas, Maceio, Brazil

We study the interband Zener transitions in two-dimensional triangular photonic lattices and derive analytical Landau-Zener-Majorana models capturing the essence of the wave tunnelling phenomena. This analysis is verified by solving the wave propagation equation.

NOTES

POSTERS

ICM Foyer 13:00-14:00
IQEC 2007 Poster Session

IB-1-MON
Zeeman slower based on magnetic dipoles
Y.B. Ovchinnikov, National Physical Lab., Teddington, Middlesex, United Kingdom
A transverse Zeeman slower based on array of discrete permanent magnets is proposed. A theory of such a slower based on point-like magnetic moments has been developed. A theory of a Zeeman slower in a case of non-uniform light field in presence of strong absorption of light is presented.

IB-2-MON
First-principles quantum dynamics with 150,000 atoms: correlations in a BEC collision
P. Deuar, University of Amsterdam, Netherlands; P.D Drummond, University of Queensland, Brisbane, Australia
The quantum dynamics of colliding macroscopic BECs was simulated directly from the Hamiltonian. Evolution of correlations between scattered atoms was calculated quantitatively. The simulation method (stochastic positive-P) is straightforward and almost a 'black-box'.

IB-3-MON
Vortex lattices in highly anisotropic traps
S. McEndoo, Th. Busch, Univ. College Cork, Ireland
We investigate details of the distribution of angular momentum in highly anisotropic traps where, in contrast to the formation of Abrikosov lattices in isotropic space, linear arrangements of vortices are formed.

IB-4-MON
Experimental limits of an inertial sensor based on cold atoms interferometry
W. Chaibi, A. Gauguet, B. Canuel, A. Clairon, N. Dimarcq, D. Holleville, A. Landragin, SYRTE - Observatoire de Paris, France
We investigate the limits of our cold atoms interferometer to rotation and acceleration measurements. Short term sensitivity is now limited by vibration for acceleration and detection for rotation.

IB-5-MON
Bloch oscillations of neutral atoms adsorbed on crystalline surfaces
T. Passerat de Silans, Université Paris 13, Villetaneuse, France; M. Chevrollier, M. Oria Univ. Federal da Paraiba, Joao Pessoa, Brazil
Cold atoms adsorbed on a crystalline surface are submitted to its parallel periodic potential and can exhibit Bloch Oscillations when submitted to static forces. We theoretically investigate such phenomena for He atoms trapped on LiF.

IB-6-MON
Fibered laser system for rubidium laser cooling based on telecom technology at 1560 nm and frequency doubling
F. Lienhart, Y. Bidel, S. Boussen, A. Bresson, O. Carraz, N. Zahzam, ONERA, Palaiseau, France
We propose a new compact and reliable laser system for rubidium laser cooling in onboard experiments. Our system is based on the frequency doubling of a telecom fiber bench at 1560 nm.

IB-7-MON
Geometrical manipulation of two-level atoms on the Bloch sphere observed in a time-domain atom interferometer
H. Imai, A. Morinaga, Y. Otsubo, Tokyo University of Science, Noda, Japan
Geometrical manipulation of two-level atoms on the Bloch sphere has been investigated on cold ensemble of sodium atoms with stimulated Raman pulses and the geometrical phase shift was detected using a time-domain atom interferometer.

IB-8-MON
A fs-frequency comb referenced diode laser system for coherent spectroscopy of cold molecules
I. Ernsting, A. Wicht, N. Strauss, K. Döringshoff, B. Roth, J. Koelemeij, S. Schiller Heinrich-Heine-University, Düsseldorf, Germany; R.H Rinkleff, K. Danzmann, Leibniz University, Hannover , Germany
A new type of diode laser system for precision spectroscopy is presented. Its excellent passive stability eases locking to fs-frequency combs, which is demonstrated with high resolution spectroscopy of cold HD+ ions.

IB-9-MON
Ab initio based calculations of cavity cooling including the ro-vibrational modes of the OH radical
M. Kowalewski, R. de Vivie-Riedle, Ludwig-Maximilians-University, Munich, Germany; P.W.H Pinkse, MPI für Quantenoptik, Garching, Germany; G. Morigi, Universitat Autonoma de Barcelona, Bellaterra, Spain
For OH we report detailed ab initio based calculations for cooling the ro-vibrational modes using laser excitation and photon emission into a resonator. The cooling mechanism and parameters to achieve high efficiency are presented.

IB-10-MON
Ionization of Rb and Na Rydberg atoms by blackbody radiation
I.I Beterov, D.B Tretyakov, I.I Ryabtsev, Institute of Semiconductor Physics, Novosibirsk, Russia; N.N Bezuglov, St. Petersburg, State University, St. Petersburg, Russia; A. Ekers, University of Latvia, Riga, Latvia
The photoionization rates of Rb and Na nS, nP and nD Rydberg atoms by blackbody-radiation (BBR) have been calculated for n=8-65 at the ambient temperatures of 77, 300 and 600 K. The obtained results are compared with our experimental data for Na nS and nD Rydberg atoms with n=8-20.

IB-11-MON
High-resolution sagnac interferometry with cold atoms
M. Gilowski, W. Ertmer, T. Müller, T. Wendrich, C. Schubert, W. Herr, E.M Rasel, Institut for Quantum Optics, Hannover, Germany
We present the concept and the current status of our Cold Atom Sagnac Interferometer (CASI). Details of our dual interferometry scheme and the different diode laser systems used for manipulating the atoms will be presented.

IB-12-MON
Interacting rubidium and caesium atoms
C. Weber, M. Haas, S. John, L. Steffens, D. Haubrich, D. Meschede, Univ. of Bonn, Germany; A. Rauschenbeutel, Univ. Mainz, Germany; V. Leung, Ins. d'Optique, Orsay, France
We present sympathetic cooling of a few thousand Caesium atoms by Rubidium to temperatures below one Microkelvin. Analyzing the cooling dynamics we estimate a lower bound of the s-wave scattering length.

IB-13-MON
Dynamics of cavity cooling of trapped atoms
S. Zippilli, G. Morigi, Universitat Autonoma de Barcelona, Bellaterra (Barcelona), Spain; M. Bienert, M. Torres, Universidad Nacional Autonoma de Mexico, Cuernavaca, Mexico
We show that the cooling dynamics of an atom trapped by an external potential inside a high-Q cavity can be enhanced by quantum interference between the mechanical effects of cavity and driving fields.

IB-14-MON
Dynamics of Bose-Einstein condensates in an asymmetric double-well
S. Whitlock, University of Amsterdam, Netherlands; V. Hall, R. Anderson, P. Hannaford, A.I Sidorov, Swinburne University of Technology, Melbourne, Australia
We report on the dynamic splitting of a Bose-Einstein condensate in a double well potential created above a perpendicularly magnetised GdTbFeCo atom chip including its sensitivity in the application of gravity field sensing.

IB-15-MON
Cooling of molecules in optical cavities
W.Lu, Y. Zhao, Heriot-Watt University, Edinbugh, United Kingdom; P.F Barker, University College London, United Kingdom
We predict that a cavity scheme can cool CN molecules from hundreds milikelvin to microkelvin temperature under experimentally accessible conditions. We further discuss the possibility of a general cavity cooling scheme for many polarizable species.

IB-16-MON
Future inertial atomic quantum sensors: state of art
A. Giorgini, F. Sorrentino, M. Prevedelli, M. de Angelis, G.M Tino, Firenze Univ., Firenze, Italy; M. Zaiser, T. Müller, T. Wendrich, E. Rasel, W. Ertmer, Ins. für Quantenoptik, Hannover, Germany; M. Schmidt, A. Sender, E. Kovalchuk, A. Peters, Humboldt Univ., Berlin, Germany; V. Josse, P. Bouyer R. Nyman, P. Lugan, J.P Brantut, Groupe d'Optique Atomique Lab. Charles Fabry de l'Institut d'Optique, Palaiseau, France; F. Impens, F. Pereira Dos Santos, A. Gauguet, J. Le Gouet, A. Landragin, T.E Mehlstäuble, LNE SYRTE, Obs. de Paris, France
The partnership is developing novel portable atomic inertial quantum sensors based on matter-wave optics and Raman interferometry. For this purpose we are implementing a gravimeter and a gyroscope using ultra cold atoms as test masses.

IB-17-MON
Simple cold-atom systems as a probe for complex dynamics
J. Chabé, J.C Garreau, M. Lepers, P. Szriftgiser, V. Zehnlé, PhLAM, Villeneuve d'Ascq, France; D. Delande, Laboratoire Kastler-Brossel, Paris, France; H. Lignier, Pisa University, Italy; H. Cavalcante,

Universidade Federal de Pernambuco, Recife, Brazil

We present a very simple system consisting in laser-cooled atoms interacting with a time-modulated standing laser wave. Such a system presents a quantum dynamics that can display different chaotic behaviors like quantum-chaos and quasi-classical chaos.

IB-18-MON

Dynamics of Bose-Einstein condensates in optical trap with internal degrees of freedom

S. Tojo, M. Iwata, A. Tomiyama, T. Hirano, Gakushuin University, Tokyo, Japan; T. Kuwamoto, Nihon University, Chiba, Japan

We have experimentally studied the dynamics of optically trapped 87Rb BEC. Thanks to its rich variety of internal degrees of freedom, we have observed polar behavior of spin-2 BEC and time-evolution of immisible binary BEC.

IG-1-MON

Complexity and coherence in random lasers

C. Conti, Research Center Enrico Fermi and Univ. La Sapienza, Rome, Italy, L. Angelani, G. Ruocco, Univ. La Sapienza, Rome, Italy; F. Zamponi, Lab. de Physique Théorique Ecole Normale Supérieure, Paris, France

We report on a statistical approach to mode-locking transitions of random-laser. Using paradigms from spin glass theory we determine the complexity as a function of temperature. FDTD simulations are performed to sustain our results.

IG-2-MON

Dynamics of a two-state quantum dot laser with saturable absorber

E.A. Viktorov, P. Mandel, Université Libre de Bruxelles, Brussels, Belgium; E.U. Rafailov, University of Dundee, United Kingdom; M.A Cataluna, L. O'Faolain, T.F. Krauss, W. Sibbett, University of St Andrews, UK

We study the regime of selfpulsations in two-state QD laser with saturable absorber. Experiments demonstrate and theory explains the appearance of antiphase selfpulsations at low relaxation oscillation frequency and a period doubling route to chaos.

IG-3-MON

Square-wave switching by crossed-polarization reinjection in VCSELs

M. Giudici, Institut Non Linéaire de Nice (INLN), Valbonne, France; J. Mulet, J. Javaloyes, S. Balle, Institut Mediterrani d'Estudis Avancats (IMEDEA), Esporles, Spain

Antiphase square wave modulation of the polarization-resolved output of a VCSEL under crossed-polarization reinjection appears above a reinjection threshold, but its quality degrades as reinjection further increases. The Spin-Flip-Model successfully explains the experimental observations.

IG-4-MON

Localized structures of light in nonlinear devices with intracavity photonic bandgap material

A.G. Vladimirov, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany; D.V. Skryabin, University of Bath, United Kingdom; M. Tlidi, Université Libre de Bruxelles, Brussels, Belgium

We study transverse pattern formation in a Kerr cavity with a photonic crystal film inside. Using the coupled mode approach and direct numerical simulations we demonstrate the existence of modulational instability, resting and moving cavity solitons, and investigate the role played by defects in periodicity.

IG-5-MON

Analysis of the chaotic dynamics of counter-propagating solitons

C. Denz, S. Koke, Ph. Jander, T.D. Frank, R. Friedrich, University of Münster, Germany

The dynamics of counter-propagating spatial solitons based on a photorefractive nonlinearity is analysed. We focus on the transition from regularly to irregularly oscillating solutions and answer the question whether the irregularly oscillating solutions are chaotic.

IG-6-MON

Addressing optical pixel bits in a slab of dense optical material via intrinsic optical bistability

J.L. Font, R. Vilaseca, K. Staliunas, Universitat Politecnica de Catalunya, Terrassa, Spain; E. Roldan, G. Valcarcel, Universitat de Valencia, Burjassot (Valencia), Spain

We show that a thin material slab with intrinsic optical bistability and irradiated with a uniform beam can sustain narrow localized structures, whose size is determined by the writing beam diameter and the diffusion strength.

IG-7-MON

Localized traveling waves in VCSELs with filtered optical feedback

P.V. Paulau, Institute of Physics, NASB, Minsk, Belarus and University of Strathclyde, Glasgow, United Kingdom; A. Naumenko, N.A. Loiko, Institute of Physics, NASB, Minsk, Belarus; W.J. Firth, T. Ackemann, A.J. Scroggie, University of Strathclyde, Glasgow, UK

Self-localized transverse traveling-wave states exist in a model of vertical-cavity surface-emitting lasers with frequency- and wavevector-selective optical feedback. The results suggest a route to realization of a cavity soliton laser using standard semiconductor laser designs.

IG-8-MON

Separation of mixed chaotic signals in microchip lasers by independent component analysis

A. Uchida, M. Kuraya, S. Yoshimori, Takushoku University, Tokyo, Japan; K. Umeno, National Institute of Information and Communications Technology, Tokyo, Japan

We experimentally demonstrated blind source separation of mixed chaotic laser signals by using independent component analysis. Non-Gaussianity of chaotic signals is a crucial property to succeed signal separation.

IG-9-MON

Delay induced instabilities in a quantum dot semiconductor laser

E.A. Viktorov, P. Mandel, Université Libre de Bruxelles, Brussels, Belgium; O. Carroll, I. O'Driscoll, J. Houlihan, G. Huyet, S.P. Hegarty, Tyndall National Institute, Cork, Ireland

We analyze experimentally and theoretically, delay induced instabilities in quantum dot semiconductor lasers. These occur outside the parameter regime expected for conventional semiconductor lasers and include irregular power dropouts, periodic pulsations and a chaotic regime.

IG-10-MON

Jitter and dynamics in passively mode-locked quantum dot semiconductor laser

E. A. Viktorov, T. Erneux, P. Mandel, Université Libre de Bruxelles, Brussels, Belgium; S. O'Donoghue, F. Kéfélian, B. Kelleher, G. Huyet, Tyndall National Institute, Cork, Ireland

We investigate the effect of the dynamics on the jitter in a quantum dot mode-locked laser. An increase of the jitter with the current, due to bistability, is predicted and experimentaly confirmed.

IG-11-MON

Semiconductor lasers under orthogonal frequency-dependent optical feedback: experiments and theory

C. Masoller, Universidad Politecnica de Catalunya, Terrassa, Spain; T. Sorrentino, M. Chevrollier, M. Oria, Universidade Federal da Paraiba, Joao Pessoa, Brazil

A semiconductor laser under orthogonal frequency-dependent feedback is studied experimentally. Two different emission frequencies with almost the same output power are observed. A model including gain-saturation and thermal effects gives good agreement with the observations.

IG-12-MON

Spatio-temporal dynamics of free-electron lasers

C. Szwaj, S. Bielawski, Lab. PhLAM/CERLA, Villeneuve d' Ascq, France; C. Bruni, M.E Couprie, Synchrotron SOLEIL, Gif-sur-Yvette, France; D. Garzella, CEA-Saclay, Gif-sur-Yvette, France; G.L. Orlandi, ENEA-Frascati, Frascati, Italy; M. Hosaka, Y. Takashima, Nagoya University Graduate School of Engineering, Nagoya, Japan; A. Mochihashi, M. Katoh, UVSOR IMS, Okazaki, Japan

We present a combined theoretical/experimental study of longitudinal pulse dynamics, in Free-Electron Laser oscillators. The pulse internal structure exhibits in particular a transition to a "turbulent" regime, which appears to be correlated to spectro-temporal dislocations.

IG-13-MON

Experimental evidence of hyperbolic transverse patterns in a nonlinear optical resonator

F. Silva, J.C. Soriano, J. Garcia Monreal, G.J. de Valcarcel, Universitat de Valencia, Burjassot, Spain; A. Esteban Martin, Institut de Ciencies Fotoniques (ICFO) Castelldefels, Spain; K. Staliunas, ICREA. Universitat Politecnica de Catalunya, Terrassa, Spain

Independent manipulation of the diffraction properties of a very large Fresnel number optical resonator along two orthogonal directions is demonstrated. Specifically, a hyperbolic resonator is built, which is shown experimentally to support hyperbolic nonlinear patterns

IG-14-MON

Cavity solitons in rocked class B lasers

M.F. Martinez Quesada, G.J. de Valcarcel, Universitat de Valencia, Burjassot, Spain

We find theoretically dark-ring cavity solitons in rocked class B lasers due to the phase bistability induced by the associated bichromatic injection.

POSTERS

ICM Foyer 13:00-14:00
Joint Symposium Poster Session

JSIII-1-MON

Absolute frequency comb mode number determination

J. Zhang, Z.H. Lu, Y.H. Wang, T. Liu, A. Stejskal, Y.N. Zhao, L.J. Wang, Max-Planck Research Group, Erlangen, Germany; R. Dumke, Nanyang Technological University of Singapore, Singapore

We report a method for determination of the frequency comb mode number without the help of wavemeters, by changing the repetition rate of the frequency comb in a two-step process.

JSIII-2-MON

Octave-spanning spectrum from a diode-pumped Yb:KYW fs-laser by nonlinear broadening

S.A. Meyer, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, USA; J.A. Squire, University of Colorado, Boulder, Colorado, USA; S.A. Diddams, National Institute of Standards and Technology, Boulder, Colorado, USA

With the goal of a compact, efficient, diode-pumped optical frequency comb capable of high repetition rates, we have built a Yb:KYW femtosecond laser and obtained an octave-spanning spectrum via nonlinear broadening in microstructured optical fiber.

JSIII-3-MON

Towards direct frequency comb spectroscopy on ions in a linear Paul trap

A.L. Wolf, K.S.E. Eikema, W. Ubachs, Laser Centre Vrije Universiteit, Amsterdam, Netherlands

To add to the debate on a possibly varying fine structure constant, we plan to do direct frequency comb spectroscopy on ions (Ca,Mn,Ti) in a linear Paul trap.

JSIII-4-MON

Doppler-limited multiplex sensitive spectroscopy with frequency combs

J. Mandon, N. Picqué, G. Guelachvili, CNRS Laboratoire de Photophysique Moléculaire, Orsay, France; F. Druon, P. Georges, Institut d'Optique Graduate School, Palaiseau, France

A femtosecond mode-locked laser is used for the first time as an infrared source for high resolution Fourier transform absorption spectroscopy. This offers new perspectives for high sensitivity broad spectral bandwidth spectroscopy.

JSIII-5-MON

Composite frequency comb spanning 0.4-2.4μm from a femtosecond Ti:sapphire laser and synchronously pumped optical parametric oscillator

B.J.S. Gale, J.H. Sun, D.T. Reid, Heriot Watt University, Edinburgh, United Kingdom

We demonstrate a composite frequency comb spanning 0.4-2.4μm from the outputs of a femtosecond optical parametric oscillator and Ti:sapphire pump laser in which the comb interval and offsets are locked to a radio-frequency clock.

NOTES

ROOM 1

08:30 – 10:00

IB1 Session: Condensed matter physics with quantum gases

Chair: *Michael Köhl, University of Cambridge, United Kingdom*

IB1-1-TUE 08:30

Spinor BEC in triangular optical lattices

C. Becker, K. Bongs, K. Sengstock, S. Stellmer, J. Kronjäger, P. Soltan-Panahi, University of Hamburg, Germany

We discuss the physics of spinor BEC in a triangular optical lattice, which can be transformed into a magnetic hexagonal lattice and present first data on the Mott insulator transition in this novel system.

IB1-2-TUE 08:45

Cavity QED with ultracold gases: probing quantum phases in optical lattices by light scattering

I.B Mekhov, University of Innsbruck, Austria and St Petersburg State University, St Petersburg, Russia; C. Maschler, H. Ritsch, University of Innsbruck, Austria

Various quantum states of atoms in lattices show qualitatively different light scattering, which can be analysed by intensity or photon-statistics measurements. Atom distribution functions can be directly mapped on transmission spectra of a high-Q cavity.

ROOM 4a

08:30 – 10:00

IE1 Session: Strong light-matter interactions

Chair: *Stefan Lochbrunner, Ludwig-Maximilians, University of Munich, Germany*

IE1-1-TUE (Invited) 08:30

Strong field nonlinear optics with light pulses of "Subatomic" duration

A. Nazarkin, University of Erlangen, Erlangen, Germany

The interaction of intense light pulses with a multilevel atomic system in the regime of pulse durations shorter than the Bohr period of atomic electron is discussed. High harmonic generation, soliton effects, and nonlinear field amplification are predicted.

ROOM 4b

08:30 – 10:00

IF2 Session: Quantum imaging

Chair: *Alexander Sergienko, Boston University, USA*

IF2-1-TUE 08:30

Quantum limits in image processing

N. Treps, V. Delaubert, C. Fabre, Laboratoire Kastler Brossel, Paris, France; H.A Bachor, The Australian National University, Canberra, Australia; P. Réfrégier, Fresnel Institute, Marseille, France

We determine the bound to the maximum achievable sensitivity in the estimation of a parameter from the information contained in an optical image in the presence of quantum noise, either coherent or squeezed.

IF2-2-TUE 08:45

Experimental realization of spatial entanglement for bright optical beams

J. Janousek, The Australian National University, Canberra, Australia and Technical University of Danemark, Kgs Lyngby, Denmark; K. Wagner, H. Zou, P.K Lam, H.A Bachor, The Australian National University, Canberra, Australia; V. Delaubert, Laboratoire Kastler-Brossel, Paris, France and The Australian National University, Canberra, Australia; C.C Harb, The University of NSW, Canberra, Australia

We present the latest results on the experimental generation of the position and momentum (x-p) entanglement for bright optical beams. We demonstrate the TEM10 quadrature entanglement. The degree of inseparability was measured to be 0.76.

ROOM 12

08:30 – 10:00

CE2 Sesion: Organic lasers and laser materials

Chair: *Ernst Heumann, University of Hamburg, Germany*

CE2-1-TUE (Invited) 08:30

Are organic LEDs and lasers similar to inorganic devices?

N. Tessler, Technion, Haifa, Israel

In this talk I would compare chemically prepared materials to those grown under high vacuum conditions. We will compare colloidal grown semiconducting nanocrystals to quantum dots and thin film organic devices to inorganic ones.

ROOM 13a

08:30 – 10:00

CA4 Session: Raman and parametric optical frequency conversion

Chair: *Valdas Pasiskevicius, Royal Institute of Technology, Stockholm, Sweden*

A4-1-TUE (Invited) 08:30

Continuous-wave self-Raman and intracavity doubled laser operation in Nd:GdVO$_4$ at 586.5 nm

P. Dekker, H.M Pask, D.J Spence, J.A Piper, Centre for Lasers & Applications, Macquarie University, North Ryde, NSW, Australia

We report continuous-wave powers at 586 nm up to 0.7 W and quasi-cw powers up to 1.9 W (50% duty cycle) from a diode-pumped Nd:GdVO$_4$ laser with intracavity frequency-doubling in LBO.

ROOM 13b

08:30 – 10:00

CB4 Session: VCSELs I: Device progress

Chair: *Francesco Marin, University Firenze, Sesto, Italy*

CB4-1-TUE 08:30

Densely packed VCSEL arrays tailored for optical particle manipulation

A. Kroner, F. Rinaldi, R. Rösch, R. Michalzik, Institute of Optoelectronics, Ulm, Germany

To reduce cost and dimensions of optical particle manipulation systems significantly, we have fabricated specially adapted, densely packed arrays of vertical-cavity laser diodes using a novel, self-aligned process. High single-mode output powers are presented.

CB4-2-TUE 08:45

High-power 1.55 µm VCSELs arrays

W. Hofmann, M. Görblich, G. Böhm, M.C Amann, Walter Schottky Institute, Garching, Germany; M. Ortsiefer, Vertilas GmbH, Garching, Germany; H. Mulatz, Institute for Technical Electronics, Munich, Germany

A VCSEL array at 1.55 µm with output-powers beyond 0.7 W is presented. The modulation bandwidth is potentially high and the wall-plug efficiency exceeds 25%. Output powers are scalable by chip area with 70 W/square-cm.

ROOM 14a

08:30 – 10:00

CG1 Session: Relativistic interactions

Chair: *Gérard Mourou, Laboratoire d'Optique Appliquée, Palaiseau, France*

CG1-1-TUE (Invited) 08:30

Particle acceleration with high-intensity lasers

H. Schwoerer, Optik und Quantenelektronik, University of Jena, Germany

Intense light fields can accelerate electrons and ions to energies of tens of MeV with narrow energy distribution and excellent beam parameters. Mechanisms and applications of this new technique will be discussed.

ROOM 14b

08:30 – 10:00

CK4 Session: Plasmonic nano-structures

Chair: *Gonçal Badenes, ICFO, Castelldefels, Spain*

CK4-1-TUE (Invited) 08:30

Lensless focusing with subwavelength resolution by an array of nanoholes

F.M Huang, N.I Zheludev, Optoelectronics Research Centre, Southampton, United Kingdom; Y. Chen, Rutherford Appleton Laboratory, Oxon, United Kingdom; F.J Garcia de Abajo, Instituto de Optica, Madrid, Spain

We provide the first evidence of free-space subwavelength focusing without evanescent fields using a photonic nano-structure. Hot-spots smaller than half wavelength of light were observed at distances of tens of wavelengths from the structure.

ROOM BOR1

08:30 – 10:00

CI1 Session: Differential phase-shift keying

Chair: *Christophe Peucheret, Technical University of Lyngby, Denmark*

CI1-1-TUE 08:30

Performance analysis of 20 Gbit/s RZ-DPSK non-slope matched transoceanic submarine links

B. Slater, S. Boscolo, S.K Turitsyn, T. Broderick, Aston University, Birmingham, United Kingdom; R. Freund, L. Molle, C. Caspar, Fraunhofer Institute for Telecommunications, Berlin, Germany; J. Schwartz, S. Barnes Azea, Networks Ltd., Romford, United Kingdom

Direct bit-error rate (BER) computation and experiments are used to assess the performance of a 20 Gbit/s return-to-zero differential phase-shift keying (RZ-DPSK) non-slope matched transoceanic submarine link. Using this system as an example, we also demonstrate the limitations of existing theoretical approaches to the BER estimation for RZ-DPSK.

CI1-2-TUE 08:45

Migration from periodic to lumped dispersion mapping in existing SMF/DCF links

R.S Bhamber, C. French, S.K Turitsyn, V. Mezentsev, Aston University, Birmingham, United Kingdom; W. Forysiak, J.H.B Nijhof, Ericsson Ltd, Coventry, United Kingdom

Studying performance of the existing terrestrial SMF/DCF link we demonstrate that transmission of 40Gbit/s RZ-DPSK signal is robust to lumped dispersion mapping, which results in significant cost savings in point-to-point links without greatly compromising system performance.

NOTES

ROOM 1

IB1-3-TUE (Keynote) 09:00

Cold quantum gases: when atomic physics meets condensed matter

J. Dalibard, Ecole Normale Supérieure, Paris, France

The talk will review recent advances in the manipulation of cold atomic gases, and show that these systems can be viewed as quantum simulators, mimicking the rich dynamics of condensed-matter physics.

ROOM 4a

IE1-2-TUE 09:00

Unstable Y wave modes in nonlinear Kerr dynamics: from spatial self-focusing to spatiotemporal filament dynamics

M.A. Porras, Universidad Politecnica de Madrid, Spain; P. Di Trapani, A. Parola, D. Faccio, University of Insubria, Como, Italy; A. Couairon, Centre de Physique Théorique, CNRS, Palaiseau, France

The most relevant features of the post-collapse filament dynamics of femtosecond pulses in Kerr media find unified explanation from the spatiotemporal instability of the self-focusing ground solution of the cubic nonlinear Schroedinger equation.

IE1-3-TUE 09:15

Spectral self-phase conjugation of optical radiation in stimulated scattering

V.I Kovalev, Russian Academy of Sciences, Moscow, Russia; R.G Harrison, Heriot-Watt University, Edinburgh, United Kingdom

Physical nature, manifestations and applications a new phenomenon, spectral self-phase conjugation in stimulated Brillioun scattering, will be discussed. We show that by its nature this phenomenon is inherent to stimulated scattering in general.

IE1-4-TUE 09:30

Propagation of femtosecond filaments in air: (3+1) dimensional numerical simulations versus experiments

S. Champeaux, L. Bergé, CEA/DAM, Bruyères-le-Châtel, France; D. Gordon, A. Ting, J. Penano, P. Sprangle, Plasma Physics Division, Naval Research Laboratory, Washington DC, USA

The three-dimensional dynamics of multiple filaments created from ultrashort laser pulses in air is investigated numerically and experimentally. Semi-quantitative agreement is achieved for appropriate nonlinear Kerr responses varying with the input pulse durations.

ROOM 4b

IF2-3-TUE 09:00

Quantum image generation by c.w. optical parametric amplification

L. Lopez, N. Treps, C. Fabre, Laboratoire Kastler Brossel, Paris, France; A. Maître, Institut des Nanosciences de Paris, France

We experimentally show that a c.w. OPO inserted in a degenerate cavity is a noiseless quantum amplifier of input images, which produces amplitude-squeezed images and quantum-correlated clones of the input image.

IF2-4-TUE 09:15

Multi-dimensional photonic entanglement: tuning in the number of modes

B.J. Pors, M.P. van Exter, S.S.R Oemrawsingh, E.R Eliel, J.P Woerdman, University Leiden, Netherlands

We present the observation of high dimensional spatial entanglement of twin photons, in a setting where the number of participating modes can be tuned at will. The effect on coincidence events is investigated.

IF2-5-TUE 09:30

Spatial quantum correlations induced by random multiple scattering of quadrature squeezed light

P. Lodahl, Technical University of Denmark, Lyngby, Denmark

We predict that spatial quantum correlations are induced when quadrature squeezed light is multiple scattered through a random medium. The correlations should be observable for realistic experimental parameters.

ROOM 12

CE2-2-TUE 09:00

Microstructured polymer lasers: diode-pumped lasing and extending operation lifetimes

G.A Turnbull, A.E Vasdekis, S. Richardson, G. Tsiminis, L. O'Faolain, T.F. Krauss, I.D.W Samuel, University of St Andrews, St Andrews, United Kingdom

We demonstrate directly diode-pumped polymer lasers using a novel surface-emitting Bragg reflector resonator, and energy-transfer blend. We also report improved operating lifetimes (exceeding 10 million pulses) in encapsulated polymer distributed feedback lasers

CE2-3-TUE 09:15

Non-radiative decay processes in Er^{3+} organic complexes

A. Monguzzi, F. Meinardi, R. Tubino, Università Milano Bicocca, Milano, Italy

We report about the non-radiative decay processes in Er^{3+} organic complexes which are proposed like alternative to silica-based systems in optical amplifiers.

CE2-4-TUE 09:30

Laser dynamics and optical switching in organic distributed feedback lasers

M. Zavelani-Rossi, S. Perissinotto, G. Lanzani, Politecnico di Milano, Italy; M. Salerno, G. Gigli, Università degli Studi di Lecce, Italy

Distributed Feedback polymer lasers are realized by deposition or soft-lithograpy. Their dynamics is studied during lasing action by pump-probe experiments with femtosecond resolution. Ultrafast optical switching is demonstrated, potentially leading to hundred GHz repetition rate.

ROOM 13a

CA4-2-TUE 09:00

Continuous-wave solid-state Raman lasers generating at first and second Stokes wavelengths

V. Orlovich, A. Grabtchikov, P. Apanasevich, V. Lisinetskii, A. Kananovich, National Academy of Sciences, Minsk, Belarus; M. Schmitt, Friedrich-Schiller-University, Jena, Germany; W. Kiefer, S. Schlueker, B. Kuestner, University Würzburg, Germany; G. Krylov, Belorussian State University, Minsk, Belarus; M. Danailov, A.A Demidovich, Laser Lab Sincrotone, Trieste, Italy

We discuss experimental conditions for continuous-wave operation of solid-state Raman lasers which can generate radiation at the first and second Stokes wavelengths and their output characteristics.

CA4-3-TUE 09:15

Wavelength selectable Raman laser in the ultraviolet (266 to 321nm)

R.P Mildren, H. Ogilvy, J.A Piper, Centre for Lasers and Applications, Macquarie University, Australia

We report a 532nm pumped $KGd(WO_4)_2$ Raman laser with intracavity nonlinear harmonic mixing of the Stokes and fundamental fields in beta-barium borate. Selectable output amongst >20 wavelengths spanning 266-321nm is observed.

CA4-4-TUE 09:30

Continuous-wave high power green generation by intracavity frequency doubling of Nd-based thin-disk lasers

N. Pavel, Solid-State Quantum Electronics Laboratory, Bucharest, Romania; K. Lünstedt, K. Petermann, G. Huber, University of Hamburg, Germany

Intracavity frequency-doubling of $Nd:YVO_4$, $Nd:GdVO_4$ and Nd:YAG thin-disk lasers pumped at 0.81 microns yielded around 6 W of green light at 0.53 microns; more than 4 W was achieved from Nd-vanadates pumped at 0.88 microns.

ROOM 13b

CB4-3-TUE 09:00

Compact 1.55 µm room-temperature optically pumped photonic crystal mirror – VCSEL

S. Boutami, B. Ben Bakir, P. Regreny, J.L Leclercq, P. Viktorovitch, Institut des Nanotechnologies de Lyon, Ecully, France

We present a new class of compact VCSEL which one of the DBRs is entirely replaced by a single-layer Photonic Crystal Mirror. Single-mode polarized laser emission was obtained around 1.55µm.

CB4-4-TUE 09:15

Record-low thermal resistance, 12.5 Gbit/s capable flip-chip bonded 850 nm wavelength 2-D VCSEL arrays

H. Roscher, F. Rinaldi, R. Michalzik, A. Weigl, Institute of Optoelectronics, Ulm, Germany

We present a novel fully self-aligned fabrication scheme for high-speed flip-chip bonded 850nm wavelength two-dimensional VCSEL arrays enabling record-low thermal resistances as well as 3dB bandwidths of at least 14GHz and open 12.5Gbit/s eye patterns.

CB4-5-TUE 09:30

Red high-temperature AlGaInP-VCSEL

R. Rossbach, M. Eichfelder, M. Jetter, H. Schweizer, P. Michler, Universität Stuttgart, Germany

We present 660 nm high-temperature oxide-confined AlGaInP-based vertical-cavity surface-emitting lasers (VCSEL) at +170 C in pulsed operation. We use a model to describe the behavior of the device which will be compared to measured data.

ROOM 14a

CG1-2-TUE (09:00)

Controlled injection of electrons in a plasma wave

C. Rechatin, J. Faure, A. Lifschitz, A. Norlin, V. Malka, Laboratoire d'Optique Appliquée, Palaiseau, France

Injection of electrons in a laser-plasma accelerator was achieved by colliding two counterpropagating laser pulses. It results in a stable monoenergetic, tunable electron beam (15-300 MeV). Simulations corroborate important physical processes at play.

CG1-3-TUE (Invited) 09:15

Emerging applications of ultraintense lasers in sciences

J. Zhang, Shanghai Jiaotong University, Shanghai and Institute of Physics, CAS, Beijing, China; Y.T Li, Z.M Sheng, X. Lu, Q.L Dong, Z.Y Wei, , Shanghai Jiaotong University, Shanghai, China

The recent advances on Emerging Scientific Applications of Ultra-Intense Lasers are reviewed in this talk, including fast-ignition, laser-acceleration of electrons and ions, laser-plasma optics etc.

ROOM 14b

CK4-2-TUE 09:00

Ultralong-range propagation of plasmon-polaritons in a thin metal film on a one-dimensional photonic crystal surface

N. Konopsky, V. Alieva, Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow region, Russia

We present experimental results on ultra-long-range surface plasmon polaritons, propagating in a thin metal film on a one-dimensional photonic crystal surface over a distance of several millimeters.

CK4-3-TUE 09:15

Total light absorption in plasmonic nanostructures

T.V Teperik, Donostia International Physics Center, San Sebastian, Spain and Ins. of Radio Engineering and Electronics, Saratov, Russia; J.F Garcia [illegible]bajo, Ins. de Optica, Madrid [illegible]adio Eng[illegible], Saratov, Russia

CANCELLED

A p[illegible] model describing the total light absorption in plasmonic nanostructures in terms of the equivalent oscillating-current resonant circuit, which explains by referring it to the impedance matching condition at the plasmon resonance.

CK4-4-TUE 09:30

Design of high-Q surface cavities on perfect electric conductors

A. De Rossi, M. Carras, L. Stabellini, Thales Research & Technology, Palaiseau, France; G. Bellanca, Università di Ferrara, Italy

Existence of surface resonant modes which are also localized around a point defect on a perfect-electric-conductor patterned surface is demonstrated numerically. Connecting radiation losses to the near-field suggests a design strategy to achieve high Q-factors.

ROOM BOR1

CI1-3-TUE 09:00

High performance configuration of all-Raman Nx40 Gbit/s RZ-DPSK systems over Ultrawave (TM) maps

M.P Fedoruk, O.V Shtyrina, A.V Yakasov, Ins. of Computational Technologies SB RAS, Novosibirsk, Russia; A.I Latkin, Ins. of Automation and Electrometry SB RAS, Novosibirsk, Russia; J.D Ania-Castanon, S.K Turitsyn, Aston Univ., Birmingham, UK; A. Tonello, S. Wabnitz, Lab. de Physique,Univ. de Bourgogne, Dijon, France; E. Pincemin, A. Tan, France Télécom, Division R&D, Lannionn, France

We study the impact of optimal system configuration for Nx40 Gbit/s WDM transmissions with the RZ-DPSK format and different Ultrawave(TM) fibre dispersion maps. Error-free 5x40 Gbits transmission over 600 km is predicted by simulations.

CI1-4-TUE 09:15

Theoretical study on the performance of optical phase conjugation for ultra long-haul differential phase-shift-keyed transmission

N. Sarapa, P. Kaewplung, Chulalongkorn University, Bangkok Thailand

The performances of optical phase conjugation (OPC) in reducing the nonlinear phase noise accumulation in DPSK transmission is theoretically analyzed and compared with that in the periodic dispersion-compensated (DC) system.

CI1-5-TUE 09:30

Tunable DPSK wavelength converter using an SOA-MZI monolithically integrated with a sampled-grating distributed bragg reflector

M.P Fok, C. Shu The Chinese University of Hong Kong, Hong Kong; J.A Summers, M.L Masanovic, D.J Blumenthal, University of California, Santa Barbara, USA

We experimentally demonstrate 10-Gb/s DPSK signal wavelength conversion using a sampled-grating distributed Bragg reflector laser-integrated SOA-MZI wavelength converter. The converted output is tunable over a range of 32 nm.

NOTES

ROOM 1

10:30 – 12:30

PL2 Session: CLEO®/Europe-IQEC 2007 Plenary 2 and EPS/QEOD, OSA Awards Ceremony and Julius Springer Prize

Chair: *Ennio Arimondo, Univ. of Pisa, Italy*

PL2-1-TUE (Plenary) 10:30

A passion for precision

T.W Hänsch, Max-Planck-Institute of Quantum Optics, Garching and Ludwig-Maximilians-University, Munich, Germany

For more than three decades, the quest for ever higher precision in laser spectroscopy of the simple hydrogen atom has inspired many advances in laser, optical, and spectroscopic techniques, culminating in femtosecond laser optical frequency combs as perhaps the most precise measuring tools known to man. Applications range from optical atomic clocks and tests of QED and relativity to searches for time variations of fundamental constants. Recent experiments are extending frequency comb techniques into the extreme ultraviolet. Laser frequency combs can also control the electric field of ultrashort light pulses, creating powerful new tools for the emerging field of attosecond science.

11:30

EPS/QEOD, OSA Awards Ceremony and Julius Springer Prize

ROOM 4a

IE1-5-TUE 09:45

Theory of photoluminiscence in J-aggregate microcavities

J. Chovan, Foundation for Research and Technology-Hellas, Heraklion, Greece; I.E Perakis, University of Crete and Foundation for Research and Technology-Hellas, Heraklion, Greece

We develop a microscopic theory of photoluminescence in J-aggregates microcavities in presence of exciton-phonon coupling. We discuss the polaronic effects and nature of mixed photon-exciton-phonon states, and show the control of photoluminiscence by Rabi energy.

ROOM 4b

IF2-6-TUE 09:45

Coherent imaging of a pure phase object with classical incoherent light

M. Bache, Technical University of Denmark, Lyngby, Denmark; E. Brambilla, L.A Lugiato, F. Ferri, D. Magatti, A. Gatti, Università dell'Insubria, Como, Italy

A ghost imaging scheme is implemented experimentally to demonstrate coherent imaging of a pure phase object with classical incoherent light. A striking complementarity is pointed out between the ghost imaging and the Hanbury-Brown-Twiss scheme.

ROOM 12

CE2-5-TUE 09:45

New organic salts for electro-optics and THz generation

B. Ruiz, Z. Yang, M. Jazbinsek, P. Günter, Swiss Federal Institute of Technology, Zurich, Switzerland

New stilbazolium salts were synthesized, one with about 1.5 times the nonlinearity of the well-studied DAST (4'-dimethylamino-N-methyl-4-stilbazolium tosylate) and the other with considerably improved capabilities for large-area bulk and thin film crystal growth.

ROOM 13a

CA4-5-TUE 09:45

Watt-level single-frequency tunable Nd:YLF/PPKTP red laser

R. Sarrouf, V. Sousa, T. Badr, G. Xu, J.J Zondy, Conservatoire National des Arts et Métiers, La Plaine Saint Denis, France

Intracavity second-harmonic generation of a diode-pumped unidirectional Nd:YLiF4 ring laser oscillating on the sigma-poalrized $^4F_{3/2}$ - $^4I_{13/2}$ transition (lambda~1314nm) with a temperature-tuned PPKTP crystal is reported, yelding up to 0,92W tunable (656-658nm) single-frequency output

ROOM 13b

CB4-6-TUE 09:45

1.3 and 1.5µm wavelength wafer fused InAlGaAs/InP - AlGaAs/GaAs VCSELs with high single mode output power

A. Caliman, E. Kapon, A. Mereuta, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland; V. Iakovlev, P. Royo, G. Suruceanu, A. Sirbu, BeamExpress S.A., Lausanne, Switzerland

1.3 and 1.5 µm wavelength VCSELs fabricated by double wafer fusion with record high single mode output power are presented. These devices are suitable for telecommunication and gas sensing applications.

ROOM 14b

CK4-5-TUE 09:45

Optical components for surface plasmon polaritons fabricated by two photon polymerization

S. Passinger, R. Kiyan, A. Stepanov, C. Reinhardt, B. Chichkov, Laser Zentrum Hannover e.V., Hannover, Germany

Applications of two-photon polymerization technique for the fabrication of optical components for surface plasmon polaritons are reported.

ROOM BOR1

CI1-6-TUE 09:45

NRZ-DPSK modulation format transmission analysis through SOA and gain-clamped SOA

P. Morel, A. Sharaiha, Laboratoire RESO, Ecole Nationale d'Ingénieurs de Brest, France

We investigate the performances of NRZ-DPSK modulation transmissions through conventional SOA and Gain-Clamped SOA. Simulations show that using a GC-SOA in presence of phase-amplitude coupling introduces a limited improvement compared to the conventional one.

NOTES

ROOM 1

14:30 – 16:00

IE2 Session: Frequency mixing and harmonic generation

Chair: *Martti Kauranen, Tampere University of Technology, Tampere, Finland*

IE2-1-TUE 14:30

Pulse spectral mapping with frequency doubling in random media

R. Fischer, W. Krolikowski, Y. Kivshar, D. Neshev, Australian National University, Canberra, Australia; S. Saltiel, Sofia University, Sofia, Bulgaria

We demonstrate exact mapping of the spectrum of the ultra-short pulses into the spectrum of their second harmonic by use of broadband phase-matched noncollinear second-harmonic generation in crystals with random ferroelectric domains.

IE2-2-TUE 14:45

Second-harmonic generation in all-dielectric resonant waveguide grating

M. Siltanen, S. Leivo, M. Kauranen, P. Voima, Tampere Univ. of Technology, Tampere, Finland; P. Karvinen, P. Vahimaa, M. Kuittinen, Univ. of Joensuu, Finland

We fabricate a lossless, dielectric resonance waveguide grating to enhance second-harmonic generation. The grating shows a sharp resonance for the fundamental wavelength leading to more than a factor of 150 enhanced second-harmonic intensity.

IE2-3-TUE 15:00

Noncollinear optical parametric amplification of cw light, continua and vacuum fluctuations

M. Breuer, E. Riedle, S. Lochbrunner, C. Homann, LS BioMolekulare Optik, Munich, Germany

A 2-stage noncollinear optical parametric amplifier is used to generate Fourier limited femtosecond and picosecond pulses from cw seed light in the visible and the NIR. Optical parametric generation makes the vacuum fluctuations directly visible.

ROOM 4a

14:30 – 16:00

IC1 Session: Joint session IB, IC & IF Quantum information theory

Chair: *Philippe Grangier, Institut d'Optique, Orsay, France*

IC1-1-TUE 14:30

Strongly interacting polaritons in coupled arrays of cavities

M.J Hartmann, F.G.S.L. Brandao, M.B Plenio, Imperial College, London, United Kingdom

We show that polaritons, atom-photon excitations, in an array of coupled cavities can form a strongly interacting many-body system governed by a Bose-Hubbard Hamiltonian with repulsive or attractive interactions where single sites can be addressed.

IC1-2-TUE 14:45

Quantum processing photonic states in optical lattices

C.A Muschik, I. de Vega, D. Porras, J.I. Cirac, Max Planck Institute for Quantum Optics, Garching, Germany

Cold atoms in an optical lattice are used to perform a two qubit gate for photons. Light states are tranferred to a collective atomic excitation and then processed with controlled collisions.

IC1-3-TUE 15:00

Signatures for generalized macroscopic and S-scopic superpositions

M.D. Reid, E.G. Cavalcanti, ARC Centre of Excellence for Quantum-Atom Optics, Brisbane, Australia

We consider constraints imposed on statistics if the density operator is a mixture of microscopic superpositions. We thus develop signatures for macroscopic superpositions that may be applied to squeezed and entangled fields and atomic ensembles.

ROOM 4b

14:30 – 16:00

IA1 Session: Atom chips

Chair: *Victor Balykin, Russian Academy of Sciences, Troitsk, Moscow, Russia*

IA1-1-TUE 14:30

Permanent magnet atom chips for BEC and microtrap arrays

S. Whitlock, University of Amsterdam, Netherlands and Swinburne Univ. of Technology, Melbourne, Australia; R.J.C Spreeuw, R. Gerritsma, Th. Fernholz, Univ. of Amsterdam, Netherlands

Using a fully self-biasing permanent magnet atom chip we produce a Bose-Einstein condensate which we study by radio frequency spectroscopy. We report on our new chip, hosting ring structures and vast arrays of microtraps.

IA1-2-TUE (Invited) 14:45

Microchips for single atom detection and spin squeezing

V. Vuletic, M. Schleier-Smith, I. Leroux, I. Teper, Y.J Lin, Massachusetts Institute of Technology, Cambridge, USA

We discuss resonator-aided optical detection of atoms in a magnetic microtrap. Single atoms are detected with 75% efficiency. We report progress towards quasi-spin squeezing for operation of an atomic clock below the standard quantum limit.

ROOM 12

14:30 – 16:00

CE3 Session: LEDs and semiconductor lasers

Chair: *Olivier Gauthier Lafaye, LAAS-CNRS, Toulouse, France*

CE3-1-TUE 14:30

High-efficiency light-emission from novel GaAs deep-centers for high-speed 1.5µm fiber-optics

J.L Pan, Yale University, New Haven, USA

We demonstrate the first LEDs at 1.3-1.5µm using GaAs deep-centers having higher (90%) efficiencies and larger Einstein B-coefficients than bulk InGaAs. An observed absence of deep-center self-absorption (Franck-Condon shift) could make possible near-zero threshold lasers.

CE3-2-TUE 14:45

Techniques to improve MWIR light emitting diode emission power

N.C Das, W. Chang, Army Research Laboratory, Adelphi, USA

We used various techniques like substrate thinning, surface texturing, antireflection coating and side wall mirror to improve MWIR LED emission. Light emission power increased by ten times due to thinning and texturing of emission surface.

CE3-3-TUE (Invited) 15:00

High power and high external efficiency m-Plane InGaN LEDs

M.C Schmidt, K.C Kim, N. Fellows, H. Sato, H. Masui, S. Nakamura, S.P DenBaars, J.S Speck, UCSB Materials, University of California, Santa Barbara, USA

World record performance for m-plane GaN LEDs has been demonstrated, marking the first time nonpolar GaN LEDs have performed on par with state-of-the-art c-plane LEDs.

ROOM 13a

14:30 – 16:00

CA5 Session: Ultraviolet and visible laser sources

Chair: *Günter Huber, University of Hamburg, Germany*

CA5-1-TUE 14:30

High-power GaN diode-pumped continuous wave Pr^{3+}-doped $LiYF_4$ laser

K. Hahimoto, F. Kannari, Keio University, Yokohama, Japan

We report GaN laser diode pumped CW laser emission of $PrLiYF_4$. The laser emits more than 90 mW of output power at 639 nm. The threshold and slope efficiency were 8 mW and 38% respectively.

CA5-2-TUE 14:45

Visible laser emission of solid state pumped $LiL_uF4:Pr^{3+}$

F. Cornacchia, D. Parisi, M. Tonelli, NEST - Dipartimento di Fisica dell'Universita' di Pisa, Italy; A. Richter, E. Heumann, G. Huber, University of Hamburg, Germany

We report on the growth, spectroscopy and laser results of LLF:Pr. We measured polarized absorption and emission spectra, and decay time. Laser emission has been obtained in the visible range under solid state pumping.

CA5-3-TUE (Invited) 15:00

High-power, high-repetition UV beam generation with an all-solid-state laser

T. Katsura, T. Kojima, M. Kurosawa, J. Nishimae, M. Seguchi, K. Yasui, Mitsubishi Electric Corporation, Advanced Technology R&D Center, Amagasaki, Japan; Y. Honda, M. Yoshimura, T. Eiro, Y. Mori, T. Sasaki, Graduate School of Engineering, Osaka, Japan

We developed the linearly-polarized 300-W TEM00 Q-switched Nd:YAG laser. With high quality CLBO for fourth- and fifth- harmonic generation or CBO for third-harmonic generation, 27.9-W 266-nm, 10.2-W 213-nm at 10 kHz and 103-W 355-nm at 20 kHz were obtained.

ROOM 13b

14:30 – 16:00

CB5 Session: VCSELs II: Device physics

Chair: *Tomasz Czyszanowski, Polytechnic University, Lodzka, Poland*

CB5-1-TUE (Invited) 14:30

Active mode control in VCSEL-based photonic crystal superlattices

L.D.A Lundeberg, E. Kapon, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

We demonstrate active control of photonic envelope functions in VCSEL-based, separate-contact photonic crystals (PhCs). Tuning the gain distribution across the three coupled PhC islands yields beam switching due to envelope function coupling and localization.

CB5-2-TUE 15:00

Transition to spatially incoherent emission of a broad-area VCSELs: evolution of beam profiles, spectra and coherence properties

G. Verschaffelt, M. Peeters, I. Fischer, Vrije Univ. Brussel, Belgium; S.K Mandre, W. Elsässer, Darmstadt Univ. of Technology, Darmstadt, Germany

Using time-resolved measurements of the near-field, far-field, spectrum and coherence properties we explore under which conditions and on what time-scale broad-area vertical-cavity surface-emitting lasers can be driven into the regime of spatially incoherent emission.

ROOM 14a

14:30 – 16:00

CG2 Session: Ultrafast dynamics at XUV/ x-ray wavelengths

Chair: *Eric Constant, CELIA, Bordeaux, France*

CG2-1-TUE (Keynote) 14:30

Attosecond spectroscopy comes of age

R. Kienberger, Max-Planck-Institut für Quantenoptik, Garching, Germany

Processes in atoms, molecules, and solids are triggered or mediated by the motion of electrons. Recent breakthroughs in laser science are opening the door to watching and controlling these electronic dynamics that unfold within tens to thousands of attoseconds.

ROOM 14b

14:30 – 16:00

CK5 Session: Imaging and spectroscopy in PCs

Chair: *Florian Kulzer, ICFO, Castelldefels, Spain*

CK5-1-TUE 14:30

Protein detection with a planar photonic-crystal sensor

N. Skivesen, A. Têtu, M. Kristensen, J. Kjems, Aarhus Univ., Aarhus, Denmark; L.H Frandsen, P.I Borel, Technical Univ. of Denmark, Lyngby, Denmark

We present a planar photonic-crystal biosensor. Experiments show refractive index measurements in good agreement with simulations and preliminary results show successful detection with excellent signal to noise ratio of proteins with concentrations around 10^{-6} g/ml (0.15^{-6} Molar).

CK5-2-TUE 14:45

High NA Fourier space imaging of planar photonic crystals

N. Le Thomas, R. Houdré, Ecole Polytechnique Fédérale de Lausanne, Switzerland; M.V Kotlyar, T.F Krauss, University of St Andrews, UK

Fourier space imaging is used to retrieve the intrinsic properties of planar photonic crystal structures. A superresolution technique based on size effects of the structures gives access to the dispersion curves below the light cone.

CK5-3-TUE 15:00

Imaging and manipulating confined electromagnetic fields in photonic crystal nanocavities with SNOM probes

B. Cluzel, Univ. de Bourgogne, Dijon, France; F. de Fornel, L. Lalouat, CNRS, Dijon, France; P. Vehla, E. Picard, E. Hadji, MINATEC, CEA, Grenoble, France; S. Callard, Ch. Seassal, X. Letartre, A. Rahmani, Ecole Centrale de Lyon, Ecully, France; P. Lalanne, D. Peyrade, CNRS, Palaiseau, France

By using the optical near-field microscopy technique coupled to microphotoluminescence or transmittance experiments, we investigate the optical near-field properties of photonic crystal nanocavities and evidence the near-field probe ability to manipulate their resonances.

ROOM BOR1

14:30 – 15:45

CI2 Session: Optical regeneration

Chair: Periklis Petropoulos, University of Southampton, United Kingdom

CI2-1-TUE 14:30

Self-phase modulation-based 2R optical regenerator for the simultaneous processing of two WDM channels

L.A Provost, C. Finot, P. Petropoulos, F. Parmigiani, D.J Richardson, Optoelectronics Research Centre, Southampton, United Kingdom

We report a Self-Phase Modulation-based 2R optical regenerator enabling simultaneous processing of two signals using a counter-propagating scheme. We show the impact of cross-talk is small and that excellent regeneration characteristics are obtained for each channel.

CI2-2-TUE 14:45

40 Gbit/s WDM all-optical regeneration using a fibre-based device

B. Cuenot, A.D Ellis, Tyndall National Institute, UCC, Cork, Ireland

Using quasi-continuous filtering principle in a non-linear fibre, we present an optical device simultaneously regenerating 4 channels at 40 Gbit/s with 600 GHz channel spacing. Simulations predict an improvement of the signal quality for the 4 channels by more than 6.8 dB.

CI2-3-TUE 15:00

Phase-preserving signal regeneration by a nonlinear amplifying loop mirror

K. Sponsel, B .Schmauss, K. Cvecek, C. Stephan, G. Onishchukov, G. Leuchs, University of Erlangen-Nuremberg, Erlangen, Germany

The influence of different parameters on the shape of nonlinear amplitude and phase transfer characteristics of a nonlinear amplifying loop mirror and the physical limitations on its regeneration abilities have been numerically investigated.

ROOM B11

14:30 – 16:00

TF1 Session: Industrial applications of ultrafast technology – I

Chair: *Wilson Sibbett, University of St. Andrews, United Kingdom*

TF1-1-TUE (Invited) 14:30

Industrial perspectives on ultrafast fiber lasers

A. Tünnermann, Fraunhofer-Institute for Applied Optics and Precision Engineering, Jena, Germany; J. Limpert, S. Nolte, Friedrich-Schiller-University, Jena, Germany

We will review the achievements of high average power and high energy ultrafast ytterbium-doped fiber laser systems and their potential to revolutionize the high precision production technology

TF1-2-TUE (Invited) 15:00

Ultrafast lasers for nanomaterial growth and processing

S. Mao, University of California, Berkeley, USA

Recent progress of ultrafast laser-based nanoscale material growth and processing will be discussed, along with selected emerging applications of laser-produced nanomaterials in the development of renewable energy technologies.

ROOM 1

IE2-4-TUE 15:15

Light self-confinement via second harmonic generation in a 2D nonlinear photonic crystal waveguide

K. Gallo, University of Southampton, United Kingdom; A. Pasquazi, S. Stivala, G. Assanto, University Roma Tre, Rome, Italy

We demonstrate the possibility of counterbalancing diffraction via two concurrent processes of second harmonic generation in a hexagonally poled $LiNbO_3$ planar waveguide and investigate this new class of spatial solitary waves

IE2-5-TUE 15:30

Angle-dispersion compensation and phase characterization of multiple CARS signals in $LiNbO_3$ towards extremely-short optical pulse generation

E. Matsubara, R. Morita, T. Sekikawa, M. Yamashita, Hokkaido University, Sapporo, Japan

We compensated angle dispersion of multiple CARS signals from a noncollinearly-pumped $LiNbO_3$ crystal by modifying a conventional 4-f configuration, and characterized the spectral phase of signals using the cross-reference SPIDER.

IE2-6-TUE 15:45

Generation of multiply charged optical vortices and spatiotemporal helical beams using cascaded four-wave mixing

A.V Gorbach, D.V Skryabin, University of Bath, United Kingdom

We demonstrate how fourwave mixing can lead to cascaded excitation of multiply charged optical vortices and generation of ultra-short spatio-temporal helical beams and solitons. Phenomenon of self-focusing in defocusing materials is presented and explained.

ROOM 4a

IC1-4-TUE 15:15

Quantum computation and quantum simulation with Coulomb crystals

D. Porras, J.I Cirac, Max-Planck-Institut für Quantenoptik, Garching, Germany

In this work we show that large two dimensional Coulomb crystals in Penning traps are well suited for quantum computation. Furthermore, this system can be used for the quantum simulation of frustrated spin models.

IC1-5-TUE 15:30

A continuous-variable quantum memory for light

A. Dantan, University of Aarhus, Denmark; J. Cviklinski, M. Pinard, J. Ortalo, E. Giacobino, Laboratoire Kastler-Brossel, Paris, France

We propose a general and robust scheme to transfer with high efficiency a quantum state of light to the ground state coherence of an atomic ensemble. This coherence also enables producing tripartite atom-light intrication.

IC1-6-TUE 15:45

Photonic phase transitions, spin models, and QIP in coupled cavity arrays

G. Angelakis, Centre for Quantum Computation, Cambridge, United Kingdom; M.F Santos, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil; S. Bose, University College London, United Kingdom

We demonstrate how a photonic insulator type of phase(Mott phase) can arise in an array of coupled high Q electromagnetic cavities and show how to drive the system to a superfluid state

ROOM 4b

IA1-3-TUE 15:15

Microwave near-fields on atom chips

P. Treutlein, P. Böhi, J. Hoffrogge, T.W Hänsch, Max-Planck-Ins. of Quantum Optics and Ludwig-Maximilians-Univ., Munich, Germany; J. Reichel, Lab. Kastler Brossel de l'E.N.S., Paris, France

We have integrated microwave near-fields on an atom chip. Dressed-state potentials generated by the microwaves can be used for state-selective coherent manipulation of atoms with applications in quantum information and atom interferometry.

IA1-4-TUE (Invited) 15:30

Strong atom-cavity coupling observed for trapped single atoms and Bose-Einstein condensates on an atom chip

Y. Colombe, J. Reichel, G. Dubois, Lab. Kastler Brossel de l'E.N.S., Paris, France; T. Steinmetz, Lab. Kastler Brossel de l'E.N.S., Paris, France and Max Planck Ins. on Quantum Optics, Munich, Germany; D. Hunger, P. Treutlein, T.W Hänsch, Max Planck Ins. on Quantum Optics, Munich, Germany; B. Lev, JILA, Boulder, CO, USA

We have used a fiber Fabry-Perot cavity on an atom chip to obtain strong, extremely stable atom-cavity coupling for single atoms and Bose-Einstein condensates trapped inside the cavity. This enables qubit detection with near-unit efficiency.

ROOM 12

CE3-4-TUE 15:30

Near field optical imaging of carrier localization in AlxGa1-xN alloys

V. Dierolf, P. Capek, L. Zhou, N. Jha, Lehigh University, Bethlehem, USA; M. Wraback, A.V Sampath, U.S. Army Research Lab, Adelphi, USA

Using UV-near-field optical spectroscopy and AlGaN layers that exhibit a strong, redshifted emission band, we demonstrate the existence of different localization regions that can be excited selectively with excitation below the bandgap.

CE3-5-TUE 15:45

SiC heteropolytype structures for optical applications

A.A Lebedev, V.V Zelenin, A.N Kuznetsov, P.L Abramov, S.Yu Davydov, A.S Tregubova, A.N Smirnov, A.F.Ioffe Physico-Technical Institute, St.Petersburg, Russia

In the present paper investigation of electrical characteristics of 3C-SiC/6H-SiC heterojunction grown by sublimation in vacuum was done. A conclusion is made that SiC heterostructures are promising for application in modern optical-electronic devices.

ROOM 13a

CA5-4-TUE 15:30

High energy, single-mode, all-solid-state and tunable UV laser transmitter

N.S Prasad, U.N Singh, NASA Langley Research Center, Hampton, USA; F. Hovis, Fibertek, Inc., Herndon, USA

In this paper, an all-solid-state, conductively-cooled, diode-pumped, single-longitudinal-mode, and short-pulsed Nd:YAG laser generating >1 J/pulse energy for pumping nonlinear optics based UV transmitters suitable for ozone sensing measurements from space-based platforms is discussed.

CA5-5-TUE 15:45

450 nm blue laser emission of an intracavity-doubled Nd:ASL crystal pumped by an extended-cavity tapered laser diode

D. Paboeuf, G. Lucas-Leclin, P. Georges, Lab. C. Fabry de l'Ins. d'Optique, Palaiseau, France; B. Sumpf, G. Erbert, Ferdinand Braun Institut für Höchsfrequenztechnik, Berlin, Germany; C. Varona, P. Loiseau, G. Aka, Lab. de Chimie de la Matière Condensée, Paris, France; B. Ferrand, CEA – LETI, Grenoble, France

We have developed a 798-nm-stabilized high-brightness tapered laser diode to pump a Nd:ASL crystal. We obtained an IR laser power of 230 mW and 42 mW at 450 nm by second harmonic generation.

ROOM 13b

CB5-3-TUE 15:15

Speckle phenomena in pulsed broad-area vertical-cavity surface-emitting laser emission under different driving and illumination conditions

F. Riechert, Univ. of Karlsruhe, Germany; M. Peeters, I. Fischer, G. Verschaffelt, Vrije Univ. Brussel, Belgium; G. Bastian, U. Lemmer, Univ. of Applied Sciences, Trier, Germany

We present results of laser-speckle measurements with a pulsed Broad-Area-VCSEL illumination source in different setups. We obtained speckle contrasts below the four percent non-uniformity human recognition limit without any additional speckle reduction techniques.

CB5-4-TUE 15:30

Linewidth of electrically pumped long-wavelength MEMS VCSELs

B. Kögel, H. Halbritter, S. Jatta, P. Meissner, Tecnical University, Darmstadt, Germany; M. Maute, G. Böhm, M.C Amann, Walter Schottky Institut, Garching, Germany

Linewidth characteristics of micro-machined surface-emitting lasers at 1.55µm using the self-heterodyning technique are presented. We implemented electro-thermally tunable MEMS to reduce the mechanical noise and thus achieved the narrowest linewidth for MEMS VCSELs of 32MHz.

CB5-5-TUE 15:45

Gain, dichroïsm and quantum efficiency of Sb-based Quantum-Well VCSELs

A. Garnache, A. Bouchier, A. Ouvrard, L. Cerutti, Université Montpellier II, Montpellier, France; E. Cerda-Méndez, Universidad Autonoma de San Luis Potosi, San Luis Potosi, Mexico

We present experimental and theoretical studies on the gain value and its dichroism along in-plane crystal axes, and the quantum efficiency properties of Sb-based strained type-I quantum-well VCSELs emitting at 2.3micron

ROOM 14a

CG2-2-TUE (Invited) 15:30

Sub-20 fs time resolved EXAFS at the Si K edge

E. Seres, EP1, University Würzburg, Germany and T.U. Vienna, Austria; Ch. Spielmann, EP1, University Würzburg, Germany

We followed the modification of the x-ray absorption spectrum above the K-edge of Silicon after excitation with intense laser pulses and gathered information about the carrier and structural dynamics with sub-20 fs resolution.

CG2-3-TUE 15:45

X-ray absorption spectroscopy in the keV range with laser generated high harmonic radiation

E. Seres, University Würzburg, Germany and Technical University Vienna, Austria; Ch. Spielmann, University Würzburg, Germany; J. Seres, Technical University Vienna, Austria

By irradiating He with ultrashort laser pulses coherent x rays up to 3.5 keV were generated. From the fine structure of the x-ray absorption they estimated the interatomic distance at the Si K-edge.

ROOM 14b

CK5-4-TUE 15:15

Single-molecule fluorescence control through metallic slabs and superlenses

R. Carminati, L.S Froufe, Ecole Centrale Paris and CNRS, Chatenay-Malabry, France

We show that the fluorescence of a single molecule can be controlled at large distance through a slab of metallic or negative index material. The analysis is illustrated by numercial examples.

CK5-5-TUE 15:30

Hyperspectral imaging of gold dimmers

M. Bashevoy, F. Jonsson, N. I. Zheludev, University of Southampton, United Kingdom; F.J Garcia de Abajo, Instituto de Optica, CSIC, Madrid, Spain; I.Pastoriza-Santos, L.M Liz Marzan, Universidade de Vigo, CSIC, Vigo, Spain

We report on the first realization of hyperspectral imaging for visualization and excitation of plasmon modes in dimers of 100 nm gold decahedra by a scanning electron beam.

CK5-6-TUE 15:45

Highly efficient SERS inside microstructured optical fibres via optical mode engineering

A.C. Peacock, J.J. Baumberg, P.J.A Sazio, A. Amezcua-Correa, University of Southampton, United Kingdom; J. Yang, S.M. Howdle, University of Nottingham, United Kingdom

We report deposition of silver nanoparticles into the voids of microstructure optical fibres specifically engineered for large field/particle overlaps. A highly efficient SERS response is obtained when the excitation beam is guided in the core.

ROOM BOR1

CI2-4-TUE 15:15

Regenerative properties of asynchronous digital optical regenerator using a single EAM

C.W Chow, A.D Ellis, Tyndall Natonal Institute, UCC, Cork, Ireland

We demonstrated the design of a 40Gbit/s asynchronous optical regenerator using a single EAM, which retimes incoming packets to a local clock and which is expected to alleviate stringent link synchronization constraints in optical networks.

CI2-5-TUE 15:30

Analysis of the effects of pulse shape and width on the retiming properties of a 3R regenerator

D. Zibar, L.K Oxenloewe, J.M Moerk, A.T Clausen, P. Jeppesen, Technical University, Kgs. Lyngby, Denmark

We investigate jitter (retiming) transfer function of the 3R regenerator in the presence of recovered clock signal. Jitter performance of a 3R significantly improves for square data signal pulses and decreasing control signal pulse width.

ROOM B11

TF1-3-TUE (Invited) 15:30

Next generation ultrafast telecommunications technologies

M. Nakazawa ,Tohoku University, Sendai, Japan

Recent progress on ultrafast transmission technology including a differential phase technique is reviewed. Then, we describe a new scheme for 160 Gbit/s distortion-free high speed transmission which employs time-domain optical Fourier transformation and TL pulses.

TUESDAY / ORAL

ROOM 1

16:30 – 18:00

IE3 Session: Ultrafast dynamics of excitonic systems

Chair: *Ilias Perakis, Univ. of Crete, Greece*

IE3-1-TUE (Invited) 16:30

Femtosecond terahertz studies of excitons

R. Huber, Univ. of Konstanz, Germany and E.O. L. Berkeley National Lab., Berkeley, USA; B.A Schmid, R.A Kaindl, D.S Chemla, E.O. L. Berkeley National Lab., Berkeley, USA

Broadband terahertz pulses resonantly probe the internal fine structure of excitons in semiconductors. We study renormalization of excitonic correlations at high densities and observe a novel quantum phenomenon: stimulated terahertz emission from intra-excitonic transitions.

IE3-2-TUE 17:00

Damping of Rabi oscillations in InAs quantum dots due to acoustic phonons

T. Moldaschl, T. Müller, S. Golka, G. Strasser, K. Unterrainer, Vienna University of Technology, Vienna, Austria

We present measurements of excitonic ground state Rabi oscillations in InAs quantum dots. From comparison with spectral hole burning data we find that acoustic phonon-induced dephasing processes damp the Rabi oscillations.

ROOM 4a

16:30 – 18:00

IC2 Session: Joint Session IC & IF Atoms and photons in a cavity

Chair: *Rainer Blatt, Univ. of Innsbruck, Austria*

IC2-1-TUE 16:30

Atom-photon entanglement in a cavity

T. Wilk, S.C Webster, G. Rempe, Max-Planck-Institut für Quantenoptik, Garching, Germany; A. Kuhn, Clarendon Laboratory, Oxford, United Kingdom

We observe atom-photon entanglement inside an optical cavity. The high photon emission and detection efficiencies achieved in our scheme allow measuring the atom's internal state by mapping it onto a second photon.

IC2-2-TUE 16:45

Controlled insertion of one and two atoms into a high-finesse optical cavity

W. Alt, I. Dotsenko, T. Kampschulte, M. Khudaverdyan, S. Reick, A. Stiebeiner, D. Meschede, Ins. for Applied Physics, Bonn, Germany; A. Rauschenbeutel, Ins. for Physics, Mainz, Germany

With an optical conveyor belt we transport one, two or more caesium atoms into a high-finesse optical cavity in the strong-coupling regime. We analyze the dynamics of the injected atoms and discuss entanglement schemes.

IC2-3-TUE 17:00

Trapping and observing single atoms in the dark

T. Puppe, I. Schuster, A. Grothe, A. Kubanek, K. Murr, P.W.H Pinkse, G. Rempe, Max-Planck-Institut für Quantenoptik, Garching, Germany

Single atoms strongly coupled to an optical cavity are stored in blue-detuned light fields. This eliminates the trap-induced light shift and allows dispersive observation of the atom reducing spontaneous scattering.

ROOM 4b

16:30 – 18:00

IG2 Session: Vortices and complexity

Chair: *Cornelia Denz, Univ. of Munich, Germany*

IG2-1-TUE 16:30

Synchronization of spatiotemporal disorder

K. Havermann, C. Denz, B. Gütlich, Westfälische Wilhelms Universität, Münster, Germany

We report on experimental synchronization of spatiotemporal disorder using two unidirectional coupled LCLV single feedback systems. After first successful research the role of spatial inhomogeneities is under observance. Higher degrees of synchronization are reached.

IG2-2-TUE 16:45

Spatio-temporal antiphase dynamics in mutually coupled nonlinear extended optical media

E. Louvergneaux, F. Rogister, P. Glorieux, Laboratoire de Physique des Lasers, Atomes et Molécules, Lille, France

Symmetry breaking of light beams counterpropagating through a system of two mutually coupled liquid crystal slices leading to spatial antiphase dynamics is demonstrated theoretically and experimentally.

IG2-3-TUE (Invited) 17:00

Experiments showing orbital angular momentum exchange with optical vortices

L.T Vuong, T.D Grow, A.I Ishaaya, A.L Gaeta, Cornell University, Ithaca, NY, USA; E.R Eliel, G. t'Hooft, Leiden University, Leiden, Netherlands

We demonstrate orbital angular momentum exchange between copropagating beams of different polarizations as a consequence of multiple-filamentation of optical vortices in Kerr self-focusing media.

ROOM 12

16:30 – 18:00

CE4 Session: Novel fabrication techniques

Chair: *Rosalia Serna, Ins. de Optica, Madrid, Spain*

CE4-1-TUE 16:30

Freestanding liquid micro-optics

G.A Turnbull, C. McDougall, J.D Stewart, M. Buck, University of St Andrews, St Andrews, United Kingdom

Free-standing liquid waveguides have been fabricated by patterning the surface wetting of a chemically modified metal substrate. We explore a range of optically significant geometries, and demonstrate optical guiding in water-cored channel waveguides

CE4-2-TUE 16:45

Two-step photolithographic technique for laterally coupled hybrid polymer microring resonators

D. Rezzonico, M. Jazbinsek, P. Günter, A. Guarino, Ch. Herzog, Federal Ins. of Technology, Zurich, Switzerland

We produced high-finesse (F=17) hybrid polymer microring resonators (50-microns radius) by means of a simple two-step photolithographic patterning technique allowing for clearing the submicrometer gap at the asymmetric coupler. Thermo-optic tuning by -0.2nm/K was demonstrated.

CE4-3-TUE 17:00

Quantitative determination of photosensitivity proximity effects in multi exposure direct UV writing for high density integrated optics

F.R Mahamd Adikan, C.B.E Gawith, J.C Gates, P.G.R Smith, University of Southampton, United Kingdom

UV direct writing is used to write planar channel waveguide gratings and simultaneously investigate photosensitivity proximity effects. Increases are seen up to 9micron away from the initial exposure with maximum effective index increase of 8.3×10^{-4}.

ROOM 13a

16:30 – 18:00

CA6 Session: High-energy laser systems

Chair: *Andy Clarkson, University of Southampton, United Kingdom*

CA6-1-TUE 16:30

Original high power oscillator Yb:YAG pumped by lasers diodes

S. Bahbah, D. Albach, J.C Chanteloup, G. Bourdet, G. Le Touze, M. Pluvinage, B. Vincent, Laboratoire LULI, Palaiseau, France

We are currently building a laser oscillator as a front end of 100J-10Hz Laser. With10J diode pumping, 4J have been obtained in free running mode and 260 mJ/60ns in Q-switch.

CA6-2-TUE 16:45

Development of 50J class repetitive laser based on Nd-doped silica glass

T. Sato, Y. Fujimoto, H. Okada, Y. Yoshida, M. Nakatsuka, Institute of Laser Engineering, Osaka University, Suita, Osaka, Japan; T. Ueda, A. Fujinoki, Research and Application Laboratory, Shin-Etsu Quartz Products Co., Ltd., Koriyama, Japan

We demonstrate a high energy laser oscillation (29J) in Nd doped silica glass (Nd_2O_3 1.34wt%, Φ 30 mm x 300 mm) with high thermal shock parameter (12W/cm).

CA6-3-TUE 17:00

Tabletop 300J 1ns Nd:glass laser with 3 diffraction-limited beam divergence

A.A Shaykin, A.N Mal'shakov, E.V Katin, E.A Khazanov, A.V Kirsanov, G.A Luchinin, M.A Martyanov, A.K Poteomkin, Institute of Applied Physics RAS, Nizhny Novgorod, Russia

A tabletop 300J Nd:glass laser is designed and constructed. The laser parameters are as follows: wavelength 1054nm, pulse duration 1.2ns, energy 300J, diameter of the laser final stage is 125mm, fill factor~0.8, and beam divergence~35urad.

ROOM 13b

16:30 – 18:00

CB6 Session: Quantum dot lasers

***Chair:** Mark Hopkinson, University of Sheffield, United Kingdom*

CB6-1-TUE 16:30

Comparative gain measurement study of high power quantum well and quantum dot lasers with high temperature stability of the emission wavelength

R. Debusmann, W. Kaiser, S. Höfling, A. Forchel, University of Würzburg, Germany

The high temperature stability of the emission wavelength of high power quantum dot lasers for uncooled pump applications is explained by comparative gain measurements of quantum dot and quantum well material.

CB6-2-TUE 16:45

Low threshold, very low noise, high temperature operation of 1.55 micrometre InP-based Fabry-Perot quantum dashes-in-a-well (DWELL) lasers

P. Resneau, M. Calligaro, B. Rousseau, F. Lelarge, M. Krakowski, Alcatel-Thales III-V Lab, Palaiseau, France

To investigate the reliability of our quantum dash lasers under continuous wave operation at 90 degrees Celsius we have performed static and noise characterisations. The results of these measurements prior ageing tests are presented

CB6-3-TUE 17:00

Threshold clamping in quantum dot lasers

P. Spencer, E. Clarke, P. Howe, R. Murray, Imperial College London, United Kingdom

Threshold clamping and the effects of inhomogeneous broadening on quantum dot lasers have been studied using a derivative spectroscopy technique with the results questioning the validity of a quasi-Fermi level picture at room-temperature.

ROOM 14a

16:30 – 18:00

CG3 Session: Attosecond metrology

***Chair:** Reinhard Kienberger, Max-Planck-Institut für Quantenoptik, Garching, Germany*

CG3-1-TUE (Invited) 16:30

Generating isolated attosecond pulses by modulating light polarization

E. Constant, CELIA, Université Bordeaux 1, Talence, France

I will present how to generate attosecond pulses by modulating the polarization of a light pulse. I will also present how to control and use these pulses for performing high temporal resolution pump-probe experiment.

CG3-2-TUE 17:00

Attosecond pulses in the few-cycle regime

G. Sansone, S. De Silvestri, S. Stagira, C. Vozzi, F. Calegari, E. Benedetti, M. Nisoli, National Lab. for Ultrafast and Ultraintense Optical Science CNR-INFM, Milano, Italy; L. Avaldi, R. Flammini, CNR-IMIP Area della Ricerca di Roma I, Monterondo Scalo, Italy; L. Poletto, P. Villoresi, Lab. for Ultraviolet and X-ray Optics Res., Padova, Italy; C. Altucci, R. Velotta, CNISM- Univ. Federico II, Napoli, Italy

We present the generation of isolated attosecond pulses using phase-stabilized 5-fs pulses with time dependent ellipticity. Using a complete temporal characterization technique, we demonstrate compression of the pulses down to 130 as (<1.2 optical cycles).

ROOM 14b

16:30 – 18:00

CK6 Session: Photonic crystal fibres

***Chair:** Richard De La Rue, Glasgow University, United Kingdom*

CK6-1-TUE (Tutorial) 16:30

New directions in photonic crystal fibres

P.St.J. Russell, Max-Planck Research Group, Erlangen, Germany

Photonic crystal fibres have given rise to numerous successful applications spanning many fields of science and technology, and opened up a number of new research directions. In this tutorial, key recent advances will be reviewed.

ROOM BOR1

16:30 – 17:45

CI3 Session: Advanced communication devices

***Chair:** Andrew Ellis, Univ. College of Cork, Ireland*

CI3-1-TUE 16:30

Gain and phase dynamics in an InAs/GaAs quantum dot amplifier at 1300nm

C. Koos, B.A Bolles, T. Vallaitis, R. Bonk, W. Freude, Ins. of High-Frequency and Quantum Electronics, Karlsruhe, Germany; M. Laemmlin, C. Meuer, D. Bimberg, Tecnical Univ., Berlin, Germany; A. Ellis, Tyndall National Ins., Univ. College Cork, Ireland; J. Leuthold, Ins. of High-Frequency and Quantum Electronics, Karlsruhe, Germany

Strong 3ps gain variations with only weak phase changes were measured with a pump-probe setup on an InAs/GaAs quantum dot amplifier at 1300nm. Such low-alpha factor devices are suited for cross-gain modulation based signal processing.

CI3-2-TUE 16:45

New passive all-optical semiconductor device for bit-1 level noise reduction

H. Trung Nguyen, G. Aubin, J.L Oudar, S. Bouchoule, Lab. de Photonique et de Nanostructures, CNRS-LPN, Marcoussis, France; S. Sauvage, Ins. d'Electronique Fondamentale, CNRS, Orsay, France

A novel approach for bit1 noise reduction is demonstrated, based on ultrafast vertical microcavity device. It allows a simple scheme for complete 2R regeneration, when combined with a state-of-the-art saturable absorber device.

CI3-3-TUE 17:00

Impact of the electro-optical modulator on CAPS code dispersion tolerance

P. Boffi, M. Martinelli, Politecnico di Milano, and CoreCom, Milano, Italy; L. Marazzi, P. Martelli, P. Parolari, A. Righetti, R. Siano, CoreCom, Milano, Italy

Combined Amplitude-Phase Shift code performance generated either by push-pull MZM or Phase Modulator are compared over uncompensated SSMF-links both experimentally and by simulations. The MZM solution over performs the PM solution achieving 225-km error-free propagation.

ROOM B11

16:30 – 18:00

TF2 Session: Industrial applications of ultrafast technology – II

***Chair:** Wilson Sibbett, Univ. of St. Andrews, UK*

TF2-1-TUE (Invited) 16:30

Spectral coherence interferometry (SCI) for fast and rugged industrial applications

A. Knüttel, F. Rammrath, ISIS Sentronics GmbH, Mannheim, Germany

ISIS sentronics has introduced Spectral Coherence Interferometry (SCI) as powerful 3D metrology tool for use in industrial production. Inner diameters from 1 mm up to 30 mm can be evaluated with the sensor generation RayDex.

TF2-2-TUE (Invited) 17:00

All-optical THz oscilloscope

A.Bartels, Gigaoptics GmbH, Konstanz, Germany

An all-optical oscilloscope based on high-speed asynchronous optical sampling (ASOPS) is presented. It acquires ultrafast optical signals of 1ns duration with 160fs resolution at a 10kHz scan-rate. THz spectroscopy and picosecond ultrasound based thin film characterization are discussed as applications.

TUESDAY / ORAL

ROOM 1

IE3-3-TUE 17:15

Investigation of Coulomb-induced coupling in semiconductor nanostructures using 2D Fourier-transform-spectroscopy

I. Kuznetsova, P. Thomas, T. Meier, Philipps-Univ., Marburg, Germany; T. Zhang, S.T Cundiff, JILA, University of Colorado, Boulder, USA

By comparing theoretical Two-Dimensional Fourier-Transform spectra resulting from different orders in the Coulomb interaction we can clearly identify the influence of the many-particle interaction on the various signatures that are visible in the spectrograms.

IE3-4-TUE 17:30

Ultrafast nonlinear optical response of the quantum Hall system

E. G Kavousanaki, I.E Perakis, University of Crete and Foundation for Research and Technology-Hellas, Heraklion, Greece; J. Tignon, Laboratoire Pierre Aigrain, Ecole Normale Supérieure, Paris, France; M. Breit, E.O. Lawrence Berkeley National Laboratory, Berkeley, CA, USA; K.M Dani, D.S Chemla, University of California at Berkeley and E.O. Lawrence Berkeley National Laboratory, Berkeley, CA, USA

We present a many-body theory of the nonlinear optical response of the quantum Hall system and discuss the manifestations of intraband and interband coherences induced by collective excitations of the two-dimensional electron gas.

IE3-5-TUE 17:45

Ultrafast exciton decay in microcrystalline pentacene films

S. Lochbrunner, H. Marciniak, M. Huth, S. Schiefer, B. Nickel, Ludwig-Maximilians-Universität, Munich, Germany

Femtosecond absorption measurements show that the primary excited excitons in microcrystalline pentacene films decay within 70 fs by charge separation in a species with a small emission cross section.

ROOM 4a

IC2-4-TUE 17:15

Generation of entangled photon pairs in optical cavity-QED: operating in the bad cavity limit

R. Garcia, K. Eckert, J. Mompart, R. Corbalan, Universitat Autonoma de Barcelona, Spain

We propose an optical cavity quantum electrodynamics scheme for the deterministic generation of polarization entangled photon pairs that operates with high fidelity even in the bad cavity limit.

IC2-5-TUE (Invited) 17:30

Quantum jumps of light recording the birth and death of a photon in a cavity

S. Kuhr, Lab. Kastler Brossel, Ecole Normale Supérieure, Paris, France and Johannes Gutenberg Univ., Mainz, Germany; S. Haroche, Collège de France, and Lab. Kastler Brossel, Ecole Normale Supérieure, Paris, France; J. M Raimond, M. Brune, S. Gleyzes, C. Guerlin, J. Bernu, S. Deléglise, U.B Hoff, Lab. Kastler Brossel, Ecole Normale Supérieure, Paris, France

We report on the first observation of photon number quantum jumps. Microwave photons stored in a high Q superconducting cavity are repeatedly probed by a stream of non-absorbing atoms performing a QND measurement.

ROOM 4b

IG2-4-TUE 17:30

Control of optical turbulence

C. Evain, S. Bielawski, C. Szwaj, Université des Sciences et Technologies de Lille, Villeneuve d'Ascq, France; A. Mochihashi, M. Katoh, UVSOR, IMS, Okazaki, Japan; M. Hosaka, Y. Takashima, Nagoya University Graduate School of Engineering, Nagoya, Japan; M.E Couprie, Synchrotron SOLEIL, Gif-sur-Yvette, France

We demonstrate theoretically (Ginzburg-Landau equation) and experimentally (on a free electron laser) the suppression of the "turbulent" regimes that can appear in optical systems with advection.

IG2-5-TUE 17:45

Rotating multipole vortex solitons in nonlocal media

D. Buccoliero, A. Desyatnikov, W. Krolikowski, Y. Kivshar, The Australian National Univ., Canberra, Australia

We introduce novel classes of soliton patterns with nontrivial phase structure in nonlocal nonlinear media. We demonstrate the rotational dynamics of tripole vortex solitons with nonzero angular momentum and the phase carrying two spiraling vortices.

ROOM 12

CE4-4-TUE 17:15

Lateral groove geometry for planar UV written evanescent devices - new flexibility, new devices

J.C Gates, C.H Holmes, F.R Mahamd Adikan, C.B.E Gawith, P.G.R Smith, Optoelectronics Research Centre, Southampton, UK

We demonstrate a lateral geometry for planar evanescent field devices. Using micro-machining prior to UV writing we create a new geometry which promotes tailoring of the interaction between the optical mode and its surroundings.

CE4-5-TUE 17:30

Sensitivity of photo-thermo-refractive glass to IR femtosecond pulses: application for the recording of phase elements

L. Siiman, J. Lumeau, L.B Glebov, University of Central Florida, Orlando, USA

We demonstrate the use of a Ti:sapphire amplified femtosecond laser to nonlinearly excite PTR glasses. Photosensitivity curves showing refractive index change versus intensity and dosage are presented. First Fresnel lens recorded in PTR is shown.

CE4-6-TUE 17:45

Femtosecond direct laser writing of buried diffractive optical elements in glasses

M.L Ng, S.M Eaton, D. Chanda, P.R Herman, University of Toronto, Canada

A high repetition rate (0.1-1.0 MHz) femtosecond laser was used for direct writing of 3-D diffractive optical elements in the bulk of various glasses by interlacing multi-layered periodic refractive index structures with sub-micron resolution.

ROOM 13a

CA6-4-TUE 17:15

High power in-band pumped Er:YAG laser at 1617 nm

J. W Kim, W.A Clarkson, J.K Sahu, The ORC, University of Southampton, United Kingdom

High power operation of an Er:YAG laser at 1617nm in-band pumped by a cladding-pumped Er,Yb fibre laser at 1532nm is reported. The Er:YAG laser yielded 23W of output for 68W of pump power.

CA6-5-TUE 17:30

Cryogenically cooled Er:YAG laser

M. Mark, N. Ter-Gabrielyan, G.A Newburgh, L.D Merke, US Army Research Laboratory, Adelphi, USA

Efficient resonantly diode-pumped Er:YAG cryo-laser at 1.6 μm is demonstrated. Slope efficiency of 71.5% per cavity absorbed power was achieved at 78K. Maximum quasi-CW power of over 63 W is reported.

CA6-6-TUE 17:45

Power scaling in resonantly diode-pumped 1.6-μm Er-doped lasers

N. Ter-Gabrielyan, L. Merkle, J.O White, M. Dubinskii, US Army Research Laboratory, Adelphi, USA

We present the results of design tradeoff study aimed at power scaling of resonantly diode-pumped eye-safe Er-doped lasers over a wide temperature range. Conclusions are based on a laser model anchored to experimental laser results.

ROOM 13b

CB6-4-TUE 17:15

Systematic study of the effects of delta-p-doping on 1.3 micrometers dot-in-well lasers

R. Alexander, D. Childs, H. Agarwal, K.M Groom, H.Y Liu, M. Hopkinson, R.A Hogg, T.J Badcock, M.S Skolnick, D.J Mowbray, Univ. of Sheffield,UK; M. Ishida, Y. Arakawa, Univ. of Tokyo, Japan; T. Yamamoto, M. Sugawara, Fujitsu Lab. Ltd., Atsugi, Japan

We systematically studied effects of increasing p-doping concentrations on Quantum Dot lasers and found: an increase in threshold current, gain and loss; gain profile narrowing; increasing infinite T0 temperature range; and higher k-factor limited bandwidth

CB6-5-TUE (Invited) 17:30

Quantum dot lasers/reliability of quantum dot lasers and perspectives for industrial applications

A. Kovsh, Innolume GmbH, Santa Clara, USA

Broad band QD lasers with lasing spectrum width above 80 nm and gain chips with tunability range of 200 nm and generated power above 500 mW, and their practical applications will be described.

ROOM 14a

CG3-3-TUE 17:15

Imaging of attosecond electron wave packets

M.F Kling, O. Ghafur, A. Engqvist, P. Johnsson, M.J.J Vrakking, FOM Ins. for Atomic and Molecular Physics, Amsterdam, Netherlands; G. Sansone, E. Benedetti, S. Stagira, M. Nisoli, Dep. of Physics, Politecnico, Milan, Italy; T. Remetter, J. Mauritsson, M. Swoboda, A. L'Huillier, Lund Univ., Lund, Sweden

Attosecond XUV-pulses were generated via the polarization-gating technique and used to ionize helium in the presence of a strong IR laser field. The dynamics of the resulting attosecond electron wave packets was recorded via velocity-map imaging.

CG3-4-TUE 17:30

Optical attosecond mapping by polarization selective detection

M. Kitzler, A. Scrinzi, A. Baltuska, Vienna University of Technology, Vienna, Austria

A general concept of using the spatial information encoded in the time-dependent polarization of high harmonic radiation generated by orthogonally polarized two-color laser fields is proposed and two applications to attosecond physics are demonstrated.

CG3-5-TUE 17:45

Single attosecond pulse generation using a seed harmonic pulse train

K.L Ishikawa, University of Tokyo, Japan; K. Midorikawa, E.J Takahashi, RIKEN, Wako, Japan

We theoretically present a new scheme of single attosecond pulse generation which does not require few-cycle lasers, based on enhanced harmonic generation by simultaneous irradiation of driving laser and seed harmonic pulse train.

ROOM 14b

CK6-2-TUE 17:30

Influence of air-filling fraction on forward Brillouin scattering in highly birefringent PCF

A. Brenn, H. Hundertmark, P.St.J Russell, University of Erlangen-Nuremberg, Germany; G.S Wiederhecker, University of Erlangen-Nuremberg, Germany and Universidade Estadual de Campinas, Brazil; N. Joly, University of Erlangen-Nuremberg, Germany and Laboratoire PhLAM, Université de Lille, France

We report on the effects of cladding air-filling fraction on the forward Brillouin scattering spectrum in highly birefringent PCF. Good agreement is achieved between experimental measurements and numerical simulations using a full-vectorial finite-element approach.

CK6-3-TUE 17:45

Reduction of guided acoustic wave Brillouin scattering in photonic crystal fibers

D. Elser, C .Marquardt, O. Glöckl, S. Lorenz, G. Leuchs, Ins. of Optics, Information and Photonics (Max Planck Res. Group), Erlangen, Germany; U.L Andersen, Technical Univ. of Denmark, Lingby, Denmark

By using Photonic Crystal Fibers, we modify the spectrum of Guided Acoustic Wave Brillouin Scattering. In a wide frequency range, this leads to a reduction of excess noise accumulated by quantum states propagating in fibers.

ROOM BOR1

CI3-4-TUE 17:15

DWDM transparent FSO system for ultrahigh bit rate applications

D.M Forin, ISCOM and Università di Roma, Italy; V. De Sanctis, M. Svaluto Moreolo, V. Sacchieri, G. Cincotti, Università Roma Tre, Rome, Italy; F.Curti, M. Guglielmucci, G.M Tosi Beleffi, ISCOM, Italian Comunication Ministry, Rome, Italy; A. Teixeira, Universidade de Aveiro, Portugal

Free Space Optic is a key solution for addressing the last hundred meters of broadband requirements. Transparent FSO experiments operating with a DWDM configuration at bit rates up to 40 Gbit/s is reported.

CI3-5-TUE 17:30

Novel synchronous time-domain spectral phase encoding/decoding scheme for secured optical communication

X. Wang, N. Wada, National Institute of Information and Commnunication Technology, Tokyo, Japan

We propose a novel synchronous time-domain spectral phase encoding/decoding scheme for secured optical communication. Proof-of-principle experiment is demonstrated to have good auto-/cross-correlation and error-free transmission at 1.25 Gbit/s with 8-chip, 10 Gchip/s optical codes.

ROOM B11

TF2-3-TUE (Invited) 17:30

Laser micromachining workstations

P. Chabassier, NOVALASE, Canejan, France

Ultra fast laser micro machining is becoming a very powerfull process to get high precision work in many difficult conditions and materials. We will present some important design rules for industrial laser workstation in this field.

POSTERS

ICM Foyer 13:30-14:30
CLEO®/Europe Poster Session

CE-1-TUE
Novel fabrication technique of proton-exchanged waveguide based on $LiNbO_3$ using inductively coupled plasma
Z. Ren, P.J. Heard, S.Yu, University of Bristol, Bristol, United Kingdom
A novel plasma-based technique has been developed for fabrication of Proton-exchanged nonlinear waveguides in $LiNbO_3$. High quality, uniform stripe waveguides with step-like proton-exchange profile and a low order crystal phase has been achieved.

CE-2-TUE
Effect of GeO_2 additive on fluorescence intensity enhancement in bismuth-doped silica glass
Y. Fujimoto, Y. Kuwada, M. Nakatsuka, Osaka University, Suita, Japan; Y. Hirata, Kinki University, Higashi-Osaka City, Japan
We have observed the enhancement of fluorescence intensity due to the addition of GeO_2 in bismuth-doped silica glass. Only 5.0 mol% of GeO_2 additive brought the 26.3 times fluorescence intensity compared with no additive.

CE-3-TUE
Enhanced photoinduced birefringence in hydrogen-bonded polymer-dye complexes
A. Priimagi, M. Kaivola, Helsinki University of Technology, Espoo, Finland; F. J. Rodriguez, M. Kauranen, Tampere University of Technology, Tampere, Finland
Photoinduced birefringence in azo-dye-doped polymers is strongly enhanced by hydrogen bonding between the guest molecules and the polymer host, which we attribute to lower aggregation tendency and reduced mobility of the dye molecules.

CE-4-TUE
Energy transfer in codoped Pr^{3+} doped YF_3 under VUV excitation
S. Kück, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; I. Sokolska, Peine, Germany
A general discussion of the dipole-dipole energy transfer between the Pr^1S_0 - $^1I_6$ transition in YF_3 and resonant transitions in different rare earth ions is given. Calculations and spectroscopic investigation are presented.

CE-5-TUE
Photoluminescence of Nd^{3+}:YLF crystalline nanofilms deposited on YLF substrates via pulsed laser ablation
S. Barsanti, P. Bicchi, A. Anwar-Ul Haq, F. Cornacchia, M. Tonelli, A. Di Lieto, University of Pisa, Pisa, Italy
We report the first realization of monocrystalline nanofilms of Nd^{3+} - doped fluoride on YLF substrates by pulsed laser deposition. The films optical characteristics are discussed and a first morphological study via SEM analysis is shown.

CE-6-TUE
Investigation of optical losses in visible and near-IR range in garnet epitaxial films doped with Cr and Nd-ions
V.B. Tsvetkov, I.A. Shcherbakov, General Physics Institute, Moscow, Russia; M.Y. Gusev, I.A. Ivanov, N.A. Neustroev, R&D Institute for materials research, Moscow, Russia
The characterization results of liquid phase epitaxy grown GGG and GSAG films doped with Nd^{3+} and Cr^{4+} ions are presented. The optimal growth conditions were determined for minimizing the optical losses in the films.

CE-7-TUE
Characterisation of multicore tellurite optical fibre
H.T. Bookey, R.R. Thomson, A. K. Kar, H. Li, W. MacPherson, J. Barton, Heriot Watt University, Edinburgh, UK; J. Lousteau, C. Hill, X. Jiang, A. Jha, University of Leeds, Leeds, UK
The fabrication and characterisation of three core tellurite glass fibre is reported. Near single-mode transmission is observed for each core. Multicore tellurite fibre has applications for devices in mid-infrared sensing and fibre laser arrays.

CE-8-TUE
Fabrication by rf-sputtering and diagnostics of Er^{3+}/Yb^{3+} - activated silica- hafnia waveguides
A. Chiasera, C. Armellini, M. Ferrari, Y. Jestin, CNR-IFN, Institute Photonics & Nanotechnology, Povo-Trento, Italy; A. Chiappini, M. Montagna, E. Moser, C.Tosello, Trento University, Trento, Italy; V. Foglietti, A. Minotti, CNR-IFN, Institute Photonics & Nanotechnology, Roma, Italy; G. Nunzi Conti, CNR-IFAC, Institute of Applied Physics, Firenze and Centro Fermi, Roma, Italy; S. Pelli, CNR-IFAC, Institute of Applied Physics, Firenze, Italia; G.C Righini, CNR-IFAC, Institute of Applied Physics, Firenze and CNR, Roma, Italia
SiO_2-HfO_2 planar waveguide activated with Er and Yb was fabricated by the rf-sputtering technique. Optical and spectroscopic properties were measured and channel waveguide were fabricated by etching the active film.

CE-9-TUE
Spectroscopic and scintillation performance of Ce:YAP single crystal fibers grown by μ-PD technique
M. Alshourbagy, D. Herbert, A. Del Guerra, A. Toncelli, M. Tonelli, Pisa University, Pisa, Italy
Growth,spectroscopic and scintillation performance of Ce:YAP single crystal fibers are described. The results demonstrate capability of the micro-pulling-down technique to produce the scintillator crystals to be device-ready shape

CE-10-TUE
Growth and optical characterization of $LiNbO_3$:Er^{3+} single crystal fibers
D. Parisi, M. Tonelli, A. Arcangeli, A. Toncelli, University of Pisa, Pisa, Italy
In this work we report the growth and spectroscopy results of $LiNbO_3$ single crystals fibers doped with different concentration of Erbium. The samples were grown using the micro pulling down technique.

CE-11-TUE
Photoluminescence, polarization, waveguiding and gain properties of organic semiconductor single crystals
A. Camposeo, M. Polo, R. Cingolani, D. Pisignano, National Nanotechnology Laboratory, Lecce, Italy; S. Tavazzi, L. Silvestri, P. Spearman, M. Campione, A. Papagni, A. Borghesi, Università di Milano Bicocca, Milano, Italy
Optical properties of organic semiconductor crystals are investigated. Self waveguiding and ASE is observed in quaterthiophene crystals. Tetracene crystals show superradiance at temperatures below 50 K, properties that make these materials suitable for laser devices.

CE-12-TUE
Comparative results on the recording of Type IIA gratings in B-Ge optical fibres using femtosecond and picosecond 248nm laser radiation
S. Pissadakis, G. Violakis, M.K. Konstantaki, Foundation for Research and Technology-IESL, Heraklion, Greece
Inscription of Type IIA gratings in B-Ge co-doped optical fiber is presented using 5ps, 500fs and 120fs, 248nm laser radiation. The photosensitivity behaviour dependence upon the intensity, energy density and accumulated energy is investigated.

CE-13-TUE
Reducing the impact of charge carrier induced absorption in organic double heterostructure laser diodes
C. Gaertner, C. Karnutsch, U. Lemmer, University of Karlsruhe, Karlsruhe, Germany
We investigate the behaviour of double heterostructure organic laser diodes under pulsed excitation by numerical simulation. By applying a reverse pulse, excited states and polarons are separated hence reducing the impact of charge carrier absorption.

CE-14-TUE
Free carrier lifetime measurements in SiGe/Si planar waveguides
A. Trita, I. Cristiani, V. Degiorgio, University of Pavia, Pavia, Italy; H. von Känel, D. Chrastina, Polo Regionale di Como, Como, Italy
Minority carrier lifetime in Si/SiGe/Si planar waveguides has been estimated measuring the free carrier absorption transient of an infrared probe beam. Electron-hole pair excitation is induced by a pulsed 810nm femtosecond laser beam.

CE-15-TUE
Light emission from LPCVD silicon nanocrystals: the effect of composition and annealing
K. Koukos, E. Scheid, O. Gauthier-Lafaye, E. Bedel-Pereira, L. Bouscayrol, S. Bonnefont, G. Sarrabayrouse, F. Lozes-Dupuy, LAAS-CNRS, Toulouse, France
Efficient photoluminescence is obtained from silicon nanocrystals embedded in SiO2 films, fabricated by LPCVD and subsequent annealing. From a systematic study of annealing conditions, we demonstrate that a RTA step after deposition enhances optical properties.

CE-16-TUE
Scanning near-field optical microscopy (SNOM) of lithium niobate aperiodically poled during growth
E. Cantelar, J. Lamela, J.A. Sanz-Garcia, G. Lifante, F. Cusso, F. Jaque, Universidad Autonoma de Madrid, Madrid, Spain; J. Canet-Ferrer, J. Martinez-Pastor, Universitat de Valencia, Valencia, Spain
Scanning near-field microscopy (SNOM) of lithium niobate aperiodically poled during crystal growth is studied. Reflectivity variations across the domain walls and its dependence with domain size are discussed.

CE-17-TUE
Ultra thin metal films for transparent conductive layers
S. Giurgola, P. Vergani, F. Lucchi, Avanex Corp., San Donato, Milanese, Italy; V. Pruneri, ICFO - Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain
We have obtained ultra thin metal films (thickness < 5nm), suitable for transparent

electrodes, with optical transmittance and electrical resistivity comparable to transparent conducting oxides. Influence of surface roughness on electrical and optical properties is discussed.

CE-18-TUE
Dispersion and thermo-optical parameters of $KY(WO_4)_2$, $Yb:KY(WO_4)_2$ and $KGd(WO_4)_2$ crystals in the visible spectral range
V.V. Filippov, I.T. Bodnar, B.I. Stepanov, National Academy of Sciences of Belarus, Minsk, Belarus; N.V. Kuleshov, Belarus National Technical University, Minsk, Belarus
Principal refractive indices and their temperature dependence were measured for KGW, KYW and Yb(20%):KYW crystals in the visible. Thermo-optical coefficients and athermal directions were determined.

CE-19-TUE
A new UV laser media: Tb^{3+} and Yb^{3+} codoped oxyfluoride glass-ceramic containing CaF_2 nanocrystals
L. Huang, T. Yamashita, R. Jose, Y. Arai, T. Suzuki, Y. Ohishi, Toyota Technological Institute, Nagoya, Japan
We have developed a new ultraviolet laser media: transparent terbium and ytterbium ions codoped oxyfluoride glass-ceramic containing calcium-fluoride nanocrystals. Intense emission at 381 nm was observed from this glass-ceramic under a 974 nm laser excitation.

CE-20-TUE
The influence of temperature on YVO_4 and $GdVO_4$ Raman laser parameters
P.G. Zverev, General Physics Institute of Russian Academy of Sciences, Moscow, Russia
The results on spontaneous Raman spectroscopy of SRS-active vibronic modes in YVO_4 and $GdVO_4$ crystals in 150-300 K temperature range are presented. The temperature sensitivity coefficients for the Raman gain and frequency shift are obtained.

CE-21-TUE
Growth and characterization of large single crystals Yb:GGG and Yb:YAG for high power thin disk lasers
I.A. Ivanov, A. M. Bulkanov, R&D Institute for materials research, Moscow, Russia; V.B. Tsvetkov, V. Seregin, I. Shcherbakov, General Physics Institute, Moscow, Russia
The results are presented of comparative investigations of growth conditions and spectral, thermal and laser characteristics of Czochralski grown Yb:YAG and Yb:GGG single crystals with 60 mm diameter and Yb-concentrations from 6 to 30 at.%.

CE-22-TUE
High precision fiber waveguide arrays for coherent light propagation
U. Röpke, S. Unger, J. Kobelke, K. Schuster, H. Bartelt, Institute for Photonic Technology, Jena, Germany
We report on the fabrication and investigation of new weakly coupled fiber arrays with coupling length and length of coherent light propagation above 50 mm. Application aspects in short pulse and laser technique are discussed.

CE-23-TUE
Spectroscopic study of bismuth-doped silica glass
L. Bigot, A.A. Choueiry, A.M. Jurdyc, B. Jacquier, UMR-CNRS 5620 Université Claude Bernard, Villeneuve d'Ascq, France; V.G. Truong, UMR-CNRS 8523, IRCICA-USTL, Villeneuve d'Ascq, France; M. Douay, UMR-CNRS 5620, IRCICA-USTL, Villeneuve d'Ascq, France; I. Razdobreev, FR-CNRS 2416, USTL, Villeneuve d'Ascq, France
Investigations of up-conversion, intensity dependence of luminescence and time-resolved luminescence on bismuth-doped silica glasses are proposed in order to identify the nature of the luminescent centre and to understand its fluorescence dynamics.

CE-24-TUE
Spectroscopy of the relaxation dynamics in Tm-Ho-fiber lasers
L. Orsila, S. Kivisto, R. Herda, G. Okhotnikov, Tampere Univ. of Technology, Tampere, Finland
Relaxation oscillations in a tunable thulium-holmium-doped fiber lasers has been studied experimentally. We show that the laser transition type changes over gain bandwidth from four-level to a three-level scheme at 1960 nm, affecting Tm-Ho-laser dynamics.

CE-25-TUE
Emission characteristics of high power LEDs studied by confocal microscopy
L. Kuna, F.P. Wenzl, C. Sommer, E. Zinterl, G. Leising, Institute of Nanostructured Materials and Photonics, Weiz, Austria; P. Pachler, P. Hartmann, S. Tasch, TridonicAtco Optoelectronics GmbH, Jennersdorf, Austria
We report on a confocal microscopy setup, which is demonstrated as a powerful tool to study the light emission characteristics of millimeter-sized high-power LEDs with micron resolution.

CE-26-TUE
Excitation mechanism of blue and infrared emission in ZnSe:Cr
V. Sirkeli, Moldova State University, Chisinau, Moldova and Lappeenranta Univ. of Technology, Lappeenranta, Univ. of Turku, Finland; D. Nedeoglo, R. Sobolevskaya, K. Sushkevich, Moldova State University, Chisinau, Moldova; N. Nedeoglo, Moldova State Univ., Chisinau, Moldova and Lappeenranta Univ. of Technology, Lappeenranta, Finland; R. Laiho, Univ. of Turku, Turku, Finland; E. Lähderanta, Lappeenranta Univ. of Technology, Lappeenranta, Finland; L. Kulyuk, O. Kulikova, A. Siminel, Academy of Sciences of Moldova, Chisinau, Moldova
The mechanisms of high-temperature blue and infrared emission in ZnSe:Cr crystals are reported. Blue emission and the intra-shell transition of chromium Cr^{2+} are induced by ionization transition of chromium ions 2+ to 1+ states in ZnSe:Cr. We conclude that the photoionization excitation mechanism can be applied for optical pumping of 2.0 micrometer ZnSe:Cr-based laser.

CE-27-TUE
Comparative study of electronic structure of thin film nanocrystals prepared by low-temperature vacuum deposition
O. Goncharova, V. Gremenok, National Academy of Sciences of Belarus, Minsk, Belarus
The relationship between the nanocrystal structure, which can be loosely divided into the surface and the core, and its properties needs to be understood. This study address the effects, which can characterize the nanocrystal surface.

CE-28-TUE
Short wavelength emission properties of highly doped Dy^{3+}:YAG/YAG planar waveguides
M. Klimczak, P. Kijek, Institute of Microelectronics and Optoelectronics, Warsaw, Poland; J. Sarnecki, Institute of Electronic Materials Technology, Warsaw, Poland; R. Piramidowicz, Institute of Microelectronics and Optoelectronics, and Telekomunikacja Polska Research & Development Centre, Warsaw, Poland
M. Malinowski, Institute of Microelectronics and Optoelectronics and Instituteof Electronic Materials Technology, Warsaw, Poland
Visible emission of highly doped (up to 10 % at.) Dy:YAG planar waveguides is investigated. Measured spectroscopic data is used in numerical analysis aimed at determining the most probable fluorescence quenching and energy transfer effects.

CE-29-TUE
Spectroscopic investigations of transparent glass-ceramics on the basis of $Cr^{4+}:LiGaSiO_4$
K.A. Subbotin, V.A. Smirnov, A.M.Prokhorov, General Physics Institute of RAS, Moscow, Russia; E.V. Zharikov, D.I. Mendeleyev, Univ. of Chemical Technology of Russia, Moscow, Russia; L.D. Iskhakova, Fiber Optics Research Center of Russian Academy of Sciences, Moscow, Russia
The fabrication and spectroscopic investigations of new promising Cr^{4+} doped material, transparent nano-sized glass-ceramics on the basis of Cr: $LiGaSiO_4$ have been reported. The material demonstrates strong fluorescence, peaking at 1.3 micron with lifetime 9 microseconds.

CI-1-TUE
Dispersion-tolerant picosecond flat-top waveform generation using a single uniform long-period fiber grating
R. Slavik, Institute of Photonics and Electronics, Prague, Czech Republic; Y. Park, J. Azana, Institut National de la Recherche Scientifique, Montreal, Canada
We demonstrate that our recently-reported all-fiber scheme for generation of picosecond and subpicosecond flat-top optical pulses can be easily reconfigured to compensate for the flat-top shape degradation caused by different levels of dispersion.

CI-2-TUE
Mode-locking and all-optical clock recovery in a semiconductor fiber laser using cross-absorption modulation in an electro-absorption modulator
L.R. Chen, McGill University, Montreal, Canada; J.C. Cartledge, Queen's Univ., Kingston, Canada
We demonstrate mode-locking at 5 GHz and all-optical clock recovery at 10 GHz in a semiconductor fiber laser using cross-absorption modulation in an electro-absorption modulator and inverse RZ pump pulses.

CI-3-TUE
Limits of terrestrial optical fiber systems for ultra-high bit rate RZ data transmissions (from 160 Gbit/s to 1.28 Tbit/s)
S. Pitois, J. Fatome, Université de Bourgogne, Dijon, France
In this work, we numerically evaluate the limits of the pre-installed terrestrial optical fiber systems based on SMF/DCF dispersion map regarding ultra high-bit rate RZ data transmission, from 160 Gbit/s to 1.28 Tbit/s.

POSTERS

CI-4-TUE

SOA and Lyot filter based multiwavelength actively mode-locked fibre ring laser with modulator birefringence compensation

C. O'Riordan, M.J. Connelly University of Limerick, Limerick, Ireland

A multiwavelength fibre ring laser is presented. Birefringence compensation of the lithium niobate modulator used to mode-lock the laser improves the stability and uniformity of the lasers spectrum and increases the number of lasing channels.

CI-5-TUE

Comparison of BER estimation methods in numerical simulation of 40 Gbit/s RZ-DPSK transmission

B. Slater, S. Boscolo, V.K. Mezentsev, S.K. Turitsyn, Aston University, Birmingham, United Kingdom

Through comparison with direct error counting, we analyze the validity of different available numerical approaches to the bit-error rate (BER) estimation in 40 Gbit/s return-to-zero differential phase-shift transmission. We demonstrate that none of the existing models is by far superior. We also reveal the impact of the duty cycle on the accuracy of the different BER estimates.

CI-6-TUE

A New PMD measurement technique with a fiber Raman amplifier

S. Sergeyev, Optics Research Group, Waterford Institute of Technology, Waterford, Ireland; S. Popov, A. Friberg, Royal Institute of Technology, Kista, Sweden

We report measurements of correlation and beat lengths and PMD on a long single mode fiber. The technique is based on the analysis of maximum and minimum polarization dependent gain in a fiber Raman amplifier.

CI-7-TUE

Expanding the range of chromatic dispersion monitoring with two-photon absorption in semiconductors

W. H. Guo, L. Barry, School of Electronic Engineering, Dublin, Ireland; J. Donegan, Trinity College Dublin, Dublin, Ireland

A scheme is proposed to expand the range of the chromatic dispersion monitoring with two-photon absorption in semiconductors.

CI-8-TUE

100GHz electrically tunable planar bragg gratings via liquid crystal overlay

F.R. Mahamd Adikan, J.C. Gates, B.D. Snow, H.E. Major, C.B.E. Gawith, P.G.R. Smith, A. Dyadyusha, M. Kaczmarek, University of Southampton, United Kingdom

We demonstrate 114GHz electrically tunable liquid crystal Bragg gratings using 170Vpp voltage. The devices were made using direct UV grating writing and use evanescent coupling into an electrically tuned nematic liquid crystal.

CI-9-TUE

Wavelength effects on a semiconductor optical amplifier based double-stage wavelength converter dynamics working with an assist light

F. Ginovart, ENSSAT - Rennes I University, Lannion, France

Using a temporal semiconductor optical amplifier (SOA) gain dynamics model, including amplified spontaneous emission, we study wavelength effects on a SOA based wavelength shifter dynamics under an assist light injection.

CI-10-TUE

Performance of gain-clamped EDFAs in channel routing and packet switched WDM optical transmissions

D.H. Thomas, J.P. von der Weid, Pontifical Catholic University, Rio de Janeiro, Brazil

In wavelength division multiplexing (WDM) networks, routed channels and switched packets disturb erbium-doped fibre amplifier (EDFA) stable operation, requiring different solutions for each application.

CI-11-TUE

Sampling of RF signals with LTG-GaAs based MSM structures

J.-M. Delord, J. F. Roux, J.-L. Coutaz, Université de Savoie, LAHC, Chambery, France; S. Formont, J. Chazelas, Thales TAS, Elancourt, France; A. Krotkus, Semiconductor Physics Institute, Vilnius, Lithuania; C. Canseliet, Université Pierre et Marie Curie, LISIF, Ivry sur Seine, France

We present complete optoelectronical characterization of photoconductive switches that are used for opyical sampling assisted of RF signals. High speed response of the devices is ensured by used of GaAs layers grown at moderate temperature.

CI-12-TUE

Patterning effects in WDM RZ-DBPSK SMF/DCF optical transmission at 40 Gbit/s channel rate

O.V. Shtyrina, M.P. Fedoruk, Institute of Computational Technologies, Novosibirsk, Russia; S.K. Turitsyn, Aston University, Birmingham, United Kingdom; A. Shafarenko, University of Hertfordshire, Hatfield, United Kingdom; S.R. Desbruslais, K. Reynolds, Azea Networks, Romford, United Kingdom; R. Webb, Cable and Wireless Submarine Systems, London, United Kingdom

We quantify error statistics in WDM Nx40 Gbit/s transmission with hybrid amplification. Improvement of BER through skewed channel pre-coding reducing the frequency of appearance of the error prone triplets in data stream is demonstrated.

CI-13-TUE

Variable rate and tunable central wavelength Terahertz repetition rate optical clock generation using variable bandwidth spectrum shaper

S.A. Anzai, Y.K. Komai, M.M. Mieno, K.K. Kodate, Japan Women's University, Tokyo, Japan; N.W. Wada, T.M. Miyazaki, National Institute of Information and Communications, Tokyo, Japan; T.Y. Yoda, Optoquest Co.,Ltd., Toyo, Japan

A new variable rate and tunable central wavelength terahertz (THz) optical clock generation technique is proposed. THz optical clocks with 2 and 3 sharp spectra components of 1.0-4.0THz mode spacing are experimentally demonstrated.

CI-14-TUE

Fiber-based in-line regeneration scheme for multichannel operation at 40 Gb/s

Ch. Kouloumentas, National Technical University of Athens, Greece; I.Tomkos, Athens Information Technology Center, Athens, Greece

A scheme based on the use of multiple pieces of nonlinear fiber with anomalous dispersion, alternated with pieces of standard DCF is proposed for in-line WDM regeneration, and is evaluated in a 40-Gb/s transmission system.

CI-15-TUE

Towards Terabit/s wavelength conversion with a single semiconductor optical amplifier and an optical bandpass filter

Z. Zhonggui, L. Liu, J.M. Molina Vazquez, E. Tangdiongga, S. Zhang, G.D. Khoe, H.J.S. Dorren, Eindhoven University of Technology, Eindhoven, Netherlands; D. Lenstra, Delft University of Technology, Delft, Netherlands

Extensive simulations employing a comprehensive numerical model show the possibility of 1 Terabit/s wavelength conversion using a single semiconductor optical amplifier with an optical bandpass filter.

CI-16-TUE

Genetic algorithm-based optical filter optimization for high speed wavelength conversion based on a semiconductor optical amplifier

Z. Li, J.M. Molina Vazquez, Y. Liu, E. Tangdiongga, S. Zhang, G. Khoe, H.J.S. Dorren, Eindhoven University of Technology, Eindhoven, Netherlands; D. Lenstra, Delft University of Technology, Delft, Netherlands

Genetic algorithm was applied in optimizing an optical filter for high speed wavelength conversion based on a semiconductor optical amplifier. Eye opening of 33dB is achieved. The robustness of the optimized filter is explored.

CI-17-TUE

Impact of OPC insertion in a WDM link

L. Marazzi, P. Parolari, P. Martelli, CoreCom, Milan, Italy; A. Gatto; P. Minzioni, I. Cristiani, V. Degiorgio, University of Pavia, Pavia, Italy; M. Martinelli, CoreCom, Milan, and Politecnico di Milano, Italy

A systematic study on MNTI technique effectiveness is presented in a 6-span-600-km-long 2-channel-WDM SM fiber link, MNTI approach significantly improves system performances with respect to MSSI which would not allow 10dBm per-channel power.

CI-18-TUE

Stability investigation of bi-directional single-fiber reconfigurable transparent WDM ring network

K. Ennser, University of Swansea Wales, Swansea, United Kingdom; G. Della Valle, S. Taccheo, Politecnico di Milano, Milan, Italy

We report on the stability of bidirectional reconfigurable WDM ring network using bidirectional optical gain clamped Erbium-doped waveguide amplifiers. This architecture allows flexible traffic re-routing and network operation even in case of node failure or fiber cut.

CJ-1-TUE

Radially polarized Yb-fiber laser with an intracavity axicon

J.L. Li, K.I. Ueda, University of Electro-Communications, Tokyo, Japan

Radially polarized Yb fiber laser by using an axicon is demonstrated with radial polarization extinction from 2.3 to 4.4.Experimental results on the evidence of the ring mode inside gain fiber also is given.

CJ-2-TUE

Core temperature measurement of an active optical fiber in lasing regime

V. Gainov, D. Demyankov, NTO "IRE-Polus" and Moscow Institute of Physics and Technology, Moscow Region, Russia; O. A. Ryabushkin, NTO "IRE-Polus" and Moscow Institute of Physics and

POSTERS

Technology, and Institute of Radio-Engineering and Electronics of RAS, Fryazino, Moscow Region, Russia
The inteferometric method of core temperature measurement of the active optical fiber in lasing regime assisted lock-in technique is proposed. The absorbed pump power of approximately 100 mW corresponds to temperature increase of 5 K.

CJ-3-TUE

Sidewall smoothing for Si/SiO_2 waveguides by excimer laser reformation

S.C. Hung, C.F. Lin, National Taiwan University, Taipei, Taiwan; E.Z. Liang, Diwan, College of Management, Tainan, Taiwan
Smoothing as-etched Si/SiO2 waveguides by laser illumination results in less damage than furnace-treated one and atomic-force-microscopy measurement on the reformed surface gives root-mean-square roughness of 0.24 nm and leads to 0.1dB/cm of calculated scattering loss.

CJ-4-TUE

Efficient energy transfer from Yb^{3+} to Tb^{3+} for the 0.54 µm band laser

T. Yamashita, Y. Ohishi, Toyota Technological Institute, Nagoya, Japan
The energy transfer efficiency from Yb^{3+} to Tb^{3+} as high as about 60% was attained in a Tb^{3+}-Yb^{3+}-codoped borosilicate glass. This glass was a promising candidate for the 0.54 um band lasing medium pumping at 0.98 µm.

CJ-5-TUE

Nonlinear frequency conversion based on a fiber amplifier at 977 nm for the indium atom lithography

J.I. Kim, D. Meschede, D. Haubrich, University of Bonn, Bonn, Germany
The fiber amplifier system at 976 nm is constructed to generate 325 nm light for the manipulation of indium atoms. Non-linear frequency conversion based on the fiber amplifier through the enhancement cavity will be discussed.

CJ-6-TUE

Effect of 805 nm auxiliary pumping in a Tm-doped Bi_2O_3-SiO_2-Based fiber for S-Band amplification

S.R. Lüthi, M.L. Sundheimer, A.S.L. Gomes, Universidade Federal de Pernambuco, Recife, Brazil
Dual-wavelength pumping using 805 nm is investigated for a thulium-doped bismuth-silicate fiber. Contrary to ZBLAN, 1426 nm is more effective than 1050 nm, giving 5.8 dB gain for 1.068 W total pump power.

CJ-7-TUE

Spontaneous rayleigh backsattering Raman lasing with fiber Bragg gratting

S. L. Stevan Jr., A. Teixeira, P. Andre, R. Nogueira, Telecommunications Institute, Aveiro, Portugal; A. Pohl, UTFPr, Curitiba, Brazil; G. M.Tosi-Beleffi, ISCOM, Rome, Italy
A lasing control based on fiber Bragg grattings and Rayleigh back scattering is demonstrated and characterized. The lasing occurs for pump powers higher than 350mW to 14km DCF module. The results are compared with simulation.

CJ-8-TUE

Yb-fiber-amplification of harmonically mode-locked semiconductor-laser-pulses

A. Budz, H. Haugen, McMaster University, Hamilton, Canada
Ultrashort pulses are generated at multiple harmonics of the cavity round-trip frequency using a passively mode-locked semiconductor laser and are subsequently amplified in Yb-doped fiber amplifier.

CJ-9-TUE

Self-starting passive mode-locked figure-eight laser using a symmetrical coupler in the loop

B. Ibarra-Escamilla, E.A. Kuzin, R. Grajales-Coutino, INAOE, Puebla, Mexico; O. Pottiez, Centro de Investigaciones en Optica, Leon, Mexico; J.W. Haus, University of Dayton, Dayton, USA
We experimentally demonstrate self-starting operation of the figure-eight mode-locked fiber laser including the symmetrical coupler in the loop. The laser generates 30 ps pulses at the fundamental repetition frequency of 0.8 MHz.

CJ-10-TUE

Linearly polarized Yb-doped fiber amplifier with phase-conjugating mirror based on stimulated Brillouin scattering

K. Sumimura, H. Hidetsugu, H. Okada, H. Fujita, M.N. Nakatsuka, Osaka Univ., Osaka, Japan
Linearly polarized Yb-doped fiber amplifier with phase-conjugating mirror based on stimulated Brillouin scattering

CJ-11-TUE

Stretched pulse and self-similar operation of an ultra-short pulse all-polarization maintaining fiber laser

M. Schultz, O. Prochnow, A. Ruehl, M. Engelbrecht, D. Wandt, D. Kracht, Laser Zentrum Hannover e.V., Hannover, Germany
We report on an ultra-short pulse Ytterbium-doped all-polarization maintaining fiber laser operating in stretched pulse and self-similar regime. The mode-locking mechanism is based on the semiconductor saturable absorber mirror.

CJ-12-TUE

Highly efficient pico-second waveguide dye laser based on a random active medium

H. Watanabe, Y. Oki, M. Maeda, Kyushu University, Fukuoka, Japan; T. Omatsu, Chiba University, Chiba, Japan
We have demonstrated highly efficient pico-second waveguide dye laser including a random active layer by pico-second pulse pumping. Experimental energy slope efficiency of 20.3% and maximum peak power of 380kW were obtained.

CJ-13-TUE

24-mJ, 2-kHz pulse generation with a Q-switched Nd:YAG laser oscillator and fiber amplifier hybrid system

K.F. Furuta, M.S. Seguchi, T.O. Okamoto, J.N. Nishimae, K.Y. Yasui Mitsubishi Electric Corporation, Hyogo, Japan
We demonstrated the high-energy operation with a solid-state-laser oscillator and a fiber-based amplifier system. The maximum pulse energy of 24 mJ was achieved with the repetition rate of 2 kHz.

CJ-14-TUE

Generation of widely tunable optical solitons in the infrared range by using dispersion decreasing fibers

S. Muraviov, A. Andrianov, A. Kim, Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia; A. Sysoliatin, Fiber Optics Research Center of the Russian Academy of Sciences, Moscow, Russia
A compact fiber system for the generation of widely tunable soliton pulses using dispersion decreasing fibers (DDF) is presented. High quality 100 fs soliton pulse in the wavelength region of 1.5-2 µm was demonstrated.

CJ-15-TUE

Microfluidic dye lasers based on microstructured optical fibres

G.A. Turnbull, A.E. Vasdekis, I.D.W. Samuel, University of St Andrews, St Andrews, UK; G.E. Town, Macquarie University, Sydney, Australia
We report the demonstration of microfluidic dye lasers based on photonic crystal optical fibres. We characterize their power and spectral properties and explain an unusual spectral selection mechanism based on a Vernier effect

CJ-16-TUE

Q-switching of a distributed feedback fiber laser by using longitudinal acoustic waves

M. Delgado-Pinar, A. Diez, J. L. Cruz, M. V. Andres, Universidad de Valencia, Valencia, Spain
We report a single frequency, single mode, actively Q switched distributed feedback fiber laser, based on the dynamic generation of defects in a uniform fiber Bragg grating, by using acoustic waves.

CJ-17-TUE

Effective gain clamping technique in a Raman amplifier with a resonant cavity

H.S. Seo, J.T. Ahn, B.J. Park, ETRI, Daejeon, South Korea; W.J. Chung, ETRI, Daejeon and Kongju University, Kongju, South Korea
We experimentally demonstrate a new gain clamping technique without a loss of gain bandwidth by generating a clamping laser out of signal band in a fiber Raman amplifier with a resonant cavity.

CJ-18-TUE

Actively Q-switched fiber ring laser employing a locally phase-shifted chirped grating

A. Gonzalez-Segura, J.L. Cruz, P. Perez-Millan, M.A. Andres, Univ. of Valencia, Burjassot, Spain
A fiber ring laser that includes locally phase-shifted chirped gratings is presented. A technique to dynamically control the induced phase shift utilizing a magnetostrictive material permits both wavelength tuning and Q-switched pulsed regime.

CJ-19-TUE

Third-order spectral phase compensation in parabolic pulse compression

Y. Zaouter, CELIA and Amplitude Systèmes, Bordeaux, France; E. Cormier, CELIA, Bordeaux, France; F. Druon, M. Hanna, P. Georges, Institut d'Optique, Palaiseau, France
Third order spectral phase compensation in parabolic pulse compression is studied. A hybrid gratings / prisms sequence compressor replacing standard gratings compressor leads to the improvement of the recompressed pulse quality.

CJ-20-TUE

Exact, implicit, integral solution of depletion and saturation in Raman and Brillouin fiber amplifiers

M. Santagiustina, Univ. of Padua, Padova, Italy
Exact, implicit, integral solutions for the equations governing Raman and Brillouin scattering amplifiers including pump depletion and different loss coefficients are given. Such solu-

POSTERS

tions avoid the necessity of recurring to non-linear boundary value problem algorithms.

CJ-21-TUE

Characterization of high power multimode combiners

J. Geiger, B. Erben, D. Hoffmann, Fraunhofer Institute for Laser Technology, Aaachen, Germany; St. Altmeyer, Cologne University of Applied Sciences, Cologne, Germany

Fused, fiber-optic, multimode pump combiners, a key component to All-Fiber-Lasers, are investigated by regards of brightness conservation und power efficiency. Over 500 W are coupled through one 100 micron input port.

CJ-22-TUE

Photosensitivity of Er/Yb-codoped Schott IOG1 phosphate glass using 248nm, 500fs laser radiation

S.P. Pissadakis, I.M. Michelakaki, M.L. Livitzis FORTH-IESL, Heraklion, Greece

The photosensitivity of the Schott IOG1 phosphate glass to 500ps, 248nm laser radiation is investigated. Refractive index changes up to $2x10^{-4}$ were calculated from Kramers-Kronig transformation.

CJ-23-TUE

All-fiber periodically Q-switched laser

G. E. Town, M. Fellew, Macquarie University, North Ryde, Australia

An all-fiber Q-switched laser is demonstrated using a simple passive loss modulation technique based upon a vibrating fiber cantilever. The Q-switch design combines the advantages of high dynamic range and high damage threshold.

CJ-24-TUE

Nanosecond-shaped optical pulse generation based on integrated all fiber systems

H.H. Lin, Z. Sui, J.J. Wang, Z. Zhang, M.Z. Li, F. Jing, Research Center of Laser Fusion, Mianyang, China

We demonstrate the work at LFRC to generate laser driven ICF required nanosecond shaped optical pulse based on integrated all fiber systems. Pulse shaping using fast electronic switches and optical pulse stacking are demonstrated.

CJ-25-TUE

DFB erbium-doped fiber laser with tunable phase shift induced in the laser cavity

Y. Barmenkov, Centro de Investigaciones en Optica, Leon, Mexico; P. Perez-Millan, J.L. Cruz, M. Andres, Universidad de Valencia, Valencia, Spain

We present a DFB erbium-doped fiber laser with a tunable phase shift induced in the middle point of a fiber Bragg grating forming the laser cavity. We demonstrate that in our experimental conditions lasing is observed at any phase grating shift value. The laser generates at one or two wavelengths depending on induced phase shift.

CJ-26-TUE

Enhanced mode coupling by local structuring of optical fibre cores with 800 nm femtosecond pulses

C.S. Smith, C.S. Balling, Institute of Physics and Astronomy, Aarhus, Denmark,

We demonstrate the writing of long-period fibre gratings using femtosecond infrared pulses. The application of a large numerical aperture microscope objective allows for very localized changes of the refractive index.

CJ-27-TUE

1.91-1.99 µm Tm^{3+}/Yb^{3+} co-doped tellurite fibre laser pumped using a 1088 nm Yb^{3+} fibre laser

B. Richards, J. Lousteau, A. Jha, The University of Leeds, Leeds, United Kingdom;
D. Binks, Y. Tsang, The University of Manchester, Manchester, United Kingdom

A Tm^{3+}/Yb^{3+} co-doped tellurite fibre laser operating at 1910-1994 nm pumped with a 1088 nm Yb^{3+} fibre laser is demonstrated. 67 mW of laser output and 10% slope efficiency has been achieved.

CJ-28-TUE

Ultra-low feedback fibre end termination geometry for high power fibre source applications

J. Chan, P. Wang, J. K. Sahu, W. A. Clarkson, University of Southampton, Southampton, United Kingdom

A novel fibre end termination geometry for reducing unwanted backreflection from end-facets to very low levels ($\sim 10^{-7}$) is reported. The advantages of this approach and its application in various high-power cladding-pumped fibres sources are discussed.

CJ-29-TUE

Characterization of delivered mid-infrared radiation spatial profile by hollow waveguide

M. Němec, H. Jelinkova, M. Fibrich, P. Koranda, Czech Technical University, Prague, Czech Republic; M. Miyagi, K. Iwai, Sendai National College of Technology, Sendai, Japan; Y.W. Shi, Fudan University, Shanghai, China; Y. Matsuura, Tohoku University, Sendai, Japan

The characterization of the laser beam spatial profile during the propagation through the COP/Ag hollow glass waveguide was investigated. As radiation sources, Er:YAG, Tm:YAG, and Tm:YAP laser systems were utilized.

NOTES

POSTERS

ICM Foyer 13:30-14:30
IQEC 2007 Poster Session

IA-1-TUE

Efficient channeling of cesium fluorescence into guided modes of a nanofiber

K. Fam, K. Hakuta, University of Electro-Communications, Tokyo, Japan; S. Dutta Gupta, University of Hyderabad, Hyderabad, India; V. Balykin, Ins. of Spectroscopy, Troitsk, Moscow Region, Russia

We show that fluorescent light from a cesium atom can be efficiently channelled into the guided modes of a nanofiber. The optical excitation spectrum of the atom is substantially modified by the atom-surface interaction.

IA-2-TUE

Laser emission from single, dye-doped microdroplets situated on a superhydrophobic surface

A. Kiraz, A. Sennaroglu, S. Doganay, M.A. Dündar, A. Kurt, H. Kalaycioglu, A.L. Demirel Koç University, Istanbul, Turkey

Laser emission is reported from stationary, single Rhodamine B-doped microdroplets of a water/glycerol solution situated on a superhydrophobic surface. Threshold fluences of a pulsed, frequency-doubled Nd:YAG laser down to 750 J/cm^2 are estimated.

IA-3-TUE

Atomic absorption from the evanescent field of a sub-micron fibre taper

M.J. Morrissey, K. Deasy, T.N. Bandi, B.J. Shortt, Cork Ins. of Technology, Cork, Ireland and Tyndall National Ins., Cork, Ireland; S. Nic Chormaic, Univ. College Cork, Ireland and Tyndall National Ins., Cork, Ireland

We report here on recent experiments studying the interactions between a cloud of cold rubidium atoms and the evanescent field of a sub-micron tapered fibre. Low-light level detection has been used to observe the signals.

IA-4-TUE

Squeezing by self induced transparency in Rb filled hollow core fibers

W. Zhong, Ch. Marquardt, G. Leuchs, Max Planck Research Group, Erlangen, Germany; U.L. Andersen, Technical University of Denmark, Lyngby, Denmark; F. Couny, P. Light, F. Benabid, University of Bath, Bath, United Kingdom

We developed methods for filling hollow core of PCF with Rb vapor and propose to guide pulsed light into the Rb vapor core and detect squeezed light generated by SIT with homodyne detection.

IA-5-TUE

Magnetic coupling of a Bose-Einstein condensate to a nanomechanical resonator

D. Hunger, S. Camerer, P. Treutlein, T.W. Hänsch, Max-Planck-Inst. of Quantum Optics and Ludwig-Maximilians-Univ., Munich, Germany; D. König, J. Kotthaus Ludwig-Maximilians-Univ., Munich, Germany; J. Reichel, Lab. Kastler Brossel de l'ENS, Paris, France

We describe an atom chip experiment which aims at coupling the spin of a Bose-Einstein condensate to the thermal oscillations of a nanomechanical resonator with a magnetic tip.

IC-1-TUE

Measurement of three-color optical quantum correlations in the above-threshold optical parametric oscillator

K.N. Cassemiro, A.S. Villar, M. Martinelli, P. Nussenzveig, Univ. de Sao Paulo, Sao Paulo, Brazil

We have measured quantum correlations among three fields, with different optical frequencies, produced by an optical parametric oscillator operating above treshold. This is a first step en route to observe tripartite pump-signal-idler entanglement.

IC-2-TUE

Generation of photonic time-bin qubit in dense atomic media

Y. Malakyan, N. Sisakyan, Ins. for Physical Res., National Academy of Sciences, Ashtarak, Armenia

Two phase-locked and well separated write pulses and a read laser generate Stokes and anti-Stokes photons. The detection of the latter guarantees the conditional projection of the Stokes photon into an entangled temporally-delocalized single-photon state.

IC-3-TUE

Loss influence on the quantum channels based on the photon-number entangled beams

V.C. Usenko, Ins. of Physics, Kiev, Ukraine; M.G.A. Paris, Univ. di Milano, Milano, Italy

We address the continuous-variables quantum communication protocols based on the photon-number entangled states of light (either coherently-correlated or twin-beam) and analyze the loss influence on the information capacity and security of the corresponding quantum channels.

IC-4-TUE

Fast cooling of trapped ions using the dynamical stark shift

A. Retzker, M.B. Plenio, Imperial College, London, United Kingdom

A fast and precise laser cooling scheme for trapped ions is presented which is based on the dynamical Stark shift. Since this cooling method suppresses the off resonant carrier transition, low final temperatures are achieved very rapidly even in traveling wave light field.

IC-5-TUE

Free-space continuous-variable quantum cryptography

S.T. Tokunaga, K.S. Shirasaki, Gakushuin University, Tokyo, Japan; T.H. Hirano, Gakushuin Univ., and Core Res. for Evolutional Science and Technology, Tokyo, Japan

We report an experimental demonstration of free-space continuous-variable quantum key distribution (CV-QKD).We have successfully demonstrated CV-QKD with the new interferometer over 5m free-space in a laboratory.

IC-6-TUE

Single-colloidal-quantum-dot fluorescence antibunching in chiral photonic bandgap hosts at room temperature

L. J. Bissell, Z. Shi, H. Shin, S.M. White, S.G. Lukishova, M.A. Hahn, R.W. Boyd, C.R. Stroud Jr., T.D. Krauss, University of Rochester, Rochester, USA

A single-photon source based on single CdSe quantum-dot fluorescence in a chiral-photonic-bandgap liquid-crystal host manifests itself in observed fluorescence antibunching. Chiral-photonic-bandgap structures will provide deterministically handed, circular-polarized fluorescence, even for emitters without a dipole moment.

IC-7-TUE

A single-photon server with just one atom

M. Hijlkema, B. Weber, S.C. Webster, H.P. Specht, A. Kuhn, G. Rempe, Max-Planck-Ins. for Quantum Optics, Munich, Germany;

We trap a single atom in a cavity, and use it to produce a stream of up to 300000 single photons. Such a single-photon server is useful for quantum information science.

IC-8-TUE

Theory of nondestructive optical measurements of two electron spins in a quantum dot

T. Takagahara, O. Cakir, Kyoto Institute of Technology, Kyoto, Japan

Nondestructive optical measurements of two electron spins in a quantum dot is proposed based on the Faraday or Kerr rotation at large off-resonance for the application to correlation measurements in entanglement swapping of quantum repeaters.

IC-9-TUE

Inhomogeneities in atom-light interfaces and spin squeezing dynamics

M. Koschorreck, M. Kubasik, S.R. de Echaniz, M.W. Mitchell, ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain

A theoretical model is presented that gives insights into the physics of continuous variable light-atom interfaces. We can account for system inhomogeneities and imperfect detector time resolution in spin squeezing end entanglement experiments.

IC-10-TUE

Controlling excess noise using acousto-optic modulator for quantum cryptography with continuous variables

Y. Kawamoto, Sony Corporation, Tokyo, Japan; R. Namiki, Osaka University, Toyonaka, Japan; A. Furuki, T. Hirano, Gakushuin University, Tokyo, Japan

In a two-way optical system of continuous-variable quantum cryptography, backscattered light causes excess noise which reduces the safety. We demonstrate the excess noise can be controlled by frequency shifting of light using an acousto-optic modulator.

IC-11-TUE

Phonon-induced decoherence of optical spin control in a doped semiconductor quantum dot

A. Grodecka, Technical University Berlin, Germany and Wroclaw University of Technology, Wroclaw, Poland; A. Knorr, C. Weber, Technical University Berlin, Germany; P. Machnikowski, Wroclaw University of Technology, Wroclaw, Poland

Within a correlation expansion and a perturbation theory approach, we study the phonon-induced decoherence accompanying an optically induced arbitrary single-qubit rotation on the electronic spin states in a doped semiconductor quantum dot.

IC-12-TUE

Optical spectroscopy of charge-tunable quantum dots emitting at 1.2µm

A. Kirihara, J. Fujikata, S. Kono, S. Yorozu, NEC Corporation, Tsukuba, Japan; S. Ohkouchi, Ultrafast Photonic Devices Laboratory and NEC Corporation, Tsukuba, Japan; A. Tomita, NEC Corporation and JST-SORST, Tsukuba, Japan

We report photoluminescence spectroscopy of single charge-tunable InAs QDs emitting at 1.2 µm. For probing electronic shell structures, large QDs in our experiments are favorable in terms of deep confinement potentials and weak Coulomb interaction.

IC-13-TUE

Calibration attack and defense in continuous variable quantum key distribution

A. Ferenczi, Laboratoire de Photonique Quantique et Moléculaire / ENS Cachan, Cachan, France; F. Grosshans, CNRS / ENS Cachan, Cachan, France; Ph. Grangier, Laboratoire Charles Fabry de l'Institut d'Optique, Paris, France

We have found new attacks against Continuous Variable Quantum Key Distribution based on the accessibility of the phase reference beam by the adversary. We then give easy countermeasures to this attack and prove their security.

IC-14-TUE

Design of photonic crystal microcavities in diamond for quantum information

C. Kreuzer, E. Neu, C. Becher, Universität des Saarlandes, Saarbrücken, Germany

We investigate photonic crystal microcavities in diamond films for applications in quantum information. Using finite difference time domain simulations we design cavities with Q factors Q > 25000 and Purcell factors > 1900.

IC-15-TUE

Polarization drift control in fibers for entangled polarization-encoded qubits

A. Poppe, B. Schrenk, A. Fedrizzi, H. Hubel, University of Vienna, Austria; A. Zeilinger, University of Vienna and Institute for Quantum Optics and Quantum Inf., Vienna, Austria

We demonstrate a setup to compensate the polarization drift of telecom fibers. Two laser diodes together with a polarimeter are used to keep polarization states fixed on the Poincare-sphere. Subsequently, polarization-entangled qubits are transmitted without disturbance.

IC-16-TUE

Photon number resolving detector with 0.3 µs recovering time

D.F. Fukuda, A.Y. Yoshizawa, H.T. Tsuchida, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan

A new photon number resoling detector with a titanium superconducting transition edge sensor has been developed. The device successfully showed 0.3 microsecond recovering time and 0.7 eV energy resolution for a pulsed telecommunication laser.

IC-17-TUE

Nonlinear couplings and cooling dynamics in a large Paul trap designed for quantum information

R. Dubessy, B. Dubost, S. Removille, S. Guibal, T. Coudreau, L. Guidoni, Laboratoire Matériaux et Phénomènes Quantiques, Paris, France

We present experimental and numerical studies of ion dynamics in a large linear Paul trap designed for quantum information experiments: a motional coupling that depends on the cloud density is observed and compared to simulation.

IC-18-TUE

Enhanced spin lifetime in semiconductors with applied electric fields

K. Ioakeimidi, C. Prescott, A. Brachmann, J. Clendenin, E Garwin, R. Kirby, T. Maruyama, Stanford Linear Accelerator Center, Menlo Park, USA; R. Prepost, University of Wisconsin, Wisconsin, USA; G. Mulhollan, J Bierman, Saxet Surface Science, Austin, USA

We measured and simulated the effect of an accelerating field on the spin polarization of photo-generated electrons in a 100nm thick GaAs based semiconductor films. Preliminary results indicate 8% increase of polarization.

IC-19-TUE

Quasi-intrinsic angular momentum

R. Zambrini, IMEDEA (UIB-CSIC), Palma de Mallorca, Spain; S.M. Barnett, University of Strathclyde, Glasgow, United Kingdom

The orbital angular momentum of a light beam about its propagation direction is characterized as quasi-intrinsic. We propose an interferometric experiment to measure efficiently the angular momentum spectrum for beams with any arbitrary spatial distribution.

IE-1-TUE

Stable two-dimensional spatial solitons in heavy metal oxide glasses

Pasquazi, S. Stivala, G. Assanto, University Roma Tre, Rome, Italy; C. Afonso, J. Solis, J. Gonzalo, Consejo Superior de Investigaciones Cientificas, Madrid, Spain

We demonstrate for the first time (2D+1) spatial solitary propagation of picosecond near infrared pulses in a Kerr-like metal-oxide glass. Multiphoton absorption provides a mechanism to prevent catastrophic collapse.

IE-2-TUE

Frequency doubling in surface periodically poled lithium niobate waveguide: competing effects

S. Stivala, University Roma Tre, Roma and University of Palermo, Italy; G. Assanto, A. Pasquazi, L. Colace, University Roma Tre, Rome, Italy; A. Busacca, M. Cherchi, University of Palermo, Palermo, Italy; A. Parisi, A. Cino, CRES, Monreale, Italy; S. Riva-Sanseverino, University of Palermo and , CRES, Monreale, Italy

We performed SHG in QPM Lithium Niobate waveguides realized by proton exchange and surface periodic poling, observing the resonance shift due to cascading.

IE-3-TUE

Propagation of frequency-chirped laser pulses in a medium of Lambda-atoms

G. Demeter, D. Dzsotjan, G.P. Djotyan, Research Institute for Particle and Nuclear Physics, Budapest, Hungary

We study the propagation of frequency-chirped laser pulses in a medium of Lambda-atoms. We show that there is a regime of enhanced transparency of the medium, where the pulses are resistant to distortions during propagation.

IE-4-TUE

Exploration of electromagnetically induced absorption with circular polarised lasers in a degenerate two-level system

L. Spani Molella, K. Dahl, R.H Rinkleff, K. Danzmann, University Hannover, Leibnitz, Germany

With a heterodyne interferometer electromagnetically induced absorption was measured in a closed degenerate two-level system driven by circularly polarised coupling and probe lasers of orthogonal polarisation as a function of the laser intensities.

IE-5-TUE

Calibration of multipolar second-order response of isotropic bulk materials

F.X. Wang, F.J. Rodriguez, M. Kauranen, Tampere Univ. of Technology, Tampere, Finland

The multipolar optical second-harmonic generation of BK7 glass is measured by calibration against a quartz crystal using a two-beam technique. This can also be used as an alternative to Maker-fringe techniques.

IE-6-TUE

Discrete midband cavity solitons

O. Egorov, F. Lederer, Friedrich Schiller University, Jena, Germany

We investigate the light dynamics in arrays of coupled Kerr-nonlinear cavities driven by a strongly-inclined holding beam. Bright and dark moving discrete cavity solitons exist in the zero-diffraction point irrespective of the sign of nonlinearity.

IE-7-TUE

Soliton content of pulses in lossy fibers

M. Böhm, F. Mitschke, University Rostock, Institut für Physik, Rostock, Germany

What is the soliton content of pulses in optical fibers with realistic energy loss? We answer this with the novel 'soliton-radiation beat analysis' technique which does not require integrability as previous methods.

IE-8-TUE

Supercontinuum generation in a highly birefringent photonic crystal fiber seeded by a low-repetition rate picosecond infrared laser

P. Blandin, Institut d'Optique Graduate School, Palaiseau and Laboratoire de Photophysique Moléculaire, Orsay, France; F. Druon, M. Hanna, P. Georges, Institut d'Optique Graduate School, Palaiseau, France; S. Lévêque-Fort, .P. Fontaine-Aupart, Laboratoire de Photophysique Moléculaire, Orsay, France; C. Lesvigne, V. Couderc, P. Leproux, XLIM, Limoges, France

We demonstrate the generation of a picosecond, polarized, visible supercontinuum in a highly birefringent fiber. The polarization dependence of the spectrum is investigated, and the mechanisms responsible for the generation of visible light are described.

IE-9-TUE

Coherent signal from incoherently cw-pumped singly resonant Ti:LiNbO$_3$ integrated optical parametric oscillator

C. Montes, C.N.R.S. Laboratoire de Physique de la Matière Condensée, Nice, France; W. Sohler, H. Suche, W. Grundkötter, University Paderborn, Paderborn, Germany

A singly resonant Ti:LiNbO$_3$ integrated optical parametric oscillator, operated with a broad-bandwidth pump at 1535 µm wavelength, can generate a coherent signal output at 3941 µm by the convection-induced phase-locking mechanism.

IE-10-TUE

Vibrating temporal soliton pairs

J M. Soto-Crespo, Ins. de Optica, Madrid, Spain; P. Grelu, Univ. de Bourgogne, Dijon, France; N. Akhmediev, Australian National Univ., Canberra, Australia

Vibrating soliton pairs in dissipative system are found numerically in cubic-quintic Ginzburg-Landau equation, and related to an experimental observation performed in a mode-locked fiber laser. Bifurcations between different soliton pair dynamics are presented.

IE-11-TUE

Reflectivity oscillations of laser-excited Bi: imprint of atomic vibrations through electron-phonon coupling

D. Boschetto, D. Glijer, T. Garl, O. Albert, A. Rousse, J. Etchepare, ENSTA/Ecole Polytechnique, Palaiseau, France; A.V. Rode, E.G. Gamaly, B. Luther-Davies, The Australian National University, Canberra, Australia

We demonstrate that the major force driving coherent phonon vibrations excited by femtosecond laser pulses in Bismuth is the thermal force, which is proportional to the electron and lattice temperature gradients.

IE-12-TUE

Subdiffractive pulses in photonic crystals

K. Staliunas, Y. Loiko, C. Cojocaru, J. Trull, R. Herrero, Universitat Politecnica de Catalunya, Terrassa-Bacelona, Spain

We investigate propagation of short pulses through photonic crystals close to the zero-diffraction (self-collimation) point. We demonstrate time-asymmetric disshaping of the pulses, and evaluate time and apace broadening.

IE-13-TUE

Experimental observation of electromagnetically induced transparency in Nd^{3+}: LaF$_3$ crystal

L.A. Gushchin, R.A. Akhmedzhanov, A.A. Bondartsev, A.G. Litvak, D.S. Sazanov, N.A. Zharova, Institute of Applied Physics RAS, Nizhny Novgorod, Russia

We report an experimental observation of electromagnetically induced transparency in a four-level quantum scheme in Nd:LaF crystal. Transparency resonances at ground and excited state hyperfine sublevels (in a lambda- and V-schemes, respectively) are detected.

IE-14-TUE

Moving discrete dissipative solitons in arrays of nonlinear cavities

O. Egorov, F. Lederer, Friedrich Schiller Univ., Jena, Germany; Y.S. Kivshar, Australian National University, Canberra, Australia

We study light propagation in arrays of nonlinear cavities. We analyse modulational instability and find the families of moving discrete cavity solitons for arbitrary inclination of the driving field both in discrete and continuous models.

IE-15-TUE

Broadening and shift of resonances in microsphere resonators due to thermo-optical nonlinearity

A. Schmidt, A. Chipouline, T. Pertsch, Ultra-Optics Center, Jena, Germany; O. Egorov, F. Lederer, Friedrich-Schiller University, Jena, Germany; A. Tünnermann, Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; L. Deych, Queens College of the City University of New York, New-York, USA

Resonance spectrum broadening and shifting have been observed in high-Q microresonators. It has been shown that the bistable response, caused by a thermo-optical nonlinearity, is responsible for both observed effects.

IE-16-TUE

Experimental verification of the origin of conical emission during filamentation.

R.V. Volkov, D. Khakhulin, A.B. Savelev, O.G. Kosareva, D.S. Uryupina, Moscow State University, Moscow, Russia

The origin of white light conical emission is experimentally investigated by pump-probe method. It is concluded that it is more likely formed by the process of refraction index modulation, than by four-waves mixing

IE-17-TUE

Transient plasma dynamics and structural changes below and above the ablation threshold in glasses upon femtosecond laser irradiation

J. Siegel, D. Puerto, J. Bonse, G. Bachelier, J. Solis, Instituto de Optica, C.S.I.C., Madrid, Spain

The interaction of femtosecond-laser pulses with glasses is studied using femtosecond-resolved microscopy. We discuss the temporal-spatial evolution of the transient plasma formed below and above the ablation threshold and its relation to structural changes induced.

IE-18-TUE

Two-photon orientational wave packets as probing tool

C. Mainos, G. Dutier, J. Grucker, F. Perales, J. Baudon, Univ. Paris 13, Villetaneuse, France

Two-photon orientational wavepackets induced by short resonant polarized pulses in rotationally-frozen interacting molecules contain precise information on the orientational states. The dynamics of the induced dipole shows orientational recurrences which are relevant.

IE-19-TUE

Evolution of temporal and spatial structure of tightly focused wave packets propagating in transparent condensed media

V.T. Platonenko, M.V. Lomonosov Moscow State Univ., Moscow, Russia; J.M. Mikhailova, M.V. Lomonosov Moscow State Univ. and Russian Academy of Sciences, Moscow, Russia; J. Zheng, Res. Centre of Laser Fusion, CAEP, Mianyang, China and M.V. Lomonosov Moscow State Univ., Moscow, Russia

Results of numerical modeling of propagation of tightly focused light packets in transparent condensed media are presented. The emphasis is placed on the interplay between spatial and spectral-temporal structures of wave packets, undergoing nonlinear self-action.

IE-20-TUE

Towards measuring structural dynamics in complex molecules by excited state circular dichroism

A. Trifonov, T. Fiebig, Boston College, Chestnut Hill, USA; I. Buchvarov, Boston College, Chestnut Hill, USA

We demonstrate a new approach to broad band circular dichroism spectroscopy using polarization controlled femtosecond white-light generation. The proposed method is evaluated by measuring the ground state circular dichroism spectrum of $[Ru(bpy)_3]^{2+}$.

IE-21-TUE

Spatio-temporal dynamics of generation of multicolor spatial Kerr solitons

G. Fanjoux, J. Michaud, M. Delque, H. Maillotte, T. Sylvestre, Université de Franche-Comté, Besançon, France

We present experimental results showing the spatio-temporal dynamics of multicolor spatial soliton generation by stimulated Raman scattering in a Kerr planar waveguide. Raman component generation in the trailing edge of the pump pulse is reported.

IE-22-TUE

Spectral and spatial analysis on near-field Fresnel coefficient using femtosecond laserD.

J. Park, S.B. Choi, Seoul National University, Seoul, South Korea; Q.H. Park, D.S. Kim Korea University, Seoul, South Korea

We report on spatially and spectrally resolved near-field Fresnel coefficients in a plasmonic crystal, using broadband femtosecond laser. The measured a giant Fresnel coefficient exceeding 20, at the surface plasmon polariton resonance.

IF-1-TUE

Sub-shot-noise photon-number correlation in the parties of a mesoscopic twin-beam

A. Andreoni, A. Allevi, Università dell' Insubria, Como, Italy; M. Bondani, National Laboratory Ultrafast and Ultraintense Opt. Science, Como, Italy; G. Zambra, University of Milano and Universita' dell'Insubria, Como, Italy; M. Paris, University of Milano, Milano, Italy

In a ps dichromatic twin-beam with thousands photons/pulse generated by travelling-wave spontaneous parametric downconversion, photon numbers detected separately for the two twin-beam parties display a variance of the difference below shot-noise limit by 3.25 dB.

IF-2-TUE

Bright magneto-optical resonance sign reversal in Cs vapour confi-

ned in an extremely thin cell

A. Atvars, M. Auzinsh, K. Bluss, University of Latvia, Riga, Latvia; C. Andreeva, S. Cartaleva, L. Petrov, Institute of Electronics, Sofia, Bulgaria; D. Sarkisyan, T. Varzhapetyan, Institute for Physical Research, Ashtarak, Armenia

An extremely thin cell was used to study cesium absorption spectra. The results strongly depend on the width of the cell. "Bright resonances" reversal to "dark resonances" were observed and explained.

IF-3-TUE

Realization of quantum decay control and Zeno dynamics in photonic structures

S. Longhi, Politecnico di Milano, Milano, Italy

An optical analog of quantum Zeno dynamics and control of quantum mechanical decay is theoretically proposed for photon tunneling in an engineered waveguide-array structure.

IF-4-TUE

Generation of narrowband photon-pairs at 1550 nm band using type-II periodically poled Lithium Niobate waveguide

G. Fujii, N. Namekata, S. Inoue, M. Motoya, Nihon University, Chiyoda-ku, Tokyo, Japan; S. Kurimura, National Institute for Materials Science, Tsukuba-shi, Ibaraki, Japan

We have demonstrated the generation of narrowband photon-pairs at 1550nm band using a Periodically Poled Lithium Niobate waveguide. The measured bandwidth of the photon-pairs generated by the waveguide is only 1 nm.

IF-5-TUE

Cold ^{87}Rb ensemble: non-Gaussian state detection and spin tomography

M.W. Mitchell, M. Koschorreck, M. Kubasik, S.R. de Echaniz, ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain

We describe methods for making tomographic measurements and detecting non-Gaussian spin states in cold atomic ensembles.

IF-6-TUE

Theory of two-photon nonlinearity by a realistic matter system with many degrees of freedom in a cavity

A. Ishikawa, Japan Science and Technology Agency, Kawaguchi, Saitama, Japan; T. Isu, The Univ. of Tokushima, Tokushima, Japan; H. Ishihara, Osaka Prefecture Univ., Sakai, Osaka, Japan

We propose theoretically a new scheme for obtaining the sufficiently strong two-photon nonlinearity by using many three-level atoms as a realistic matter system with many degrees of freedom in a cavity.

IF-7-TUE

Entangling level-crossing interaction between independent atoms

Z. Ficek, The Univ. of Queenslad, Brisbane, Australia; R. Tanaś, Adam Mickiewicz Univ., Poznan, Poland

We propose a scheme to entangle two closely located and noninteracting atoms through the selective interaction with a standing-wave laser field.

IF-8-TUE

Photon blockade effect on entangled photon generation from a quantum dot in microcavity

H. Ajiki, Osaka University, Toyonaka and CREST, Kawaguchi, Saitama, Japan; H. Ishihara, Osaka Prefecture University, Sakai, Osaka and CREST, Kawaguchi, Saitama, Japan

We provide theoretical study on entangled photon generation from a cavity-dot system in resonant hyper-parametric scattering. There exist conditions that all emitted pairs are entangled due to the photon blockade effect.

IF-9-TUE

Theory of entangled-photon generation via cavity bipolaritons

H. Oka, Osaka Prefecture University, Sakai, Japan; H. Ishihara, Osaka Prefecture University, Sakai and CREST, Sakai, Japan

We theoretically investigate effects of unbound two-exciton states on entangled-photon generation via cavity bipolaritons formed in a quantum well embedded in a high-Q semiconductor microcavity.

IF-10-TUE

Generation of polarization entanglement utilizing spatially correlated photon pairs from spontaneous parametric down-conversion

T. Yamaguchi, Tohoku Univ. Sendai, Japan; Y. Mitsumori, H. Kosaka, K. Edamatsu, Tohoku Univ. Sendai, and CREST, Honcho Kawaguchi, Japan; R. Shimizu, CREST, Honcho Kawaguchi, Japan

We propose a novel method to generate polarization-entangled photon pairs utilizing a spatial correlation effect in spontaneous parametric downconversion. We experimentally demonstrated the proposal by using a double slit and a polarization Michelson interferometer.

IF-11-TUE

Cold ytterbium atoms in high-finesse optical cavities: towards atom-photon interfaces

M. Cristiani, J. Eschner, T. Valenzuela, ICFO - The Ins. of Photonic Sciences, Castelldefels, Spain

We present a modular, versatile setup for various quantum optical and quantum information experiments, from collective interaction between an atomic cloud an the light fiel of a high-finesse cavity, to single atom - single photon interfaces.

IF-12-TUE

A solid state single photon source based on SiV centers in diamond

J. Bahe, C. Wang, H. Weinfurter, Ludwig-Maximilians-Universität, München, Germany; V. Chernyshev, B. Burchard, Ruhr-Universität, Bochum, Germany

We report on our work to realize a solid state single photon source based on color centers in diamond for the applications in practical quantum cryptography.

IF-13-TUE

Bessel-type interference patterns detected in single photon regime

R. Grunwald, M. Bock, Max-Born-Institute, Berlin, Germany

Quantum interference experiments were performed with Bessel beams at high detector efficiency. In contrast to Young's double slit diffraction, interference from refracted photons was observed in the near-field. Non-local propagation of single photons was confirmed.

IF-14-TUE

Anisotropically high entanglement of biphotons

E.V. Moreva, Moscow Engineering Physics Institute, Moscow, Russia; M.A. Efremov, M.V. Fedorov, P.A. Volkov General Physics Institute of Russian Academy of Sciences, Moscow, Russia; S.P. Kulik, S.S. Straupe, Moscow State University, Moscow, Russia

We show that a wave packet of a biphoton generated via spontaneous parametric down conversion is strongly anisotropic.A method of biphoton detection which discloses a very high degree of entanglement is suggested.

IF-15-TUE

Quantum transport of single neutral atoms

L. Förster, W. Alt, A. Härter, D. Döring, M. Karski, D. Meschede, University of Bonn, Bonn, Germany; A. Rauschenbeutel, University of Mainz, Mainz, Germany

We present an experimental implementation of the state-selective (quantum) transport for caesium atoms in a one-dimensional optical lattice, allowing us to study applications based on quantum interference and atom-atom interactions for quantum information purposes.

IF-16-TUE

Orbital angular momentum of twisted cavity modes

S.J.M. Habraken, G. Nienhuis, Universiteit Leiden, Leiden, Netherlands

We use algebraic techniques to study the spatial structure of (possibly) twisted cavity modes. We focus on the orbital angular momentum of these modes and consider cavities that consist of physically rotating mirrors as well.

IF-17-TUE

Photon pair source based on periodically poled twin-hole silica fibre

K.P Huy, S. Massar, A.T. Nguyen, E. Brainis, M. Haelterman, P. Emplit, Université Libre de Bruxelles, Brussels, Belgium; C. Corbari, A. Canagasabey, P.G. Kazansky, University of Southampton, United Kingdom; O. Deparis, A. Fotiadi, P. Megret, Faculté Polytechnique de Mons, Belgium

We study parametric fluorescence in periodically poled twin-hole fibers. We demonstrate that this source produces photon pairs by using it to realize a Hong-Ou-Mandel dip experiment.

IF-18-TUE

Use of classical input for solving two-photon nonlinear dynamics

K. Koshino, Wakayama University, Wakayama, Japan and PRESTO, Japan Science and Technology Agency, Saitama, Japan

It is shown that the theoretical analyses of the two-photon nonlinear dynamics can be greatly simplified by considering a case where a classical light pulse (not a two-photon pulse) is used as the input.

IF-19-TUE

A pair photon source for heralded single-photon-single-atom interaction

A. Haase, N. Piro, J. Eschner, M.W. Mitchell, ICFO - The Institute of Photonic Science, Castelldefels (Barcelona), Spain

We present the design, construction, and first characterization of a down-conversion photon-pair source providing photons resonant with an atomic transition in

POSTERS

trapped Ca^+ ions.

IF-20-TUE

Two-photon optics: imaging below the diffraction limit

D. Schlenk, Ludwig Maximilans University, Munich, Germany; H. Weinfurter, Ludwig Maximilans University, Munich, and Max-Planck Research Institut für Quantenoptik, Erlangen, Germany

Imaging properties of optical systems are limited by the wave nature of light. Entangled photons allow an improvement in resolution. We show an experimental realisation using entangled photons from a spontaneous parametric down conversion source.

IF-21-TUE

Detection of orbital angular momentum superposition photon states using hologram and path interferometer

Y. Miyamoto, M. Takeda, The University of Electro-Communications, Chofu, Tokyo, Japan; D. Kawase, K. Sasaki, Hokkaido University, Sapporo, Japan; A. Wada, Tokyo University of Science, Tokyo, Japan, S. Takeuchi, Hokkaido University, and JST CREST, Sapporo, Japan

We propose a scheme for the detection of orbital angular momentum superposition photon states consisting of a hologram and a path interferometer. The method utilizes multiple diffraction orders and is performed without shifting the hologram.

IF-22-TUE

Quadrature and polarization squeezing in a vectorial Kerr cavity

E. Roldan, G.J. de Valcarcel, F.V. Garcia-Ferrer, University of Valencia, Burjassot, Spain; I. Perez-Arjona, Universitat Politecnica de Valencia, Gandia,

We study theoretically quantum fluctuations in a vectorial Kerr cavity, and show, in particular, that the output field exhibits not only quadrature squeezing but also large levels of polarization squeezing.

IF-23-TUE

Two-photon spectral coherency matrix and multi-parameter optical entanglement

V. Sergienko, B.E.A. Saleh, M. C. Teich, Boston University, Boston, MA, USA; C. Bonato, University of Padua, Padua, Italy and Boston University, Boston, MA, USA

We introduce the concept of two-photon spectral coherency matrix and the spectral two-photon Stokes parameters as a counterpart to the classical coherency matrix of broadband polarized light. We discuss its use for characterizing frequency-polarization entanglement.

IF-24-TUE

Narrowband ^{87}Rb resonant down-conversion source for quantum memories

A. Predojevic, J.M.Caballero, Z. Zhai, M.W. Mitchell, ICFO-Institute of Photonic Sciences, Barcelona, Spain; E.S. Polzik, ICFO-Institute of Photonic Sciences, Barcelona, Spain and Copenhagen University,Copenhagen, Denmark

In order to investigate quantum memories based on light-atom coupling we are developing a diode laser pumped downconversion source of nonclassical light capable of interacting with rubidium atoms.

IF-25-TUE

Analysis of errors in an optical controlled-NOT gate with a high-precision testing bed

T. Nagata, K. Sasaki, Hokkaido University, Sapporo, Japan; H. Hofmann, Hiroshima University, Hiroshima, Japan; R. Okamoto, S. Takeuchi, Hokkaido University and Japan Science and Technology Agency, Sapporo, Japan

We report the analysis of errors in an optical Controlled-NOT gate without path-interference. For this purpose, we develop a special test-bed system with precise position controllers for highly accurate analysis.

IF-26-TUE

Generation and detection of photonic qutrits

Y. Chen, G. Björk, Royal Institute of Technology, Stockholm, Sweden

We propose a generation scheme, based on photon pairs from spontaneous down-conversion, and linear optical components, to generate any given state of any of the four mutually unbiased qutrit bases. We also discuss, using the same components, the discrimination between the three basis state of any of the bases.

IF-27-TUE

Factoring numbers with ultrashort laser pulses

B. Chatel, E. Baynard, D. Bigourd, C. Meier, B. Girard, LCAR-IRSAMC, Toulouse, France; W. Merkel, W. Schleich, University of Ulm, Germany

Various schemes have been recently proposed to factor numbers with physical systems. Based on electromagnetic fields interacting with quantum systems, they operate as analog computers. Here we present several experimental demonstrations based on ultrashort pulses interacting with Rubidium atoms.

NOTES

WEDNESDAY / ORAL

ROOM BOR1

08:30 – 10:00

IC3 Session: Control of matter qubits

Chair: *David Vitali, University of Camerino, Italy*

IC3-1-WED 08:30

Error-resistant single qubit gates with trapped ions

N. Timoney, V. Elman, C. Weiss, M. Johanning, Chr. Wunderlich University of Siegen, Germany; W. Neuhauser, University of Hamburg, Germany

Shaped pulses developed using optimal control theory and composite pulses, both designed to provide robustness against errors in experimental parameters, are experimentally shown suitable to realise single and multi-qubit gates with trapped ions.

IC3-2-WED 08:45

Topologically decoherence-protected qubits with trapped ions

T. Coudreau, P. Milman, W. Maineult, S. Guibal, L. Guidoni, Laboratoire Matériaux et Phénomènes Quantiques, Paris, France; B. Douçot, Laboratoire de Physique Théorique et Hautes Energies, Paris, France; L. Ioffe, Rutgers University, Piscataway, USA

We present a new long range spin coupling Hamiltonian which provides inherent protection against decoherence and show that it can be naturally implemented in trapped ions giving very long qubit lifetimes up to 10^9 s.

ROOM B11

08:30 – 10:00

IG3 Session: Dissipative solitons

Chair: *Thorsten Ackemann, University of Strathclyde, Glasgow, United Kingdom*

IG3-1-WED 08:30

Spatial dissipative solitons with intra-cavity photonic crystals

D. Gomila, Instituto Mediterraneo de Estudios Avanzados, Palma de Mallorca, Spain; G.-L. Oppo, University of Strathclyde, Glasgow, United Kingdom

We study the effects of photonic crystals on bistable regimes in a nonlinear optical cavity. The introduction of an intra-cavity photonic crystal opens new useful bistable regimes supporting a novel class of cavity solitons.

IG3-2-WED 08:45

Growth laws, pinning and localized structures: an experiment in sodium vapour

M. Pesch, W. Lange, Westfälische Wilhelms-Universität, Munich, Germany; D. Gomila, Instituto Mediterraneo de Estudios Avanzados, Palma de Mallorca, Spain; T. Ackemann, University of Strathclyde, Glasgow, United Kingdom

We study front dynamics experimentally in a 2D nonlinear optical system. We find a t1/2 growth law and observe the slowing down of fronts due to pinning when spatial dissipative solitons are formed.

ROOM 13a

08:30 – 10:00

IE4 Session: Slow light and resonant systems

Chair: *Paola Borri, Cardiff University, United Kingdom*

IE4-1-WED (Tutorial) 08:30

Slow light in room-temperature optical waveguides

D. Gauthier, Duke University, Durham, North Carolina, USA

Recently, slow light was achieved in room temperature optical waveguides, which is accelerating the transition of this technique to applications. This tutorial will explain basic slow-light concepts and highlight recent advances.

ROOM 13b

08:30 – 10:00

CB7 Session: VCSELs III: dynamics and switching

Chair: *Atsushi Uchida, Takushoku University, Tokyo, Japan*

CB7-1-WED 08:30

Polarization Stability of Surface Grating VCSELs Under Strong Optical Feedback

J.M. Ostermann, R. Michalzik, Ulm University, Germany; P. Debernardi, Politecnico di Torino, Torino, Italy

We show that vertical-cavity surface-emitting lasers (VCSELs) with surface gratings are polarization-stable under isotropic optical feedback in the long external cavity regime for feedback levels up to 39 %, limited by the setup.

CB7-2-WED 08:45

Polarization-switching of VCSELs under orthogonal optical feedback: experiments and theory

J. Paul, Y. Hong, K.A. Shore, P.S. Spencer, University of Wales; Bangor, United Kingdom; C. Masoller, Universidad Politecnica de Catalunya, Terrassa, Spain

We study the polarization-resolved LI-curve of VCSELs with polarization-rotated feedback. Weak feedback modifies the switching point, while strong feedback can even suppress the PS. Simulations using the spin-flip model show good agreement with the experiments.

ROOM 14a

08:30 – 10:00

CG4 Session: High-harmonic generation and few-cycle laser technology

Chair: *Andreas Becker, MPIPKS Dresden, Germany*

CG4-1-WED 08:30

Characterization of high-order harmonics generated from solid surfaces

Y. Nomura, M. Geissler, S. Rykovanov, S. Karsch, Zs. Major, J. Osterhoff, G.D. Tsakiris, Max-Planck-Institute for Quantum Optics, Garching, Germany; P. Tzallas, Hellas, Institute of Electronic Structure and Laser, Iraklion, Greece; R. Hörlein, F. Krausz, Max-Planck-Institute for Quantum Optics, Garching and Ludwig-Maximilians University, Munich, Germany

The high-order harmonic generation from solid surface constitutes an alternate route towards the generation of intense XUV attosecond pulses. The properties of harmonics generated from solid targets are studied numerically and experimentally.

CG4-2-WED 08:45

Long-term phase stabilization of intense few-cycle pulses

A.J. Verhoef, A. Fernández, Technical University, Vienna, Austria; M. Lezius, Max-Planck Institute of Quantum Optics, Garching, Germany; M. Uiberacker, F. Krausz, Max-Planck Institute of Quantum Optics, Garching and Ludwig Maximilians University, Munich, Germany

We demonstrate an improved scheme for phase-stabilization of chirped pulse amplifiers. With a stereo detector based on above threshold ionization, we characterize the phase stability after compression into the few-cycle regime.

ROOM 14b

08:30 – 10:00

CJ1 Session: Short pulse fibre lasers I

Chair: *Andrei Fotiadi, Faculté Polytechnique de Mons, Belgium*

CJ1-1-WED 08:30

Optimized one-step compression of femtosecond fibre laser pulses to 30 fs in dispersion-flattened highly nonlinear fibre

R. Fischer, D. Neshev, Australian National University, Canberra, Australia; B. Kibler, P.A. Lacourt, F. Courvoisier, J. Dudley, Institut Femto-St, Besançon, France

We report compression of a commercial fiber laser source to the sub-30 fs regime using a single 7 cm length of highly nonlinear fiber spliced directly to the output laser pigtail.

CJ1-2-WED 08:45

Simultaneous amplification and compression of picosecond pulses to 50 kW in Er fiber

J. Jasapara, M. Andrejco, J.W. Nicholson, A.D. Yablon, OFS Laboratories, Somerset, USA; Z. Varallyay, FETI, Budapest, Hungary

Picosecond pulses are amplified to 50-kW peak power in a Er fiber with a diffraction limited output. The interplay of nonlinear spectral broadening and anomalous fiber dispersion compresses the pulse to bandwidth limited 600-fs.

NOTES

ROOM BOR1

IC3-3-WED 09:00

An all-optical ion-loading technique for scalable microtrap architectures

R.J. Hendricks, D.M. Grant, P.F. Herskind, A. Dantan, J.L. Sørensen, M. Drewsen, University of Aarhus, Denmark

We demonstrate the loading of an ion trap through photo-ionization of a pulsed atomic beam generated by laser ablation. The technique is compatible with the expected demands of scalable quantum information processing in ion traps.

IC3-4-WED 09:15

Quantum proces tomography of decoherence in diatomic molecules

M.P.A. Branderhorst, I.A. Walmsley, University of Oxford, United Kingdom; R.L. Kosut, SC Solutions, Sunnyvale, CA, USA

We present quantum process tomography of the environment-induced decoherence process in an experimental model of system-environment interaction. By using prior knowledge the size of the problem can be significantly reduced.

ROOM B11

IG3-3-WED 09:00

Cavity light bullets in a prototype nonlinear optical resonator

S.D. Jenkins, CNR – INFM, Como, Italy; L. Columbo, F. Prati, L.A. Lugiato, Università dell' Insubria, Como, Italy

We demonstrate numerically the existence of propagating localized structures (cavity light bullets) in a model for a Kerr resonator. We consider also the effects of a slow material dynamics.

IG3-4-WED 09:15

Nonlocal coupling resolves cavity soliton theory-experiment discrepancy

L. Columbo, Università dell'Insubria, Como, Italy; W.J. Firth, University of Strathclyde, Glasgow, United Kingdom; T. Maggipinto, Università e Politecnico di Bari, Italy

Cavity solitons in nonlinear optical systems should, in theory, be produced only by local addressing but in experiment they often appear spontaneously on parameter variation. An additional nonlocal nonlinearity can resolve this discrepancy.

ROOM 13b

CB7-3-WED 09:00

Polarization control and stabilization of VCSELs by means of optical feedback from an extremely short external cavity

M. Arizaleta Arteaga, Public University of Navarra, Pamplona, Spain and Vrije Universiteit Brussel, Brussels, Belgium; M. López-Amo, Public University of Navarra, Pamplona, Spain; H. Thienpont, Vrije Universiteit Brussel, Brussels, Belgium; K. Panajotov, Vrije Universiteit Brussel, Brussels, Belgium and Institute of Solid State Physics, Sofia, Bulgaria

We present experimental evidences of polarization control and stabilization of the light emitted by VCSELs by means of optical feedback from an extremely short external cavity. Our numerical results are in good agreement with experiments.

CB7-4-WED 09:15

Injection-induced polarization switching of a modulated-1.5 µm wavelength single-mode VCSEL

K.H. Jeong, K.H. Kim, M.H. Lee, Inha University, Incheon, South Korea; B.S. Yoo, J. Roh Raycan Co., Ltd, Daejeon, South Korea; K.A. Shore, University of Wales, Bangor, United Kingdom

This paper represents, to our knowledge, the first report of experimental observations of the polarization switching dynamics of a modulated 1.5µm wavelength single-mode vertical cavity surface emitting laser (VCSEL) under optical injection control. An injected optical beam with polarization orthogonal to that of the stand-alone VCSEL caused a dynamical instability of the laser polarization state near threshold. Successful switching of the polarization state of the output of the VCSEL modulated at 5 MHz was achieved.

ROOM 14a

CG4-3-WED 09:00

Characterising spatio-temporal coupling of extreme ultraviolet ultrashort pulses from high harmonic generation

T. Witting, A.S. Wyatt, A. Monmayrant, I.A. Walmsley, Clarendon Laboratory, University of Oxford, United Kingdom; C. Haworth, J.S. Robinson, J.W.G. Tisch, J.P. Marangos, Blackett Laboratory, Imperial College London, United Kingdom

We demonstrate a tool for performing measurements of space-time coupling of ultrashort, extreme ultraviolet pulses from high harmonic generation which can be used to study propagation and phasematching effects during the generation process.

CG4-4-WED 09:15

Quantum-path interferences in high order harmonic generation

A. Zaïr, M. Holler, A. Guandalini, F. Schapper, J. Biegert, U. Keller, ETH Zurich, Switzerland; P. Salières, T. Auguste, CEA-Saclay, Gif-sur-Yvette, France; E. Cormier, CELIA – Université Bordeaux, France; A. Wyatt, A. Monmayrant, I. Walmsley, Clarendon Laboratory, Oxford, United Kingdom

Intensity dependent high harmonic generation was investigated when both short and long trajectories contribute to the emission. We have directly observed for the first time clear indication of quantum-path interference through harmonic spectrum modulations.

ROOM 14b

CJ1-3-WED 09:00

Designing quadratic nonlinear photonic crystal fibers for soliton compression to few-cycle pulses

M. Bache, J. Lægsgaard, O. Bang, Technical University of Denmark, Lyngby, Denmark; J. Moses, F.W. Wise, Cornell University, Ithaca, USA

We show theoretically that high-quality soliton compression from 400 fs to 14 fs is possible in poled silica photonic crystal fibers using cascaded quadratic nonlinearities. A moderate group-velocity mismatch optimizes the compression.

CJ1-4-WED 09:15

Photonic-crystal fibers for dispersion compensation in short-pulse fiber laser sources: design algorithms and dispersion characterization

A.M. Zheltikov, E.E. Serebryannikov, D.A. Sidorov-Biryukov, Moscow State University, Moscow, Russia; A. Baltuška, A. Fernandez, L. Zhu, A. Verhoef, Vienna University of Technology, Vienna, Austria; J.C. Knight, University of Bath, United Kingdom

Characterization of dispersion of photonic-crystal fibers (PCFs) using spectral interferometry demonstrates the viability of the proposed pulse stretcher design based on small-core PCFs.

NOTES

WEDNESDAY / ORAL

ROOM BOR1

IC3-5-WED (Invited) 09:30

Quantum information processing with superconducting qubits and cavities

A. Wallraff, ETH Zurich, Switzerland; D.I. Schuster, A. Blais, J. Gambetta, A. Houck, J. Schreier, B. Johnsson, J. Chow, L. Frunzio, J. Majer, M.H. Devoret, S.M. Girvin, R.J. Schoelkopf, Yale University, New Haven, CT, USA

I will present experiments demonstrating that superconducting two-level systems embedded in microwave resonators represent a promising architecture for quantum information processing and quantum optics. This approach is now also known as circuit quantum electrodynamics.

10:30 – 12:00

IC4 Session: Conditional preparation of photonic quantum states

Chair: *Tobias Schmitt-Manderbach, Ludwig Maximilians University, Munich, Germany*

ROOM B11

IG3-5-WED 09:30

Bidirectional laser cavity solitons

I. Pérez-Arjona, V.J. Sánchez-Morcillo, Universitat Politecnica de Valencia, Gandia, Spain; E. Roldán, Universitat de Valencia, Burjassot, Spain

We demonstrate theoretically that bidirectional lasers can support cavity solitons when cavity losses are slightly different for the two counterpropagating fields. These solitons can be written or erased by acting on only one field.

IG3-6-WED 09:45

Bistable phase locking of laser-like systems via rocking: transforming optical vortices into phase domain walls

A. Esteban-Martín, Institut de Ciènces Fotoniques, Castelldefels, Spain; M. Martínez-Quesada, E. Roldán, G. J. de Valcárcel, Universitat de Valencia, Spain; V. B. Taranenko, National Academy of Sciences of Ukraine, Kiev, Ukraine

We give experimental evidence of bistable phase locking in a laser-like system induced by bichromatic optical injection (rocking). Vortices of the free running cavity are seen to transform into phase patterns like phase domain walls.

10:30 – 12:00

IG4 Session: Dynamics in novel microsystems

Chair: *Alexander Gaeta, Cornell University, Ithaca, NY, USA*

ROOM 13a

IE4-2-WED 09:30

Coherant control of light-shifts and application to slow-light and pulse amplification

M.A. Bouchene, J.-C. Delagnes, F.A. Hashmi, Université Paul Sabatier, Toulouse, France

We describe an experiment where we achieve coherent control of light-shifts in a atomic medium achieving an efficient control of pulse amplification in the femtosecond regime. A new method to slow light is presented

IE4-3-WED 09:45

Crystalline cavities for quantum and nonlinear optics

I.S. Grudinin, A.B. Matsko, A.A. Savchenkov, L. Maleki, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA; E. Rubiola, FEMTO-ST Institute, Besançon, France

Ultra low threshold highly efficient whispering gallery mode (WGM) based Raman laser is demonstrated. We analyze Q factor limits and show that decay times exceeding 1 second may be expected for fluorite WGM resonators.

10:30 – 12:00

CD4 Session: Generation and manipulation of wide bandwidth optical signals

Chair: *Stéphane Coen, The University of Auckland, New Zealand*

ROOM 13b

CB7-5-WED 09:30

Frequency- and polarization-selective feedback control of broad-area VCSELs

Y. Chembo Kouomou, P. Colet, Universitat de les Illes Balears, Palma de Mallorca, Spain; I. Fischer, Vrije Universiteit Brussel, Brussels, Belgium; S.K. Mandre, W. Elsässer, Darmstadt Technical University, Germany

We analyze theoretically and experimentally the selection of transverse modes in VCSELS using frequency and polarization-selective feedback. Intensity fluctuations and polarization dynamics can be considerably quenched when the appropriate feedback is applied.

CB7-6-WED 09:45

Self-sustained pulsation and signal peaking in the oxide-confined VCSELs based on submonolayer InGaAs quantum dots

G.S. Sokolovskii, A.G. Deryagin, N.A. Maleev, S.A. Blokhin, V.I. Kuchinskii, Ioffe Physico-Technical Institute, St Petersburg, Russia; A.G. Kuzmenkov, V.M. Ustinov, Saint-Petersburg Physico-Technical Centre of Russian Academy of Sciences for Research and Education, St Petersburg, Russia; A.D. McRobbie, M.A. Cataluna, W. Sibbett, University of St Andrews, United Kingdom; A.S. Shulenkov, S.V. Chumak, Minsk R&D Institute of Radiomaterials, Minsk, Belarus; S.S. Mikhrin, A.R. Kovsh, NL-Nanosemiconductors GmbH, Dortmund, Germany; E.U. Rafailov, University of Dundee, UK

Self-sustained pulsation at frequencies in the range of 0.2-0.6GHz with pulse durations of 100-300ps and electrical-to-optical signal peaking of over 500 times was observed first time in the oxide-confined VCSELs based on submonolayer InGaAs quantum-dots.

10:30 – 12:00

CB8 session: Communication lasers

Chair: *Pere Colet, Universitat Illes Balears, Palma de Mallorca, Spain*

ROOM 14a

CG4-5-WED 09:30

Intense self-compressed carrier-envelope phase-locked few-cycle pulses at 2 μm

C.P. Hauri, R.B. López-Martens, Laboratoire d'Optique Appliquée, Palaiseau, France; C.I. Blaga, G. Doumy, K.D. Schultz, L.F. DiMauro, J. Cryan, R. Chirla, P. Colosimo, A.M. March, C. Roedig, E. Sistrunk, J. Tate, J. Wheeler, Ohio State University, Columbus, USA; E. Power, University of Michigan, Ann Arbor, USA

We demonstrate filamentation at 2 μm using carrier-envelope phase (CEP) stabilized 55 fs, 330 μJ pulses from an OPA. The ultra-broadband output is self-compressed below 3-optical cycles with 270 μJ and preserves the CEP offset.

CG4-6-WED 09:45

Spatio-temporal characterization of sub-5fs pulses obtained by filamentation

A. Zaïr, A. Guandalini, F. Schapper, M. Holler, J. Biegert, L. Gallmann, U. Keller, ETH Zurich, Switzerland; A. Couairon, Centre de Physique Théorique, Palaiseau, France; M. Franco, A. Mysyrowicz, Laboratoire d'Optique Appliquée, Palaiseau, France

We demonstrate the spatial dependence of a 4.9 fs pulse profile obtained by filamentation, leading to a single pulse structure in the central core and a double pulse in the outer part of the beam.

10:30 – 12:00

CG5 Session: Strong field molecular dynamics

Chair: *Matthias Kling, Max-Planck-Institut für Quantenoptik, Garching, Germany*

ROOM 14b

CJ1-5-WED 09:30

Hybrid mode-locking scheme for similariton fiber laser

A. Ruehl, O. Prochnow, D. Wandt, D. Kracht, Laser Zentrum Hannover e.V., Germany

We discuss a hybrid mode-locked scheme for similariton fiber lasers based on slow and fast saturable absorbers. Beside an enhanced self-starting capabilty, additional pulse shaping as well as the suppression of noise pulses is possible.

CJ1-6-WED 09:45

Self-starting wave-breaking-free environmentally stable Yb-doped all-fiber laser

M. Plötner, B. Ortaç, R. Kinney, J. Limpert, A. Tünnermann, Friedrich Schiller University, Jena, Germany; T. Schreiber, Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We report the both numerically and experimentally generation of wave-breaking-free pulses from an environmentally stable Yb-doped all-fiber laser. Parabolic pulses with energies of 190 pJ at a repetition rate of 20.33 MHz were obtained. The pulses with a spectral bandwidth of 15 nm at center wavelength of 1035 nm could be externally compressed to 233 fs.

10:30 – 12:00

CJ2 Session: Short pulse fibre lasers II

Chair: *William Wadsworth, University of Bath, United Kingdom*

ROOM B21

10:30 – 12:00

CK7 Session: Photonic states and propagation

Chair: *José Sanchez-Dehesa, Universidad Politécnica de Valencia, Spain*

NOTES

ROOM BOR1

IC4-1-WED (Invited) 10:30

Generation and detection of entangled light fields with negative Wigner functions

P. Grangier, A. Ourjoumtsev, R. Tualle-Brouri, A. Dantan, Laboratoire Charles Fabry de l'Institut d'Optique, Orsay, France

We experimentally demonstrate that entanglement between Gaussian states can be increased by coherent subtraction of single photons from quadrature-entangled light pulses. This produces delocalized "Schrödinger's kitten" states, which are analyzed using various entanglement measures.

IC4-2-WED 11:00

Realization and characterization of a 2-photon 4-qubit linear cluster state

G. Vallone, P. Mataloni, E. Pomarico, F. De Martini, University of Rome "Sapienza", Rome, Italy; V. Berardi, University and Politecnico of Bari, Italy

We report on the realization and characterization of a 4-qubit linear cluster state via two photons entangled both in polarization and linear momentum. By this state we performed a novel nonlocality test of quantum mechanics.

ROOM B11

IG4-1-WED 10:30

Nonlinear landscaping of optical trap potentials by the trapped objects

S. Barland, G.L. Lippi, R. Kaiser, Institut Non Linéaire de Nice, Valbonne, France; J.-M. Fournier, Swiss Federal Institute of Technology, Lausanne, Switzerland

Coherent light scattered by small trapped spheres contributes to the trap field and nonlinearly reshapes the trapping potential. For strongly elliptical traps the experimentally reconstructed potential shows the contributions of the different particles.

IG4-2-WED 10:45

Radiation pressure driven vibrational modes in ultra-high-Q silica microspheres

R. Ma, T. J. Kippenberg, A. Dabirian, P. Del'Haye, A. Schliesser, Max-Planck-Institute of Quantum Optics, Munich, Germany

We report two families of vibrational eigenmodes in ultra-high-Q silica microspheres, excited via radiation-pressure induced parametric oscillation. The measured frequencies agree well with numerical simulation, revealing linear dependence on the inverse sphere diameter.

IG4-3-WED (Invited) 11:00

Tailored shapes of organic micro-lasers: a testbed for wave chaos physics

M. Lebental, École Normale Supérieure, Cachan and Univ. Paris XI, Orsay, France; E. Bogomolny, Université Paris XI, Orsay, France; J. Zyss, C. Arnaud, J.-S. Lauret, École Normale Supérieure, Cachan, France

Organic micro-lasers with different cavity shapes are investigated. Such open resonators exhibit emission features revealing strong connections between wave and geometrical optics. They expand the range of quantum chaos while opening perspectives in integrated optics.

ROOM 13a

CD4-1-WED 10:30

Nonlocal response of optical thermal nonlinearity

A.E. Minovich, D.N. Neshev, W.Z. Krolikowski, Y.S. Kivshar, Australian National University, Canberra, Australia; A. Dreischuh, Sofia University, Bulgaria

We study experimentally the nonlinear response of thermal liquids and reveal that despite the infinite range of nonlocality, the nonlocal nonlinear response can be characterized by a finite response function independent on the material parameters.

CD4-2-WED 10:45

Photorefractive-resistant Hafnium-doped lithium niobate crystals at very low dopant concentration

P. Minzioni, I. Cristiani, V. Degiorgio, University of Pavia, Italy; E.P. Kokanyan, National Academy of Sciences of Armenia, Ashtarak-2, Armenia

We experimentally identify, as about 2mol%, the threshold concentration for photorefractivity reduction in Hf-doped lithium niobate crystals, through measurements of induced birefringence change and of the second-harmonic phase-matching temperature

CD4-3-WED 11:00

Broadband switching of polychromatic light in nonlinear waveguide couplers

I.L. Garanovich, A.A. Sukhorukov, Yu.S. Kivshar, Australian National Univ., Canberra, Australia

We suggest a nonlinear waveguide coupler with optimized axis bending which has five times enhanced bandwidth compared to a conventional straight coupler, allowing for switching of polychromatic light covering the entire visible spectrum.

ROOM 13b

CB8-1-WED 10:30

10Gbit/s modulation of a fast switching slotted Fabry-Pérot tunable laser

F. Smyth, L.P. Barry, Dublin City University, Ireland; J. O'Dowd, Trinity College Dublin, Ireland; J.E. Simsarian, D.C. Kilper, Bell Laboratories, Alcatel-Lucent, Holmdel, USA; B. Roycroft, B. Corbett, Tyndall National Institute, Cork, Ireland

In this paper we show that discrete mode tunable lasers based on slotted Fabry-Perot structures exhibit sub-nanosecond rise times and can be modulated error free with high speed data.

CB8-2-WED 10:45

High speed 1225 and 1250 nm VCSELs based on low-temperature grown quantum dots

F. Hopfer, D. Bimberg, A. Mutig, G. Fiol, M. Kuntz, V. Shchukin, N.N. Ledentsov, Tecnical University, Berlin,Germany; D.A. Livshits, S.S. Mikhrin, I.L. Krestnikov, A.R. Kovsh, Innolume GmbH, Dortmund,Germany

Single mode VCSELs based on low-temperature grown quantum dots realized at 1225 nm 9.5 GHz modulation bandwidth at 2 mW, multi-mode devices achieved 10.5 GHz. The modulation bandwidth for 1250 nm devices is 8.5 GHz.

CB8-3-WED 11:00

Transmission experiments using 1.3 µm single mode InGaAs VCSELs

E. Söderberg, P. Modh, J.S. Gustavsson, A. Larsson, Chalmers Univ. of Technology, Göteborg, Sweden; M. Hammar, Z.Z. Zhang, J. Berggren, Royal Ins. of Technology, Stockholm, Sweden

Using a 1.3 µm InGaAs VCSEL with an integrated surface relief for single mode emission, successful transmission of OC-48 and 10GbE data over 9 km of standard single mode fiber is demonstrated up to 85C.

ROOM 14a

CG5-1-WED 10:30

3D alignment by holding and spinning molecules

S.S. Viftrup, V. Kumarappan, H. Stapelfeldt, University of Aarhus, Denmark; S. Trippel, University of Freiburg, Germany

We demonstrate, experimentally, a new method for obtaining 3-dimensional molecular alignment using two orthogonally polarized laser pulses. A femtosecond pulse spins the molecule about its symmetry axis, which is held fixed by a nanosecond pulse.

CG5-2-WED 10:45

Control of alignment dynamics of asymmetric top molecules

L. Holmegaard, S.S. Viftrup, V. Kumarappan, C.Z. Bisgaard, H. Stapelfeldt, University of Aarhus, Denmark

We demonstrate, experimentally, a scheme to transform the non-periodic motion of an asymmetric top into stable periodic rotations about its slowest axis, providing a new tool to control the alignment dynamics of asymmetric tops.

CG5-3-WED 11:00

Probing orbital structure of polyatomic molecules by high-order harmonic generation

R. Torres, N. Kajumba, J.S. Robinson, S. Baker, J.W.G. Tisch, J.P. Marangos, The Blackett Lab., Imperial College London, UK; J.G. Underwood, The Open Univ., Milton Keynes, UK; R. de Nalda, Instituto de Quimica-Fisica Rocasolano, Madrid, Spain; W.A. Bryan, I.C.E. Turcu, CCLRC Rutherford Appleton Lab., Chilton, Didcot, UK; R. Velotta, C. Altucci, Univ. di Napoli "Federico II", Napoli, Italy

Signatures of orbital structure are observed in high-order harmonic generation from laser aligned polyatomic molecules, in good agreement with calculations. This suggests the applicability of the molecular orbital imaging techniques to large molecular systems.

ROOM 14b

CJ2-1-WED 10:30

Ytterbium fiber laser producing 89-fs pulses directly at the fiber output

R. Herda, O.G. Okhotnikov, Tampere University of Technology, Tampere, Finland

We present a practical ytterbium-doped mode-locked fiber source producing 89 fs pulses without external bulk compensator. Negatively chirped pulses taken from the cavity are then compressed in a standard output fiber resulting in high-quality pulses.

CJ2-2-WED 10:45

Bound state of hundreds pulses in the Er:Yb-doped double-clad fiber laser

A. Haboucha, F. Sanchez, H. Leblond, Université d'Angers, France

We report experimental evidence of bound state of some hundreds of pulses obtained in the erbium-doped double-clad fiber laser operating in the anomalous dispersion regime. Theoretical results will be also presented.

CJ2-3-WED (Keynote) 11:00

The diversity of fibre laser technology

D.J. Richardson, Southampton University, United Kingdom

The operating regimes of high power fibre lasers are reviewed highlighting the versatility of this revolutionary technology.

ROOM B21

CK7-1-WED (Invited) 10:30

Optical surface resonances hide the gap in photonic crystals!

F. Garcia-Santamaria, E.C. Nelson, P.V. Braun, University of Illinois at Urbana-Champaign, Urbana, USA

An optical resonance on the surface of photonic crystals prevents the coupling of photons to the crystal for a wide range of wavelengths and masks the underlying photonic band structure, leading to potentially misleading measurements.

CK7-2-WED 11:00

Quasi-incoherent propagation in waveguide arrays using coherent light sources

A. Szameit, F. Dreisow, M. Heinrich, T. Pertsch, S. Nolte, A. Tünnermann, Friedrich-Schiller-University, Jena, Germany

We present the effect of quasi-incoherent propagation of coherent light in fs laser written waveguide arrays. This was visualized by monitoring the fluorescence of NBOH colour centers generated during the writing process.

NOTES

ROOM BOR1

IC4-3-WED 11:15

Multi-particle correlations and characteristic Bell inequalities

Ch. Schmid, N. Kiesel, W. Wieczorek, R. Pohlner, H. Weinfurter, Max-Planck-Institute of Quantum Optics, Garching and Ludwig Maximilians University, Munich, Germany; W. Laskowski, Instytut Fizyki Teoretycznej i Astrofizyki, Gdansk, Poland

We show how the characteristic Bell inequality can be constructed for the recently experimentally observed symmetric four-qubit Dicke state. The inequality is characteristic in the sense that it is violated maximally by the Dicke state.

IC4-4-WED 11:30

Implementation of quantum algorithms using optical cluster state

A. Stefanov, T. Jennewein, F. Tiefenbacher, Austrian Academy of Sciences, Vienna, Austria; P. Prevedel, P. Böhi, R. Kaltenbaek, University of Vienna, Austria; P. Walther, Harvard University, Cambridge, MA, USA; A. Zeilinger, University of Vienna and Austrian Academy of Sciences, Austria

We present the implementation of several quantum algorithms using an optical realization of the one-way quantum computer model with active feed-forward. Results for Deutsch and Grover algorithms and applications to quantum games are presented.

IC4-5-WED 11:45

Multiphoton experiments using fibre pair photon sources

J.G. Rarity, J.L. O'Brien, A. Clark, J. Fulconis, O. Alibart, University of Bristol, United Kingdom; W.J. Wadsworth, University of Bath, United Kingdom

We describe experiments exploiting our bright source of time-correlated photon pairs from microstructured fibres. These include four photon experiments showing high visibility interference effects suitable for developing quantum gates and cluster states.

ROOM B11

IG4-4-WED 11:30

Collective scattering of partially coherent light by cold atoms

G.R.M. Robb, W.J. Firth, SUPA, University of Strathclyde, Glasgow, United Kingdom

We investigate the effect of introducing pump phase noise into the Collective Atomic Recoil Laser (CARL) model. We demonstrate that the reduced coherence of the pump field can actually increase the intensity of backscattered light.

IG4-5-WED 11:45

Analysis of fractal dimension of light scattering in polyhedral mirror-ball structures

K. Amano, D. Narimatsu, S. Sotome, S. Tashiro, A. Uchida, S. Yoshimori, Takushoku University, Hacjioji, Tokyo, Japan

We experimentally observed fractal patterns in polyhedral mirror-ball structures that consist of spherical reflectors located at the vertices of polyhedra. We obtained the fractal dimension of basin boundaries in a cubic mirror-ball structure is 1.597.

ROOM 13a

CD4-4-WED 11:15

RGB generation in secondary cores of microstructured fibres

P. Horak, P. Dupriez, F. Poletti, M.N. Petrovich, Y. Jeong, J. Nilsson, D.J. Richardson, D.N. Payne, University of Southampton, United Kingdom

We demonstrate the generation of RGB light in submicron secondary cores of microstructured holey fibres using a green picosecond pump. The process is attributed to degenerate four-wave mixing with birefringent phase matching.

CD4-5-WED 11:30

All optical vestigial sideband generation using counter propagating pumping in semiconductor optical amplifier

T. Silveira, P. Monteiro, Siemens Networks S.A., Amadora and Instituto de Telecomunicaçoes, Aveiro, Portugal; A. Teixeira, A. Ferreira, Instituto de Telecomunicaçoes, Aveiro, Portugal

A simple all-optical vestigial-sideband generator using SPM induced in a SOA with counter propagating pumping is experimentally demonstrated. The output signal features ssideband suppression above 16dB and improved signal distortion, when compared to the input.

CD4-6-WED 11:45

Modelling pulse compression in BBO using cascaded nonlinearity: the effects of self-steepening in quadratic media

N.G.R. Broderick, J.H.V. Price, M. Praeger, University of Southampton, United Kingdom

We present the first systematic study of pulse compression in a chi-2 material including self steepening. These results show that for ultrashort pulses self steepening is detrimental to the pulse quality and we discuss their effects on possible experiments.

ROOM 13b

CB8-4-WED 11:15

Active stabilization of external cavity diode laser rapidly chirped over 10 GHz by an optoelectronic digital servo-loop control

G. Gorju, A. Jucha, V. Crozatier, I. Lorgeré, J.L. Le Gouët, F. Bretenaker, Laboratoire Aimé Cotton, Orsay, France

We demonstrate an active stabilization scheme for frequency chirped laser thanks to an optoelectronic digital servo-loop control. The errors affecting a laser scanned over 10 GHz in 1 ms, are reduced below 100 kHz.

CB8-5-WED 11:30

1.55 µm tensile strained GaInNAs/InP laser diodes performances

B. Messant, O. Gauthier-Lafaye, M. Boutillier, S. Bonnefont, F. Lozes-Dupuy, LAAS-CNRS, Toulouse, France; B. Dagens, F. Alexandre, Alcatel Thales 3-5 Labs, Marcoussis, France; H. Carrere, X. Marie, LNMO, Toulouse, France

A detailed study of GaInNAs/InP tensile strained quantum well laser diodes is presented. Despite being dominated by Auger recombination below threshold, these devices exhibit high differential gain and resonant frequency and good characteristic temperature.

CB8-6-WED 11:45

Dynamics-induced asymmetries in the nonlinear gain of semiconductor lasers on multimode operation

S. Beri, M.K. Smit, M. Yousefi, P.C. de Jagher, COBRA Research Institute, Eindhoven, Netherlands; D. Lenstra, Delft University of Technology, Delft, Netherlands

Nonlinear gain asymmetries in semiconductor lasers which manifest in amplification or damping of side modes next to a dominant spectral peak are investigated. The role of carrier dynamics and carrier-diffusion is elucidated.

ROOM 14a

CG5-4-WED 11:15

Visualization of vibrational wave packet via Coulomb explosion in poly-atomic molecules

H. Yazawa, Y. Esumi, F. Kannari, T. Shioyama, Keio University, Yokohama, Japan; R. Itakura, Japan Atomic Energy Agency, Kyoto, Japan; K. Yamanouchi, The University of Tokyo, Japan

Applying a Coulomb explosion imaging technique to visualize the vibrational wave packet of dissociating ethanol and 1-propanol molecules, we observed the real-time evolution of wave packet at each main chemical bond axis simultaneously.

CG5-5-WED 11:30

Correlated two-electron dynamics in ultrashort laser pulses

A. Becker, C. Ruiz, S. Baier, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany; L. Plaja, L. Roso, Universidad Salamanca, Spain

Ab-initio computations of the interaction of two-electron atoms and molecules with ultrashort Ti:sapphire laser pulses beyond the one-dimensional approximation exhibit a rich quantum dynamics with two pathways to nonsequential double ionization.

CG5-6-WED 11:45

A quantitative-accurate S-Matrix model for the description high-order harmonic generation

L. Plaja, J.A. Pérez-Fernández, Universidad de Salamanca, Spain

A S-Matrix model is developed without resort to the common approximations (stationary-wave approximation, neglecting continuum-continuum transitions). Our approach describes quantitatively the HHG spectrum for hydrogenic atoms in a wide range of situations with reduced computing times.

ROOM B21

NOTES

CK7-3-WED 11:15

Scattering optical elements: towards complete control of light propagation on the wavelength scale

A. Håkansson, H.T. Miyazaki, National Ins. for Material Science, Tsukuba, Japan; J. Sanchez-Dehesa, Polytechnic University of Valencia, Spain

We here present a library of photonic devices shaped using inverse design, to achieve full control of the scattering of light. These devices, named Scattering Optical Elements, introduce 'automatic photonic component design on demand'.

CK7-4-WED 11:30

Optical Corkscrew

E.J. Grace, Imperial College London, UK

A novel, highly non-paraxial, helical beam is predicted. Dubbed a corkscrew beam, since the pitch is comparable to the wavelength, they offer the possibility of optically sculpting structures with a chiral response.

CK7-5-WED 11:45

Design and fabrication of long-period gratings in As_2S_3 Chalcogenide glass Rib waveguides

K. Finsterbusch, V.G. Ta'eed, N.J. Baker, B.J. Eggleton, University of Sydney Australia; D.-Y. Choi, S. Madden, B. Luther-Davies, Australian National University, Sydney, Australia

Long-period gratings are written into highly nonlinear chalcogenide (As_2S_3) glass rib waveguides. Bragg gratings and modal analysis of the waveguide enable up to 20 dB forward mode coupling resonances to be designed at telecommunication wavelengths.

ROOM 1

14:30 – 16:00

CA7 Session: Laser materials and spectroscopy I

***Chair:** Mark Dubinskii, U.S. Army Research Laboratory, Adelphi, USA*

CA7-1-WED 14:30

Spectroscopic and lasing properties of Ti:Sapphire at low temperature

M. Delaigue, I. Manek-Hönninger, D. Villate, F. Salin, T. Cardinal, F. Guillen, A. Garcia, Université Bordeaux I, France; F. Estable, P.-M. Paul, Amplitude Technologies, Evry, France; J.L. Doualan, R. Moncorgé, Université de Caen, France

We study the temperature dependence of the Ti:Sapphire gain properties. We explain the evolution of the lasing properties at low temperature with the changes in the fluorescence spectra and the emission cross section.

CA7-2-WED 14:45

Comparative laser and spectroscopic properties of (1-x)CaF_2-(x)SrF_2 solid solutions doped with Yb^{3+} ions

M.E. Doroshenko, T.T. Basiev, S.V. Vassiliev, S.B. Kravtsov, P.P. Fedorov, V.V. Osiko, V.A. Konyushkin, S.V. Kouznetzov, O.V. Mikhailovskaya, General Physics Institute, Moscow, Russia

Laser and spectroscopic properties of fluoride crystals CaF_2:Yb^{3+}, SrF_2:Yb^{3+} and solid solution of CaF_2-SrF_2:Yb^{3+} are compared. For CaF_2-SrF_2:Yb^{3+}(6%) solid solution oscillations at 1025 nm were obtained with the maximum slope efficiency of 85%.

ROOM 4a+b

14:30 – 16:00

CE5 Session: Microstrucutred fibres, fibre devices and glass materials

***Chair:** Kerstin Wörhoff, University of Twente, Netherlands*

CE5-1-WED 14:30

Large pitch kagome-structured hollow-core PCF

F. Couny, F. Benabid, P.S. Light, University of Bath, United Kingdom

A new type of hollow-core-PCF based on large pitch kagome-lattice cladding is reported to exhibit broad visible and IR transmission bands with low chromatic dispersion and high core-light confinement.

CE5-2-WED 14:45

Femtosecond Ti:sapphire laser fabrication of micro-channels in microstructured optical fibres

A. van Brakel, D.J. Richardson, C. Grivas, M.N. Petrovich, University of Southampton, United Kingdom

Femtosecond laser fabrication of precision microchannels in photonic bandgap and index-guiding microstructured fibres is reported. Radial gaseous access was demonstrated from the fibre surface to the microstructured region, without significant impact on optical transmission.

ROOM BOR1

14:30 – 16:00

IB2 Session: Optical lattices

***Chair:** Martin Zwierlein, Massachusetts Institute of Technology, Cambridge, MA, USA*

IB2-1-WED (Tutorial) 14:30

Ultracold atoms in optical lattices

I. Bloch, Johannes Gutenberg University Mainz, Germany

Ultracold atoms in optical lattices offer outstanding control and manipulation possibilities for artificial quantum matter close to absolute zero temperature. The talk gives an introduction into this novel and interdisciplinary research field.

ROOM B11

14:30 – 16:00

IG5 Session: Dynamics in novel systems

***Chair:** Michael Böhm, University of Rostock, Germany*

IG5-1-WED (Invited) 14:30

Thermalization of incoherent nonlinear wave-packets

A. Picozzi, S. Lagrange, S. Pitois, H.R. Jauslin, CNRS, Institut Carnot de Bourgogne, Dijon, France

We present theoretically and experimentally in an optical fiber system a novel phenomenon of velocity-locking of incoherent nonlinear waves. This intriguing process is explained by simple thermodynamic arguments based on the weak turbulence theory.

ROOM 13a

14:30 – 16:00

CD5 Session: Nonlinear photonic materials

***Chair:** Frank Wise, Cornell University, Ithaca, NY, USA*

CD5-1-WED 14:30

Form birefringence and third-harmonic generation in nanostructured silicon oxide

L.A. Golovan, V.A. Melnikov, S.O. Konorov, A.B. Fedotov, V.Yu. Timoshenko, A.M. Zheltikov, P.K. Kashkarov, M.V. Lomonosov Moscow State Univ., Russia; D.A. Ivanov, Russian Academy of Sciences, Moscow, Russia; G.I. Petrov, V.V. Yakovlev, Univ. of Wisconsin-Milwaukee, USA

We report strong in-plane birefringence of oxidized porous silicon films caused by a network of preferentially oriented pores. The third-harmonic generation efficiency studied as a function of the pump wavelength evidences the phase-matched interaction.

CD5-2-WED 14:45

Epitaxial growth of inverted GaP for quasi phase matching nonlinear optical devices

T. Matsushita, T. Kondo, The University of Tokyo, Bunkyo-ku, Tokyo, Japan; T. Yamamoto, The University of Tokyo, Kashiwa, Chiba, Japan

Spatially-inverted GaP epilayers have been successfully grown on Si intermediate epilayers deposited on GaP (100) substrates using molecular beam epitaxy. This will open up a novel application of GaP to QPM nonlinear optical devices.

ROOM 13b

14:30 – 16:00
CB9 Session: Semiconductor laser physics
Chair: *Hans-Jürgen Wünsche, Humboldt University, Berlin, Germany*

CB9-1-WED 14:30
Ultrafast carrier dynamics in p-doped InGaAs quantum dot amplifiers
V. Cesari, P. Borri, W. Langbein, Cardiff University, Cardiff, United Kingdom; S. Mikhrin, I. Krestnikov, A. Kovsh, Nanosemiconductor GmbH, Dortmund, Germany; M. Rossetti, A. Fiore, Ecole Polytechnique Fédérale de Lausanne, Switzerland

We measured the ultrafast gain and index dynamics in undoped and p-doped electrically-pumped InGaAs quantum-dot optical amplifiers emitting near 1.3micron at room temperature and found faster gain dynamics in the undoped than in p-doped samples.

CB9-2-WED 14:45
Round-Robin measurements of linewidth enhancement factor of semiconductor lasers in COST 288 action
G. Giuliani, S. Donati, Univ. of Pavia, Italy; J.M. Rorison, J. Pozo, Univ. of Bristol, UK; A. Villafranca, I. Garces, J. Lasobras, Univ. of Zaragoza, Spain; M. Chacinski, R. Schatz, Royal Ins. of Technology, Stockholm, Sweden; K. Kouloumentas, I. Tomkos, D. Klonidis, Athens Information Technology Center, Athens, Greece; P. Landais, Dublin City Univ., Dublin, Ireland; A. Fiore, P. Moreno, M. Rossetti, École Polytechnique Fédérale de Lausanne, Switzerland; W. Elsässer, J. Von Staden, Tecnical Univ. Darmstadt, Germany; M. Saarinen, M. Pessa, P. Leinonen, Tampere Univ. of Technology, Tampere, Finland; G. Huyet, Univ. College Cork, Ireland; M. Sciamanna, SUPELEC, Metz, France; J. Danckaert, K. Panajotov, Vrije Univ. Brussel, Brussels, Belgium; T. Fordell, A. Lindberg, Univ. of Helsinki, Finland; P. Besnard, J.-F. Hayau, J. Poette, FOTON-ENSSAT, Lannion, France; M.F. Pereira, Sheffield Hallam Univ., Sheffield, UK; A. Wacker, R. Nelander, Univ. of Lund, Sweden; R. Escorihuela, Aragon Photonics Labs S.L., Zaragoza, Spain; V. Vilokkinen, Modulight, Tampere, Finland; F. Grillot, FOTON-INSA, Rennes, France; A. Tredicucci, R. Green, NEST - Scuola Normale Superiore, Pisa, Italy

Round-Robin measurements on the linewidth enhancement factor are carried out in many laboratories participating to EU COST 288 Action. Seven different techniques are applied to DFB, VCSELs, QCL, and QD lasers, and results are compared.

ROOM 14b

14:30 – 16:00
CF4 Session: Pulse characterization
Chair: *Ian Walmsley, University of Oxford, United Kingdom*

CF4-1-WED 14:30
Directly measuring the spatio-temporal electric field of ultrashort pulses in and near a focus
P. Bowlan, P. Gabolde, R. Trebino, Georgia Institute of Technology, Atlanta, USA

We present the first technique for measuring the complete spatio-temporal intensity and phase of an ultrashort pulse in and near a focus. Our method uses a variant of spectral interferometry that we recently introduced.

CF4-2-WED 14:45
Fast Gabor transform for video-rate phase retrieval from SPIDER interferograms
J. Bethge, G. Steinmeyer, C. Grebing, Max-Born-Institute, Berlin, Germany;

We experimentally demonstrate a fast wavelet phase retrieval algorithm, allowing for live pulse reconstruction from SPIDER interferograms with several Hertz update rate. This method is shown to be more robust than the standard Takeda algorithm.

ROOM B21

14:30 – 16:00
CK8 Session: 2D Photonic crystals
Chair: *Martin Cryan, University of Bristol, United Kingdom*

CK8-1-WED 14:30
Manipulation of dispersion properties of two-dimensional photonic crystal slab waveguides by atomic layer deposition
D.P. Gaillot, E. Graugnard, C.J. Summers, J. Blair, S. Dunham, C.W. Neff, T. Yamashita, Georgia Institute of Technology, Atlanta, USA

We present an elegant and powerful technique to precisely engineer the dispersion properties (frequency, phase and group velocity) of 2D PC slab WGs using low-temperature atomic layer deposition to achieve conformal coating of TiO_2.

CK8-2-WED 14:45
Photonic crystals with a complete bandgap for TM-modes used as resonators for Terahertz quantum-cascade lasers
A. Benz, A.M. Andrews, G. Fasching, K. Unterrainer, T. Roch, W. Schrenk, G. Strasser, Vienna University of Technology, Vienna, Austria

We present the design and the fabrication of a photonic crystal with a complete bandgap for TM-modes. The photonic crystal is used as a resonator for terahertz quantum-cascade lasers.

NOTES

ROOM 1

CA7-3-WED 15:00

Spectroscopy and high efficiency laser operation of high purity Yb^{3+}-doped Lu_2O_3 grown by the heat exchanger method

R. Peters, C. Kränkel, M. Fechner, K. Petermann, G. Huber, Institute of Laser-Physics, Hamburg, Germany

We report on improved crystal-growth of high-purity $Yb:Lu_2O_3$ by the heat-exchanger-method leading to an increase of fluorescence-lifetime and laser-efficiency. At 1.04W absorbed pump-power an output-power of 0.74W with a slope-efficiency of 84% at 1034nm was obtained.

CA7-4-WED 15:15

UV absorption wing enhanced refractive index changes observed in Yb:YAG and Yb:KGW

R. Moncorgé, J.L. Doualan, P. Camy, Université de Caen, France; O.L. Antipov, O.N. Eremeykin, Institute of Applied Physics of the Russian Academy of Science, Nizhny Novgorod, Russia

Time-resolved excited-state absorption and interferometric measurements were performed with the Yb:YAG and Yb:KGW laser crystals. Observed refractive index variations are related to the existence of polarizability changes induced by strong UV absorption bands.

CA7-5-WED 15:30

The study of thermo-mechanical and -optical properties of $GdVO_4$ and YVO_4

Y. Sato, T. Taira, Institute for Molecular Science, Okazaki, Japan

Thermal conductivity, thermal expansion coefficient, and thermal refractive index coefficient of $GdVO_4$ and YVO_4 were carefully evaluated. We also discussed thermo-mechanical and -optical characteristics from the viewpoint of power scaling in the limited compact volume.

ROOM 4a+b

CE5-3-WED 15:00

LP_{01} to TE_{01} fibre mode convertor

A. Witkowska, K. Lai, S.G. Leon-Saval, T.A. Birks, University of Bath, United Kingdom

We demonstrate a low-loss (0.3 dB) fibre mode convertor from LP_{01} to TE_{01}. The device has been made from photonic crystal fibre via a hole inflation technique and its extinction ratio is better than -20 dB.

CE5-4-WED 15:15

Unexpected optical behaviour of standard single mode fibre cladding

M. Tacca, P. Boffi, M. Ferrario, M. Martinelli, Politecnico di Milano, Italy

The existence of two cladding zone which present different optical properties is experimentally verified for the first time in standard single mode fibre by means of a high precision photoelastic tomographic fibre characterization.

CE5-5-WED 15:30

Optimization of repetition rate, pulse duration, and polarization for femtosecond-laser-writing of waveguides in borosilicate and fused silica glasses

S.M. Eaton, P.R. Herman, M.L. Ng, H. Zhang, S. Ho, University of Toronto, Canada

Low-loss waveguides were fabricated in fused silica and borosilicate glasses using a femtosecond fiber laser. The effect of repetition rate, scan speed, pulse duration and polarization on waveguide properties will be discussed.

ROOM BOR1

IB2-2-WED 15:30

Confining and probing BEC dynamics in optical lattices via boundary dissipations

G.-L. Oppo, University of Strathclyde, Glasgow, United Kingdom; R. Franzosi, R. Livi, Università di Firenze, Sesto Fiorentino, Italy

Atomic losses at the boundaries of a one-dimensional optical lattice can induce self-localisation of Bose-Einstein Condensates. They can also be used to probe the dynamics and interaction of breathers inside the lattice.

ROOM B11

IG5-2-WED 15:00

Experimental observation of coherent destruction of tunnelling in a driven double-well potential

G. Della Valle, S. Longhi, M. Ornigotti, P. Laporta, Politecnico di Milano, Italy; V. Foglietti, E. Cianci, IFN-CNR di Roma, Italy

The first experimental visualization of coherent destruction of tunneling is reported in a driven optical double-well potential. Fluorescence patterns are used to trace the dynamical evolution of the wave function induced by the driving field

IG5-3-WED 15:15

Dynamics of degenerate optical parametric oscillators with left-handed materials

P. Tassin, G. Van der Sande, I. Veretennicoff, Vrije Universiteit Brussel, Brussels, Belgium; P. Kockaert, M. Tlidi, Université Libre de Bruxelles, Brussels, Belgium

We investigate the spatiotemporal dynamics of degenerate optical parametric oscillators containing a left-handed metamaterial. We show that diffraction can become negative for either the signal or the pump wave and study localised structures.

IG5-4-WED 15:30

Asymmetric modulation of a laser as a weak optical ratchet

C.E. Preda, P. Glorieux, B. Ségard, Université Lille1, France

Subjecting lasers to triangular modulations of the pump produces phenomena that drastically depend on the symmetry of the triangle. With slow up-rising, a laser delivers coherent pulses, while it does not with fast up-rising.

ROOM 13a

CD5-3-WED (Invited) 15:00

All-optical switching and control of ultrahigh-Q photonic-crystal nanocavities

M. Notomi, T. Tanabe, E. Kuramochi, A. Shinya, H. Taniyama, NTT Basic Research Laboratories, Atsugi, Japan

We present our recent progress in terms of ultrahigh-Q photonic-crystal cavities, and discuss its impact on various optical phenomena and applications, including slow-light, all-optical switching/processing, adiabatic wavelength conversion, and optomechanical energy conversion.

CD5-4-WED 15:30

Continuous tuning of silicon Raman laser for molecular spectroscopy

V. Sih, H. Rong, S. Xu, Y.-H. Kuo, M. Paniccia, Intel Corporation, Santa Clara, USA; O. Cohen, O. Raday, Intel Corporation, Jerusalem, Israel

We demonstrate mode-hop free tuning of a continuous-wave silicon Raman laser at infrared wavelengths over a tuning range suitable for molecular spectroscopy. Absorption spectroscopy measurements of methane correspond well with a calculated reference spectrum.

ROOM 13b

CB9-3-WED 15:00

The influence of carrier density non-pinning on the output power of 1.55 µm lasers at high temperature

I.P. Marko, S.J. Sweeney, A.R. Adams, University of Surrey, United Kingdom; N.D. Whitbread, D.J. Robbins, A.J. Ward, B. Asplin, Bookham, Towcester, United Kingdom

We show that whilst losses are important in determining the power output of 1.55µm lasers, self-heating induced non-pinning of the carrier density above threshold increases non-radiative recombination processes and ultimately limits the maximum obtainable power.

CB9-4-WED 15:15

A simple model for the intensity noise of single mode class-A lasers

G. Baili, M. Alouini, D. Dolfi, Thales Research and Technology, Palaiseau, France; I. Sagnes, Laboratoire de Photonique et de Nanostructures, Marcoussis, France; F. Bretenaker, Laboratoire Aimé Cotton, Orsay, France

A model is proposed for class-A lasers intensity noise. It describes low frequency RIN and SMSR at cavity modes frequencies. The model predictions fit well with the measurements performed on a class-A semiconductor laser.

CB9-5-WED 15:30

Static gain saturation spectra of quantum dot optical amplifiers: the role of excited to ground state relaxation

M. Laemmlin, C. Meuer, J. Kim, D. Bimberg, Technical University, Berlin, Germany; G. Eisenstein, Electrical Engineering Department Technion, Haifa, Israel

We describe static gain saturation spectra in quantum dot optical amplifiers. Highly populated excited states serve as carrier reservoirs for the replenishing of saturated ground state carriers yielding symmetric saturation spectra.

ROOM 14b

CF4-3-WED 15:00

Towards A compact femtosecond spectrometer based on photonic crystal fibers with probe light in the near-UV

J. Léonard, N. Lecong, S. Haacke, O. Crégut, University Louis Pasteur, Strasbourg, France; P. Leproux, V. Couderc, University of Limoges, France

We use the supercontinuum generated in PCF's for broadband femtosecond transient spectroscopy applied to studying small organic molecules in solution. A birefringent fiber allows us to reach probe wavelengths as short as 360 nm.

CF4-4-WED 15:15

Full three dimensional intensity-and-phase retrieval of arbitrarily complex ultrashort laser pulses

F. Bragheri, L. Tartara, V. Degiorgio, University of Pavia, Italy; C. Liberale, University of Magna Graecia, Catanzaro, Italy; D. Faccio, O. Jedrkiewicz, University of Insubria, Como, Italy; P. Di Trapani, Vilnius University, Lithuania

We present a new experimental technique to obtain the full, i.e. in space and time, characterization of a pulse both in amplitude and phase. The technique is applicable in case of cylindrically symmetric pulses.

CF4-5-WED 15:30

Achromatic and single-beam pulse characterization technique for visible-UV pulses based on direct UV pulse shaping and cross-polarized wave generation

N. Forget, S. Coudreau, T. Oksenhendler, Fastlite, Palaiseau, France; F. Lepetit, DSM/DRECAM/SPAM CEA, Saclay, France; O. Albert, LOA, École Polytechnique, Palaiseau, France

40fs pulses at 397nm are characterized by a single-beam, achromatic, programmable and self-compensated spectrally resolved interferometric autocorrelation technique based on the conjugate use of a broadband pulse shaper and crossed-polarized wave generation.

ROOM B21

CK8-3-WED 15:00

Photoluminescence properties of vertical emitting InP nanopillars photonic crystal slab on silicon

L. Ferrier, P. Rojo-Romeo, E. Drouard, X. Letartre, C. Seassal, P. Viktorovitch, Institut des Nanotechnologies de Lyon, Ecully, France

High quality factor Bloch modes around Gamma-point are observed around 1.43µm in compact 2D nanopillar arrays patterned in an InP membrane including InAs quantum dots. Vertical laser emission is expected in such structures with quantum wells.

CK8-4-WED 15:15

Novel tuneable optical filter made of a polymer and liquid crystal holographic grating on glass waveguides

D. Donisi, R. Asquini, A. d'Alessandro, University of Rome "La Sapienza", Rome, Italy; C. Umeton, L. De Sio, R. Caputo, LICRYL, University of Calabria, Rende (CS), Italy; R. Beccherelli, Consiglio Nazionale delle Ricerche - Istituto per la Microelettronica e Microsistemi, Rome, Italy

A novel tuneable optical filter made of a polymer and nematic liquid crystal grating on a channel glass waveguide is presented. A few microwatts driving power is able to tune the optical transmission response.

CK8-5-WED 15:30

Photonic crystal tapers for coupling into slow-light photonic crystal channel waveguides

P. Pottier, R.M. De La Rue, University of Glasgow, United Kingdom; M. Gnan, University of Glasgow, United Kingdom and University of Ferrara, Italy

The simulated coupling efficiency of light from ridge waveguides into low group velocity photonic crystal channel guides (butt-coupling) has been improved significantly in the band-edge region via the introduction of photonic crystal tapers.

NOTES

ROOM 1

CA7-6-WED 15:45

Pulse timing effects in bulk Er/Yb codoped diode-pumped eyesafe lasers

E. Georgiou, N. Lazarides, Technological Educational Institute of Crete, Heraklion, Greece; O. Musset, J.P. Boquillon, Université de Bourgogne, Dijon, France

Novel operating characteristics and uncommon input / output pulse timing effects for diode-pumped bulk Er/Yb systems, both in free-running and Q-switched modes, are reported. These results are directly applicable in eyesafe laser engineering and upscaling.

16:30 – 18:00

CA8 Session: Laser materials and spectroscopy II

Chair: *Klaus Petermann, University of Hamburg, Germany*

CA8-1-WED 16:30

Continuous wave laser oscillation of stoichiometric YbAG crystal

S. Matsubara, S. Kawato, M. Inoue, T. Kobayashi, University of Fukui, Japan

Continuous-wave 1076-nm lasing of the stoichiometric YbAG was realized by 937-nm pumping at room temperature. An output power of 100 mW was obtained with 38% slope efficiency and 29% optical-to-optical efficiency for the incident power.

ROOM 4a+b

CE5-6-WED 15:45

Optimization of the structural and optical properties of Ge-As-Se glasses

C. Zha, A. Prasad, B. Luther-Davies, R. Wang, S. Madden, A. Rode, The Australian National University, Canberra, Australia

The relations between composition, structure and properties of Ge-As-Se glasses have been studied using Raman, UV-Vis-IR, Z-scan, PDS and DSC techniques, and a method for optimizing glass composition towards high optical nonlinearity has been developed.

16:30 – 18:00

CE6 Session: Nanostructured optical devices

Chair: *Simon Rivier, Max Born Institute, Berlin, Germany*

CE6-1-WED 16:30

Observation of blue light emission from Si Ion implanted fused Silica substrates

K. Miura, T. Tanemura, O. Hanaizumi, Gunma University, Kiryu, Japan; S. Yamamoto, K. Takano, M. Sugimoto, M. Yoshikawa, Japan Atomic Energy Agency, Takasaki, Japan

We observed blue-light emission from Si ion implanted fused silica substrates after annealing. Blue PL peaks were located around a wavelength of 400nm, and the intensities can be remarkable after annealing above 1150 degrees centigrade.

ROOM BOR1

IB2-3-WED 15:45

Phase-dependent Landau-Zener effect in asymmetric optical lattices

T. Salger, C. Geckeler, S. Kling, Universität Bonn, Germany; M. Weitz, Universität Bonn and Universität Tübingen, Germany

We investigate transport properties of atoms in a ratchet-like optical potential realized by superimposing two harmonic lattices. We report a phase-dependent Landau-Zener effect between the first and second excited Bloch band.

16:30 – 18:00

IB3 Session: Novel trapping and cooling schemes

Chair: *Michael Köhl, University of Cambridge, United Kingdom*

IB3-1-WED 16:30

Trapping atoms with a persistent supercurrent atom chip

C. Hufnagel, T. Mukai, NTT Basic Research Laboratories, Kanagawa and Japan Science & Technology Agency, Saitama, Japan; F. Shimizu, UEC, Tokyo, NTT Basic Research Laboratories, Kanagawa and Japan Science & Technology, Saitama, Japan

In this presentation we report an achievement of persistent supercurrent atom chip and trapping of 87Rb atoms in the vicinity of a cold surface.

ROOM B11

IG5-5-WED 15:45

Misalignment effects in nonlinear feedback devices

R. Zambrini, Universitat Illes Balears, Palma de Mallorca, Spain; F. Papoff, University of Strathclyde, Glasgow, United Kingdom

We investigate nonlinear optical systems with a misaligned feedback loop. This gives rise to a peculiar two-point nonlocality with important effects on spatio-temporal instabilities. Large tunability of phase and group transverse velocities is also demonstrated.

16:30 – 18:00

IC5 Session: Joint Session IA & IC & IF Optomechanical control and entanglement

Chair: *Michael Hartmann, Imperial College London, United Kingdom*

IC5-1-WED (Invited) 16:30

Optomechanical entanglement between a movable mirror and a cavity field

D. Vitali, P. Tombesi, Univ. of Camerino, Italy; M. Aspelmeyer, A. Zeilinger, Univ. of Vienna and Austrian Academy of Sciences, Vienna, Austria; S. Gigan, H.R. Böhm, Univ. of Vienna, Austria; A. Ferreira, Porto Univ., Portugal and University of Vienna, Austria; V. Vedral, Leeds Univ., United Kingdom and Univ. of Vienna, Austria; A. Guerreiro, Porto Univ., Portugal

We show how stationary entanglement between an optical cavity field mode and a macroscopic vibrating mirror can be generated by means of radiation pressure. We also show how the generated optomechanical entanglement can be quantified and we suggest an experimental readout-scheme to fully characterize the entangled state. Surprisingly, such optomechanical entanglement is shown to persist for environment temperatures above 20K using state-of-the-art experimental parameters.

ROOM 13a

CD5-5-WED 15:45

Nanometric three-dimensional subsurface imaging of a silicon flip-chip

E. Ramsay, K.A. Serrels, M.J. Thomson, A.J. Waddie, R.J. Warburton, M.R. Taghizadeh, D.T. Reid, Heriot-Watt University, Edinburgh, United Kingdom

By implementing two-photon optical-beam-induced-current microscopy using a solid-immersion lens, imaging inside a silicon flip chip is reported with 166nm lateral resolution and an axial resolution capable of resolving features only 100nm deep.

16:30 – 18:00

CD6 Session: Photonic chips

Chair: *John Dudley, Université de Franche-Comté, Besançon, France*

CD6-1-WED (Keynote) 16:30

The all-photonic chip

B.J. Eggleton, University of Sydney, Australia

This paper reviews progress towards developing ultra-fast all-optical photonic integrated circuits for future ultrahigh bandwidth optical communication systems.

ROOM 13b

CB9-6-WED 15:45

Nonlinear stability of quantum dot semiconductor lasers

T. Erneux, E.A. Viktorov, P. Mandel, Université Libre de Bruxelles, Brussels, Belgium

We analytically show that the slow decay of the carriers as well as the strong capture rate of the empty dots are responsible for the unusual dynamical properties of quantum dot lasers.

16:30 – 18:00

CB10 Session: Quantum cascade lasers

Chair: *Wolfgang Elsässer, Technical University Darmstadt, Germany*

CB10-1-WED 16:30

Near-field imaging of the evanescent electric field on the surface of a quantum cascade laser

V. Moreau, M. Bahriz, R. Colombelli, Université Paris-Sud, Orsay, France; L. Wilson, A. Krysa, University of Sheffield, United Kingdom; P.-A. Lemoine, Y. De Wilde, Laboratoire d'Optique Physique, ESPCI, Paris, France; R. Perahia, O. Painter, California Institute of Technology, Pasadena, USA

We report the imaging - obtained with apertureless scanning near-field microscopy - of the evanescent electric field at the surface of a quantum cascade laser. This suggests that the devices could be "surface" sensitive.

ROOM 14b

CF4-6-WED 15:45

Complete field measurement of segmented beams using quadri-wave lateral shearing interferometry

S. Velghe, D. Brahmi, B. Wattellier, PHASICS SA, Palaiseau, France; F. Boubault, P. Drabczuk, N. Blanchot, C. Rouyer, CEA/CESTA, Le Barp, France

We present a new technique to fully characterize the wave front of segmented beams, using quadri-wave lateral shearing interferometry. It is applied to the metrology of synthetic aperture compressors used in petawatt scale lasers.

16:30 – 18:00

CF5 Session: Supercontinua and nonlinear spatiotemporal shaping

Chair: *Alexander Apolonski, Ludwig-Maximilians University, Munich, Germany*

CF5-1-WED 16:30

High energy vortices generation by volume phase holograms and breaking into spiraling beams in air

I.J. Sola, J. San Román, M.V. Collados, L. Plaja, C. Méndez, I. Arias, D. Delgado, V. Díaz, C. Ruiz, A. García, L. Roso, University of Salamanca, Spain

High power vortices have been generated by using home made volume phase holograms. When focused in air, vortices breaking into two spiraling beams have been observed and studied, experimental and theoretically, depending on propagation.

ROOM B21

CK8-6-WED 15:45

Photonic crystal waveguides on InP membranes for slow light implementation

A. Talneau, K.H. Lee, I. Sagnes, C.N.R.S., Marcoussis, France

Low propagation losses have been measured for a one missing row Photonic Crystal waveguide on InP membrane operating in the slow light regime. This opens the route to optical pulse processing.

16:30 – 18:00

CK9 Session: Nonlinear optical properties of PCs

Chair: *Concita Sibilia, University Roma La Sapienza, Rome, Italy*

CK9-1-WED 16:30

Non-linear optical properties of hybridized surface plasmon polaritonic crystals: observation of optical bistability

G. Wurtz, R. Pollard, A. Zayats, The Queen's University of Belfast, United Kingdom; L. Salomon, Université de Bourgogne, Dijon, France; K. Cho, Sogang University, Mapo-gu, South Korea

We report on the non-linear optical properties of a hybrid plasmonic crystal made of a nanostructured metallic film coupled with a non-linear polymer. The non-linear transmission of the crystal is shown to be pump wavelength dependent and demontrates bistability at selected probe wavelengths.

NOTES

ROOM 1

CA8-2-WED 16:45

Laser operation of Yb^{3+} in the acentric $RbTiOPO_4$ crystal codoped with Nb^{5+}

X. Mateos, V. Petrov, Max-Born-Institute for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany; A. Peña, M. Aguiló, F. Díaz, University Rovira i Virgili, Tarragona, Spain; P. Segonds, B. Boulanger, Université Joseph Fourier, Grenoble, France

We demonstrate laser operation of Yb^{3+} in the acentric orthorhombic crystal RbTiOPO4 which exhibits large splitting of the ground level, achieving very low laser thresholds and broad tunability extending roughly from 1010 to 1080 nm.

CA8-3-WED 17:00

Passively Q-switched Yb:YAG/Cr:YAG ceramics miniature lasers with peak power > 150 kW and nearly diffraction-limited beam quality

J. Dong, A. Shirakawa, K. Ueda, Univ. of Electro-Communications, Tokyo, Japan; H. Yagi, T. Yanagitani, Konoshima Chemical Co. Ltd., Kagawa, Japan

We report on a passively Q-switched Yb:YAG/Cr:YAG all-ceramic miniature laser generating 51.3 μJ pulses with 335 ps pulse duration and over 150 kW peak power and with a nearly diffraction-limited beam quality ($M^2 < 1.05$).

CA8-4-WED 17:15

True three level laser operation with Nd:vanadate crystals

E. Hérault, F. Balembois, P. Georges, Institut d'Optique, Palaiseau, France

We present first true three-level-lasers based on an Nd-doped vanadate crystals. Emission around 880nm in NdGdVO4 and NdYVO4 was studied in cw and pulsed regime. SHG was realized to reach blue range at 440nm.

ROOM 4a+b

CE6-2-WED 16:45

Optical characterisation of nanostructured metallic Split-Ring arrays

A.K. Sheridan, A.W. Clark, A. Glidle, J.M. Cooper, D.R.S. Cumming, University of Glasgow, UK

We demonstrated the fabrication of highly uniform arrays of gold rings and split-rings. We show that multiple plasmon resonances can be identified and study the effect of gap and spacing on the resonances.

CE6-3-WED 17:00

Broadband birefringence of GaP nanowires

S.L. Diedenhofen, J. Gómez Rivas, O.L. Muskens, AMOLF/Philips Research Laboratories, Eindhoven, Netherlands; M.T. Borgström, E.P.A.M. Bakkers, Philips Research Laboratories, Eindhoven, Netherlands

We demonstrate giant and broadband birefringence on samples of vertically aligned semiconductor nanowires. The difference between the ordinary and the extraordinary refractive indices increases by 25 % in the wavelength range from 980 nm to 530 nm.

CE6-4-WED 17:15

Reflection photoelastic tomography for the detection of axial stress distribution in Planar optical waveguides

M. Ferrario, A. Licciardello, S.M. Pietralunga, CoreCom, Milan, Italy; M. Martinelli, CoreCom and Politecnico di Milano, Italy

A novel photoelastic tomographic technique in reflection is demonstrated, which accounts for polarization effects and enables to reconstruct the birefringence-related two-dimensional stress distribution in the core region of optical waveguides, with sub-micrometric resolution.

ROOM BOR1

IB3-2-WED 16:45

Electric trapping of neutral Rb atoms

T. Rieger, P.W.H. Pinkse, G. Rempe, Max-Planck-Institut für Quantenoptik, Garching, Germany

We report on all-electrical trapping of neutral Rb atoms in a macroscopic electric trap. Approximately hundred thousand atoms are stored for a few hundred milliseconds. The trapping results will be discussed in detail.

IB3-3-WED 17:00

An optical trap for Chromium atoms

R. Chicireanu, B. Laburthe-Tolra, Q. Beaufils, A. Pouderous, E. Marechal, L. Vernac, J.C. Keller, O. Gorceix, Lab. de Physique des Lasers, Villetaneuse, France

We report on our recent experimental progresses towards the realization of chromium degenerate gases. At present, we continuously load metastable atoms in an Optical Dipole Trap. Optimization of this loading scheme is expected to yield a good starting point for reaching degeneracy by optical means.

IB3-4-WED 17:15

Two-photon cooling below the Doppler limit in bosonic magnesium

M. Riedmann, K. Moldenhauer, T.E. Mehlstäubler, J. Friebe, N. Rehbein, W. Ertmer, A. Pape, A. Voskrebenzev, E.M. Rasel, Leibniz University Hannover, Germany

We prepared atomic samples below the Doppler limit (1.9 mK) of Mg-24, an atom where the level structure prohibits standard sub-doppler cooling. Temperatures of 0.5 mK could be achieved cooling on a coherent three-level transition.

ROOM B11

IC5-2-WED 17:00

Radiation pressure cooling of a micromechanical oscillator using dynamical backaction

A. Schliesser, N. Nooshi, P. Del'Haye, T.J. Kippenberg, Max-Planck-Ins. of Quantum Optics, Garching, Germany; K. Vahala, California Ins. of Technology, Pasadena, USA

We demonstrate how dynamical backaction of radiation pressure can be exploited for passive laser-cooling of high-frequency (>50 MHz) mechanical oscillation modes of very high finesse optical microcavities from room temperature to 11 K.

IC5-3-WED 17:15

Observation of radiation-pressure effects and back-action cancellation in interferometric measurements

T. Briant, P.-F. Cohadon, T. Caniard, P. Verlot, M. Pinard, A. Heidmann, Laboratoire Kastler Brossel, Paris, France

We report the first experimental demonstration of back-action cancellation of radiation pressure, with a setup based upon a high-finesse optical cavity with movable mirrors. Further improvement will allow probing quantum effects of radiation pressure.

ROOM 13b

CB10-2-WED 16:45

Interband cascade laser: multi-wavelength generation and mode mixing

Vl.V. Kocharovsky, S.V. Morozov, V.Ya Aleshkin, A.A. Dubinov, V.I. Gavrilenko, K.V. Marem'yanin, Russian Academy of Science, Nizhny Novgorod, Russia; A.A. Belyanin, Texas A&M Univ., College Station, USA; V.V. Kocharovsky, Russian Academy of Science, Nizhny Novgorod, Russia and Texas A&M Univ., College Station, USA; A.A. Biryukov, P.B. Demina, S.M. Nekorkin, N.N. Semenov, B.N. Zvonkov, Nizhny Novgorod State Univ., Nizhny Novgorod, Russia

Multi-wavelength generation and nonlinear mode mixing in a new class of injection heterolasers - interband dual-cascade laser with a tunnel junction, which separates two different quantum-well active regions in a single waveguide, are obtained and investigated.

CB10-3-WED 17:00

Near room temperature continuous wave operation of an external cavity quantum cascade laser

A. Mohan, A. Wittman, S. Blaser, A. Hugi, M. Giovannini, J. Faist, University of Neuchâtel, Switzerland; E. Gini, Swiss Federal Institute of Technology, Zurich, Switzerland

Near room temperature, continuous-wave (CW) operation of an external-cavity buried heterostructure quantum-cascade laser is reported. Single mode tuning range of 120cm-1 was achieved. Mode-hop free tuning is demonstrated for an anti-reflection coated laser.

CB10-4-WED 17:15

Vertically emitting distributed-feedback quantum-cascade lasers

M. Austerer, S. Schartner, S. Golka, L. Hoffmann, M. Nobile, A.M. Andrews, P. Klang, W. Schrenk, G. Strasser, Technical University, Vienna, Austria

We present single-mode surface-emitting distributed-feedback quantum-cascade lasers. Optical peak powers from the surface around 10 μm wavelength exceed 3 Watts at 78K, while our second-harmonic generating devices deliver ~150 muW of frequency-doubled surface emission.

ROOM 14b

CF5-2-WED 16:45

Generation of high-energy sub-20 fs pulses at 248 nm

T. Nagy, M. Forster, P. Simon, Laser-Laboratorium Göttingen e.V., Germany

High-energy sub-20fs DUV pulses are generated by the hollow-fiber compression technique applied to KrF laser pulses at 248nm. The key issues relevant to the DUV operation are discussed and experimental results are presented.

CF5-3-WED 17:00

Tunable few-optical-cycle visible pulses with passive carrier-envelope phase stabilization from an optical parametric amplifier

C. Manzoni, G. Cerullo, D. Polli, G. Cirmi, D. Brida, S. De Silvestri, Politecnico di Milano, Italy

The passively phase-stabilized idler of an IR optical parametric amplifier is spectrally broadened and seeds a blue-pumped non-collinear optical parametric amplifier. Few-optical cycle phase-stable pulses with broad tunability in the visible are generated.

CF5-4-WED 17:15

Tunable femtosecond vacuum UV pulses at a repetition rate of 1 kHz

M. Mero, J. Zheng, P. Tzankov, O. Steinkellner, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

Femtosecond pulses tunable between 168 and 181 nm are generated at an energy of 100 nJ by mixing the third-harmonic of a Ti:Sapphire laser with pulses from an optical parametric amplifier in an argon-filled capillary.

ROOM B21

CK9-2-WED 16:45

Optical parametric oscillator in a lithium niobate photonic crystal membrane

R. Iliew, F. Lederer, C. Etrich, T. Pertsch, Friedrich-Schiller-University, Jena, Germany

We investigate theoretically the feasibility of an optical parametric oscillator in a realistic high-Q microcavity in a photonic crystal membrane with quadratic nonlinearity. We compare results from nonlinear finite-difference time-domain calculations with a modal model.

CK9-3-WED 17:00

Electromagnetically induced transparency in Rubidium-Filled HC-PCF

P.S. Light, F. Benabid, University of Bath, UK and University of Western Australia, Crawley, Australia; F. Couny, University of Bath, United Kingdom; M. Maric, A.N. Luiten, University of Western Australia, Crawley, Australia

We report the observation of electromagnetically induced transparency in rubidium-filled kagome-structure hollow-core photonic crystal fibre. Using a PDMS coating on the core wall of the fibre, a transparency peak width of 7MHz was achieved.

CK9-4-WED 17:15

Linear and possible non-linear suppression of near-UV emission in ZnO inverted opal structures

W. Khunsin, S.G. Romanov, C.M. Sotomayor Torres, Tyndall National Institute, Cork, Ireland; R.P.H. Chang, M. Scharrer, L. Aagesen, Northwestern University, Evanston, Illinois, USA

We report light emission in inverted opal ZnO structure; possessing PBG with FWHM of 0.39eV and a broad defect-related luminescence spectrum (~1.2eV) at 2.35eV were observed. Non-linear band-edge suppressions were observed at high excitation intensities.

NOTES

ROOM 1

CA8-5-WED 17:30

Continuous-wave laser action of an $Er:Sc_2O_3$ bulk crystal at 1.58 µm

M. Fechner, A. Kahn, K. Petermann, H. Scheife, G. Huber, University Hamburg, Germany

We report on an $Er:Sc_2O_3$ laser emitting in the 1.6 µm region with a maximum output power of 16.1 mW. This material is also suitable for the fabrication of planar waveguiding films.

CA8-6-WED 17:45

Tunable CW laser operation of Tm^{3+} in locally disordered $NaLa(WO_4)_2$

S. Rivier, V. Petrov, U. Griebner, X. Mateos, Max-Born-Institute for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany; J. Cano-Torres, F. Esteban-Betegón, M.D. Serrano, C. Zaldo, Instituto de Ciencia de Materiales, Madrid, Spain

We report on room-temperature laser operation of Tm^{3+} in the locally disordered crystal NaLa(WO4)2 achieving output powers in excess of 200 mW and a tuning range from 1789 to 1953 nm with Ti:sapphire laser pumping.

ROOM 4a+b

CE6-5-WED (Invited) 17:30

Highly dispersive 100%-efficiency transmission gratings without reflection losses

T. Clausnitzer, T. Kämpfe, E.-B. Kley, A. Tünnermann, Friedrich-Schiller-University, Jena, Germany; A.V. Tishchenko, O. Parriaux, Université Jean Monnet, St. Etienne, France

A new approach for realizing highly-dispersive rectangular transmission gratings is presented, enabling theoretically 100% diffraction efficiency due to the complete suppression of reflection losses. A comprehensible explanation as well as experimental results is given.

ROOM BOR1

IB3-5-WED 17:30

Demagnetization cooling of a Chromium cold gas

T. Koch, M. Fattori, T. Lahaye, S. Goetz, A. Griesmaier, S. Hensler, J. Stuhler, T. Pfau, 5. Physikalisches Institut, Stuttgart, Germany

We demonstrate a new cooling technique for atomic gases using dipolar relaxation and optical pumping. This demagnetization cooling yields a two-fold temperature reduction of Chromium atoms, with almost no atom loss.

IB3-6-WED 17:45

Cavity cooling of internal and external degrees of freedom of molecules

P.W.H. Pinkse, Max-Planck-Institut für Quantenoptik, Garching, Germany; M. Kowalewski, R. de Vivie-Riedle, Ludwig Maximilans University, Munich, Germany; G. Morigi, Universitat Autonoma de Barcelona, Bellaterra, Spain

We report a scheme, which allows for simultaneously cooling internal and external degrees of freedom of molecules using laser excitation and photon emission into a resonator. The cooling efficiency is investigated numerically for OH.

ROOM B11

IC5-4-WED (Invited) 17:30

Radiation-pressure effects upon a micro-mirror in a high-finesse optical cavity

P.F. Cohadon, O. Arcizet, C. Molinelli, T. Briant, M. Pinard, A. Heidmann, Laboratoire Kastler Brossel, Paris, France

We present an experiment where the motion of a micro-mechanical resonator is optically monitored with a quantum-limited sensitivity. Directs effects of intracavity radiation pressure are experimentally demonstrated. Applications to quantum optics are discussed.

ROOM 13a

CD6-2-WED 17:30

1.25GHz repetition rate operation of a SOA-DFB laser diode based all-optical flip-flop

W. D'Oosterlinck, G. Morthier, R. Baets, Ghent University-IMEC, Ghent, Belgium; A. Perez Pardo, S. Sales, A. Ortigosa Blanch, G. Puerto, Universitad Politecnica de Valencia, Spain

All-optical flip-flop operation employing a SOA/DFB-laser diode optical feedback scheme is experimentally demonstrated. 1.25GHz repetition rate operation, with switch energies below 1pJ, is demonstrated. On-off ratios of over 18dB have been obtained.

CD6-3-WED 17:45

Exclusive-OR gate for RZ-DPSK signals using four-wave mixing in a highly nonlinear Bismuth-Oxide fiber

M.P. Fok, C. Shu, The Chinese University of Hong Kong, Shatin, Hong Kong

We experimentally demonstrate an all-optical exclusive-OR gate for RZ-DPSK signals using four-wave mixing in a 35-cm highly nonlinear bismuth-oxide fiber. Detuning up to 12 nm is allowed between the input wavelengths.

ROOM 13b

CB10-5-WED 17:30

Dependence of the linewidth enhancement factor on the temperature induced detuning of a distributed feedback grating in a quantum cascade laser

J. von Staden, T. Gensty, W. Elsässer, Technical University of Darmstadt, Germany; Ch. Mann, Fraunhofer IAP, Freiburg, Germany; G. Giuliani, Università di Pavia, Italy

We present measurements of the linewidth enhancement factor (LEF) and the linewidth of distributed feedback quantum cascade lasers. Here, we investigate a temperature dependence of the LEF caused by the detuning of the grating.

CB10-6-WED 17:45

Index-coupled DFB quantum cascade lasers with high SMSR using metal grating

M. Carras, M. Garcia, O. Drisse, X. Marcadet, M. Krakowski, Alcatel Thales 3-5 lab, Palaiseau, France; A. De Rossi, S. Bansropun, Thales Research and Technology, Palaiseau, France

We demonstrate a metal grating purely index coupled Distributed Feedback Quantum Cascade Lasers at around 7.5 microns. It presents a large tuning without broadband gain and side mode suppression ratio above 30 dB.

ROOM 14b

CF5-5-WED 17:30

Pulse compression and X wave generation by Cross-Phase-Modulation induced spatiotemporal reshaping

D. Faccio, A. Averchi, University of Inusbria, Como, Italy; M. Kolesik, University of Arizona, Tucson, USA; A. Couairon, École Polytechnique, Palaiseau, France; P. Polesana, G. Tamosauskas, A. Dubietis, P. Di Trapani, A. Piskarskas, University of Vilnius, Lithuania

We show that due to XPM, ultrashort laser pulse filaments may reshape a weak laser pulse seed, thus generating an X wave which may also be amplified in the presence of FWM or SRS.

CF5-6-WED 17:45

Generation of tailored supercontinua from telecom wavelength femtosecond pulses: experiment and simulation

A. Sell, F. Adler, A. Leitenstorfer, University of Konstanz, Germany

Simulations of ultrabroadband supercontinuum generation from femtosecond Er:fiber lasers quantitatively agree with experiment, allowing detailed insight into nonlinear pulse propagation. Kerr and Raman contributions are separated. Influences of dispersion and pump pulse parameters are discussed.

ROOM B21

CK9-5-WED 17:30

Polarization dependent band structure mapping of photonic crystal mid infrared photodetectors

S. Schartner, L. Hoffmann, S. Golka, M. Austerer, P. Pavel, A.M. Andrews, W. Schrenk, G. Strasser, Technical University Vienna, Austria

The photonic crystal enables response to surface incident radiation for intersubband-based QWIPs. The angular and polarization dependence of the spectral photocurrent is used to map the photonic band structure and to investigate polarization conversion effects.

CK9-6-WED 17:45

NbN nanowire superconducting single photon detectors fabricated on MgO substrates

F. Marsili, D. Bitauld, S. Hold, M. Benkahoul, A. Fiore, F. Lévy, École Polytechnique Fédérale de Lausanne, Switzerland; A. Gaggero, R. Leoni, F. Mattioli, Istituto di Fotonica e Nanotecnologie, Rome, Italy

High performance NbN nanowire superconducting single photon detectors have been realized on a different substrate (MgO) and at lower deposition temperature than previously reported, opening the way to integration with advanced solid state optical structures.

NOTES

POSTERS

ICM Foyer 13:30-14:30
CLEO®/Europe Poster Session

CB-1-WED

Dynamic switching behaviour of bistable semiconductor ring lasers triggered by resonant optical pulse injection

G. Yuan, S. Yu, University of Bristol, United Kingdom

The relaxation oscillation and decay towards steady state following the switching of the lasing direction in a bistable semiconductor ring laser triggered by resonant optical pulse injection is studied theoretically and numerically.

CB-2-WED

GaInNAs/GaAs quantum-well semiconductor optical amplifiers for simultaneous multi-wavelength amplification

J. Pozo, N. Vogiatzis, J.W Lu, P.J Heard, O. Ansell, J.M Rorison, University of Bristol, UK; P. Tuomisto, J. Konttinen, M. Saarinen, C. Peng, J. Viheriala, T. Leinonen, M. Pessa, Tampere University of Technology, Tampere, Finland

The constraints on dilute-nitride Semiconductor Optical Amplifiers (SOAs) for multichannel amplification have been evaluated. The SOA has been fabricated angling the facets of a GaInNAs/GaAs edge emitting laser using gas enhanced focused ion beam etching.

CB-3-WED

Low-frequency modulation effects on the polarization dynamics of vertical-cavity surface-emitting lasers subject to optical feedback

Y. Hong, J. Paul, K.A Shore, P.S Spencer, University of Wales, Bangor, United Kingdom

The influence of low frequency modulation rates on the polarization dynamics of VCSELs under optical feedback has been investigated experimentally. Significant changes in polarization dynamics occur for modulation rates between 1Hz and 100 kHz.

CB-4-WED

Non-equilibrium quantum transport theory for quantum cascade lasers

T. Kubis, P. Vogl, Walter Schottky Institute, Garching, Germany

We present non-equilibrium Greens function calculations of quantum cascade laser structures including all relevant scattering mechanisms. Resulting I-V characteristics and emission spectra agree with experiment and demonstrate the balance between coherent and incoherent mechanisms.

CB-5-WED

Lasing dynamics in ZnO nanorods

J. Fallert, H. Zhou, R. Hauschild, M. Wissinger, F. Stelzl, C. Klingshirn, H. Kalt, Karlsruhe University, Germany

The lasing dynamics in single ZnO nanorod resonators is studied after pulsed optical excitation. The influence of the resonator properties and of the excitation conditions on the lasing modes is investigated.

CB-6-WED

200 kHz linewidth of 780 nm high-power distributed feedback diode laser

T.P Nguyen, O. Brox, A. Klehr, G. Erbert, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik, Berlin, Germany

We present experimental investigations on 780 nm high power distributed feedback (DFB) lasers in dependence on output power. The lasers emit in single lateral and longitudinal mode with a linewidth as low as 200 kHz.

CB-7-WED

High power pulse generation from a 10mm long monolithic multi section mode locked semiconductor laser at 920nm

S. Schwertfeger, A. Klehr, J. Fricke, G. Erbert, G. Tränkle, Ferdinand Braun Institut, Berlin, Germany

Active and passive mode locking of a four section 10mm long monolithic 920nm DBR laser was investigated. 10ps pulses are generated at a repetition rate of 4GHz with a peak power of 1.3W.

CB-8-WED

Numerical modelling of quantum dot superluminescent diodes

M. Gioannini, I. Montrosset, Politecnico di Torino, Italy

We present a model for the analysis and design of quantum dot superluminescent diodes including the real characteristics of the nanostructure material. The model is used to design new superluminescent diodes with improved performance.

CB-9-WED

ECM-components in a VCSEL with optical feedback

K. Green, Vrije Univ., Amsterdam, Netherlands; B. Krauskopf, Univ. of Bristol, UK; D. Lenstra, Delft Univ. of Technology, Delft, Netherlands

We investigate the external-cavity-mode structure of a two-mode VCSEL with optical feedback, where we identify qualitative changes as the feedback strength, phase and amount of cross-coupling of the fields via the feedback are varied.

CB-10-WED

Locking of two delay coupled semiconductor lasers: dependence on the pump current

H. Erzgraber, Vrije Universiteit, Amsterdam, Netherlands; B. Krauskopf, University of Bristol, United Kingdom and Vrije Universiteit, Amsterdam, Netherlands; D. Lenstra, Delft University of Technology, Delft, Netherlands

We investigate the dynamics within the locking region of two mutually delay-coupled semiconductor lasers. Hysteresis effects due to bistabilities between stable cw-emission and complicated dynamics, which appear for decreasing pump current, are observed.

CB-11-WED

Extremely low-threshold room-temperature electron beam pumped green semiconductor lasers grown by MBE

M.M. Zverev, E.V. Zdanova, N.A. Gamov, V.B. Studionov, D.V. Peregoudov, Moscow State Institute of Radio Engineering, Moscow, Russia; S.V. Ivanov, S.V. Sorokin, I.V. Sedova, S.V. Gronin, P.S. Kop'ev, Ioffe Physico-Technical Institute of RAS, St.-Petersburg, Russia

Room-temperature ZnSe-based electron beam pumped lasers with thin top claddings were studied. Lasing was observed at electron energies exceeded 3.7 keV. Threshold current density of 0.4-0.5 A/cm^2 has been measured at the electron energies 8-9 keV.

CB-12-WED

Optical gain and recombination currents in a GaAsSb / InGaAs type-II W laser structures

J.D. Thomson, P.M. Smowton, P. Blood, Cardiff University, United Kingdom; F. Klem Sandia, National Laboratories, Albuquerque, USA

Experimental modal gain and the radiative current of a type-II InGaAs/GaAsSb laser structure emitting at 1300 nm are presented. We discuss the non-radiative mechanisms present in this structure.

CB-13-WED

Measurement of the Linewidth Enhancement Factor of InGaAlAs and InGaAsP laser diodes using the Fourier Series Expansion of the ASE spectrum

D. Byrne, W.H. Guo, Q.Y. Lu, R. Phelan, J.F. Donegan, Trinity College Dublin, Ireland; B. Corbett, Tyndall National Institute, Cork, Ireland

A new method for determining the Linewidth Enhancement Factor for a semiconductor laser by Fourier Series Expansion is presented here. The Linewidth Enhancement Factor calculated by this method is independent of the OSA resolution bandwidth.

CB-14-WED

Quantum theory of the optical excitation of a semiconductor quantum dot

T. Feldtmann, L. Schneebeli, M. Kira, S.W. Koch, Philipps University Marburg, Germany

We present a fully quantum-mechanical theory for the optical excitation of a semiconductor quantum-dot coupled to a phonon bath. The optically generated many-body configurations are characterized with respect to their correlated nature.

CB-15-WED

Design and simulation of a novel three-section widely-tunable slotted fabry-perot laser

Q.Y. Lu, W.H. Guo, R. Phelan, D. Byrne, J.F. Donegan, Trinity College Dublin, Ireland; B. Corbett, Tyndall National Institute, Cork, Ireland

A novel three-section widely-tunable slotted FP laser diode with a channel spacing of 400 GHz is designed and simulated. A simplified numerical model using the scattering matrix technique is presented to analyze the tuning characteristics.

CB-16-WED

Narrow spectral linewidth between 10C and 90C for high-power al-free active region DFB operating at 852nm for atomic clocks applications

V. Ligeret, M. Lecomte, M. Calligaro, O. Parillaud, M. Krakowski, Alcatel-Thales, Palaiseau, France; S. Bansropun, Thales Research and Technology, Palaiseau, France

We have developed single frequency (SMSR~50dB) and single spatial mode (M^2<1.5) laser structures with stable narrow linewidth (<1MHz) and high optical power (40mW), using an aluminium free active region for Cs pumping at 852nm.

CB-17-WED

High-power, high-brightness, index-guided tapered lasers, comparison between CW and pulsed operation

N. Michel, I. Hassiaoui M. Calligaro, O. Parillaud, M. Krakowski, Alcatel-Thales, Palaiseau, France

Index-guided tapered lasers at 975 nm deliver 1 W CW, with a low M2 of 1.6 at 1/e2, which is a record for such a device, no measurable astigmatism, and a narrow far-field angle of 6.8 degrees FWHM.

CB-18-WED

Microscopic nonequilibrium simulations in semiconductor laser structures

E. Kuehn, A. Thraenhardt, S. Chatterjee, C. Lange, S. Horst, K. Hantke, W. Stolz, W. Ruehle, S.W Koch, Philipps-University, Marburg, Germany; W. Diehln, P. Brick OSRAM Opto Semiconductors, Regensburg, Germany

A microscopic theory of coherent optical excited surface emitting lasers and their thermal properties with special regard to nonequilibrium carrier distribution and microscopic scattering rates is presented. Simulations show good agreement with experiments.

CB-19-WED

High brightness single-mode 1060-nm diode lasers for demanding industrial applications

M. Bettiati, F. Laruelle, V. Cargemel, P. Bourdeaux, P. Pagnod-Rossiaux, P. Garabedian, J. Van de Casteele, S. Fromy, D. Chambonnet, J.P Hirtz, Avanex France S.A., Nozay, France

We demonstrate record kink-free output powers, over 1.2W, for 1060-nm single-mode lasers. Saturation powers of 1.9W are observed at room temperature that guarantee high-power and kink margins with respect to typical operation conditions.

CB-20-WED

Mapping of transverse mode locking and switching in VCSELs under orthogonal optical injection

I. Gatare, SUPELEC-LMPOS CNRS-UMR, Metz, France and Vrije Universiteit Brussel, Brussels, Belgium; M. Sciamanna, SUPELEC-LMPOS CNRS-UMR, Metz, France; A. Valle, Instituto de Fisica de Cantabria, Santander, Spain; K. Panajotov, Vrije Universiteit Brussel, Brussels, Belgium

We experimentally and theoretically show that the first order transverse-mode plays a key role in the switching mechanism between the fundamental linearly polarized modes of a vertical-cavity surface emitting laser subject to orthogonal optical injection.

CB-21-WED

Quantum design of a 1.3µm InGaPAs semiconductor laser

J.V. Moloney, J. Hader, Nonlinear Control Strategies and University of Arizona, Tucson, USA; M. Fallahi, L. Fan, University of Arizona, Tucson, USA; S.W Koch, University of Marburg, Germany

The first closed-loop demonstration, from initial semiconductor epitaxial design and wafer growth validation to end laser L-I characteristic for an electrically-pumped InGaPAs 1.3mm laser without using free fit parameters will be presented.

CB-22-WED

Optical bistability and nonlinear gain in a 1550nm-vertical cavity semiconductor optical amplifier (VCSOA) with high on-off contrast ratio

A. Hurtado, Universidad Politecnica de Madrid, Spain; I.D Henning, M.J Adams, University of Essex, Colchester, United Kingdom

We report a first experimental observation of high contrast ratio clockwise and anticlockwise optical bistability in a 1550nm-VCSOA operated in reflection.

CB-23-WED

A 1 THz quantum cascade laser in strong magnetic field

G. Scalari, C. Walther, L. Sirigu, J. Faist, University of Neuchatel, Switzerland; H.E Beere, D.A Ritchie, University of Cambridge, UK

A quantum cascade laser emitting at the frequency of about 1 Terahertz in strong magnetic field is demonstrated. Laser emission as a function of the applied magnetic field together with detailed transport characteristics are analyzed.

CB-24-WED

High brightness laser diode array at 940 nm for Yb:YAG pumping

M. Siebold, J. Hein, Institute of Optics and Quantum Electronics, Jena, Germany; C. Wandt, S. Karsch, F. Krausz, Max-Planck-Institute for Quantum Optics, Garching, Germany; D. Wolff, G. Bonati, S.S Beyertt, Jenoptik Laserdiode GmbH, Jena, Germany

A novel design of a quasi-cw 13kW peak power diode array for Yb-doped solid state laser pumping with a repetition rate of 10Hz is presented. A high brightness is achievd by wave-guide and polarization coupling.

CB-25-WED

Frequency doubled tunable diode laser for excitation of Rydberg states in Rb atoms

V.M. Entin, I.I. Ryabtsev, I.I. Beterov, D.B. Tretyakov, Institute of semiconductor physics SB RAS, Novosibirsk, Russia

Paper describes current progress on developing of all-solid state single mode laser tunable in the range 479-481 nm. Experiments were made with semiconductor laser for 960 nm frequency doubled inside LBO-crystal using external enhancement cavity.

CB-26-WED

Effects of doping concentration on terahertz quantum-cascade lasers

Ch. Deutsch, K. Unterrainer, A. Benz, G. Fasching, A.M. Andrews, T. Roch, W. Schrenk, G. Strasser, Vienna University of Technology, Austria

This work presents the effects of the doping concentration on terahertz quantum-cascade lasers. We performed our measurements at four different doping concentrations with the focus on the temperature performance and the threshold current density.

CB-27-WED

All-optical logic OR gate based on cross gain modulation in semiconductor optical amplifiers

A. Sharaiha, J. Le Bihan, M. Guegan, Laboratoire RESO / ENIB, Brest, France; A. Hamze, A. Hamié, University College, Beirut, Lebanon

All-optical logic OR gate is performed by using two-cascaded SOAs in a counterpropagating configuration based on cross gain modulation. The experimental results present the logic OR gate with an extinction ratio of about 7 dB.

CB-28-WED

Designs of photonic-crystal vertical-cavity surface-emitting diode lasers assuring high performance with minimal technological effort

T. Czyszanowski, P. Panajotov, Vrije Universiteit, Brussels, Belgium; M. Dems, Technical University of Lodz, Poland

We determine the high performance of 1300 nm InP based photonic-crystal vertical-cavity surface-emitting diode laser configurations, which can be achieved with minimal technological effort assuring minimal modal losses and high beam quality.

CB-29-WED

Bistable vertical cavity laser as a truly random number generator

V.N. Chizhevsky, D.B. Horoshko, D.I. Pustakhod, S.Y. Kilin, B.I. Stepanov Institute of Physics, NASB, Minsk, Belarus

We show that spontaneous polarization switchings in a bistable vertical cavity laser can generate random bits obtained from residence times. An effective algorithm of conversion into truly random binary numbers is proposed and statistically tested.

CB-30-WED

High power 980 nm tapered lasers with separate contacts: numerical simulation and comparison with experiments

H. Odriozola, L. Borruel, JM.G Tijero, I. Esquivias, Universidad Politecnica de Madrid, Spain; H. Wenzel, F. Dittmar, K. Paschke, B. Sumpf, G. Erbert, Ferdinand-Braun-Institut für Hochstfrequenztechnik, Berlin, Germany; S. Sujecki, E.C Larkins, University of Nottingham, UK

980 nm tapered lasers with separate contacts have been simulated. The results show a good agreement with experiments and provide a physical interpretation of the device performance.

CB-31-WED

6 Gbit/s Tx/Rx-leadframe-modules at -40 to 115 degrees C based on 1.1-micron VCSEL

H. Hatakeyama, K. Fukatsu, K. Shiba, N. Suzuki, K. Yashiki, K. Tokutome, T. Akagawa, T. Anan, M. Tsuji, NEC corporation, Shiga, Japan

We developed Transmitter and Receiver leadframe-type modules using a 1.1-micron-range VCSEL and PIN-PD. 6 Gbit/s-operation under a temperature range from -40 to 115 degrees C was successfully achieved.

CB-32-WED

InGaAs sub-monolayer quantum dots VCSEL with extremely temperature insensitivity for 2.125 Gb/s application

F.I. Lai, Yuan Ze University, Chung-Li, Taiwan; H.C Kuo, H.W Huang, S.C Wang, National Chiao Tung University, Hsinchu, Taiwan; J.Y. Chi, G.R. Lin, Industrial Technology Research Institute, Chutung, Taiwan; N.A. Maleev, S.A. Blokhin, Russian Academy of Sciences, St Petersburg, Russia

The InGaAs SML QD VCSEL with fully doped AlGaAs/GaAs DBRs was fabricated. The VCSEL exhibits a wide operation range and shows extremely temperature insensitivity under high speed operated in 2.125 Gb/s from -40°C~100°C.

CB-33-WED

High-power hybrid integrated master-oscillator power-amplifier on micro-optical bench at 980nm

K. Paschke, C. Dzionk, J. Fricke, A. Ginolas, A. Knauer, G. Erbert, M. Maiwald, P. Ressel, S. Schwertfeger, Ferdinand-Braun-Institut für Höchstfrequenztechnik, Berlin, Germany

A compact master-oscillator power-amplifier was realized on a micro-optical bench. More than 3 W in a nearly diffraction limited beam with a narrow spectral line width was demonstrated.

CB-34-WED

Tunable semiconductor narrowband reflection filters for single frequency sources

A. Garnache, Université Montpellier II, France; I. Sagnes, Laboratoire de Photonique et Nanostructures, CNRS UPR20, Marcoussis, France

We present a tunable metal-semiconductor narrowband reflection filter for the 0.8-3micron range, with a reflectivity >99%, a bandwidth <500GHz. The structures are based on a Al(Ga)As/GaAs multilayer, having a 5-15nm metal layer evaporated on top.

CB-35-WED

Tailoring single-mode DFB laser with integrated passive feedback section for direct modulation applications

M. Radziunas, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany; U. Troppenz, J. Kreissl, Heinrich-Hertz-Institut, Berlin, Germany

We consider a passive feedback laser consisting of a DFB and an integrated feedback section. We discuss the choice of the DFB section that should allow an appropriate laser operation at 40 Gb/s direct modulation applications.

CB-36-WED

Transverse emission pattern of a vertical external cavity surface emitting laser with high Fresnel number : towards a cavity soliton laser ?

T. Elsass, R. Kuszelewicz, I. Sagnes, X. Hachair, S. Barbay, LPN-CNRS, Marcoussis, France

An optically pumped Vertical External Cavity Surface Emitting Laser's transverse emission is investigated experimentally in a high Fresnel number regime. Adding an intracavity saturable absorber could lead to a Cavity Soliton Laser...

CB-37-WED

Brightness scaling of high power laser diode bars

Y.M Manz, M. Krejci, S. Weiss, A. Thies, D. Schulz, A. Fily, N. Lichtenstein Bookham, Zürich, Switzerland

Bookham has developed Very High Brightness devices with filling factors of 80 % with improved brightness by a factor of 4. Bars of 10 mm widths with 30 % show 170 W at 190 A.

CB-38-WED

Time-resolved characterization of heating and dissipation processes in semiconductor lasers

S. Ducci, L. Deveaux, L. Lanco, J.P Likforman, Laboratoire Matériaux et Phénomènes Quantiques, Paris, France; N. Michel, M. Krakowski, X. Marcadet, M. Calligaro, Alcatel-Thales III-V Lab, Palaiseau, France; G. Leo, V. Berger, Laboratoire Matériaux et Phénomènes Quantiques, Paris, France

We demonstrate a non-destructive technique that allows the characterization of heating and dissipation processes in semiconductor lasers. Analysis of temperature-induced Fabry-Perot oscillations on an injected beam allows a time-resolved thermal characterization of the device

CB-39-WED

Chaos synchronisation of self-pulsating laser diodes

M.W Lee, I. Pierce, University of Wales, Bangor, United Kingdom

Chaos synchronisation of self-pulsating laser diodes has been experimentally demonstrated. Optical feedback and external modulation configurations have been used to generate chaotic pulsations. Synchronisation of chaotic pulse-sequences has been achieved in both the configurations.

CB-40-WED

Synchronization regimes of unidirectionally coupled VCSELs with orthogonal optical injection

A. Locquet, UMI 2958 Georgia Tech – CNRS, Metz, France; M. Sciamanna, UMI 2958 Georgia Tech – CNRS and LMOPS CNRS UMR 7132, Metz, France; I. Gatare, LMOPS CNRS UMR 7132, Metz, France; K. Panaiotov, Vrije Universiteit, Brussels, Belgium

We characterize two regimes of chaos synchronization occurring between a master VCSEL subjected to isotropic optical feedback and a slave VCSEL subjected to orthogonal optical injection from the master laser.

CB-41-WED

Bistability and optical switching in semiconductor ring lasers

A. Scirè, T. Perez, C.R. Mirasso, P. Colet, IMEDEA, Palma de Mallorca, Spain

We have theoretically investigated the bifurcation scenario that leads to the emergence of a bistable regime in a two-mode model for a Semiconductor Ring Laser,and analyzed its switching properties Ring Laser under coherent optical pulse injection.

CC-1-WED

Holographic volume absorption gratings in glass-like polymer recording materials

V. Matusevich, A. Matusevich, R. Kowarschik, Institute of Applied Optics, Jena, Germany; L.P. Krul, Y.I. Matusevich, Institute of Physical and Chemical Problems, Minsk, Belarus

We present investigations of the glass-like polymer recording mediums based on poly(methyl methacrylate) and its thermostable derivative (copolymer with acrylic acid) with regard to their application as storage materials for holographic gratings.

CC-2-WED

Interband dynamic holography at visible wavelengths in $Sn_2P_2S_6$

R. Mosimann, M. Jazbinsek P. Gunter, ETH Zurich, Switzerland; G. Montemezzani, University of Metz and Supelec Metz, France

Continuous-wave interband photorefraction in visible at 514nm in $Sn_2P_2S_6$ was demonstrated. Grating response times of 100 µs were measured at 0.6W/cm² intensity, which is two orders of magnitude faster than in the conventional regime.

CC-3-WED

Gaussian beam output from a large-mode-area higher-order-mode fiber

N. Lindlein, G. Leuchs, Friedrich-Alexander University of Erlangen, Germany; S. Ramachandran, OFS Laboratories, Somerset, USA

An alternative for converting higher-order $LP_{0,m}$ fiber modes (m>1) into a nearly fundamental Gaussian shape at the output of a fiber is described. The conversion will be done by using a binary phase plate.

CC-4-WED

Investigation of photorefractive spatial bright soliton in lithium niobate by interferometric technique

M. Paturzo, L. Miccio, S. De Nicola, P. De Natale, P. Ferraro, CNR-INOA, Pozzuoli, Italy

A spatial bright soliton is created in a z-cut lithium niobate sample. The temporal behaviour of the soliton formation is investigated by reconstructing its intensity and phase by a digital holography approach.

CC-5-WED

Propagation of an array of four Gaussian light beams in a SBN crystal

V. Shepelevich, A. Zagorskiy, Mozyr State Pedagogical University, Mozyr, Belarus; D. Khmelnitsky, V. Matusevich, A. Kiessling, R. Kowarschik, Friedrich Schiller University, Jena, Germany

The peculiarities of propagation and interaction of four light beams in SBN crystal with thickness 20 mm under conditions of screening self-focusing are researched theoretically.

CC-6-WED

Polarization simultaneous readout for volume holographic storage in $LiNbO_3$

W.C. Su, C.M. Chen, National Changhua University of Education, Changhua, Taiwan; Y. Ouyang, R.O.C. Military Academy, Kaohsiung, Taiwan

We demonstrated a holographic memory with two simultaneous but individual readout channels in a $LiNbO_3$ crystal. The simultaneous readout technique is achieved in a hybrid-multiplexed memory implemented by angular multiplexing and polarization multiplexing.

CC-7-WED

Space-and-time current spectroscopy of polypyrrole nanostructures in chrysotile asbestos matrix

I. Sokolov, M. Bryushinin, V. Semkin, Y. Kumzerov, A.F. Ioffe Physico-Technical Institute, St.-Petersburg, Russia

The non-steady-state photocurrent measurements of polypyrrole nanostructures within chrysotile asbestos are presented. The diffusion length of carriers is estimated to be 0.18 microns for the illumination wavelength 532 nm.

CC-8-WED

Fast photorefractive self focusing in InP : Fe in near infrared

C. Dan, N. Khelfaoui, D. Wolfersberger, N. Fressengeas, MOPS Lab. CNRS UMR 7132, Metz, France; H. Leblond, Angers University, Angers, France

Transient photorefractive self focusing in InP:Fe is studied as a function of intensity and temperature; bending and self focusing are found to take place on a microseconds time scale.

CC-9-WED

Photo-induced patterning of birefringence and quadratic non linear optical properties in chromophore doped photopolymers

L. Mager, D. Gindre, J.P Bombenger, J.P Vola, K.D Dorkenoo, A. Fort, IPCMS/GONLO, Strasbourg, France

We present the direct photopatterning of the birefringence and of the quadratic non linear optical properties of push-pull chromophore doped photopolymers. We demonstrate stability over to 10000 hours and a 8 micrometers spatial resolution.

CC-10-WED

Ultra-broadband radial polarization conversion based on goos-hanchen shift

P.B Phua, DSO National Laboratories, Singapore, Singapore; W.J Lai, Nanyang Technological University, Singapore, Singapore

We demonstrate, for the first time, a scheme that generates radially-polarized light using Goos-Hanchen shift of a cylindrically symmetric Total Internal Reflection. It allows ultra-broadband radial polarization conversion for wavelengths differing >1 micron.

POSTERS

CC-11-WED

Temperature-dependent anisotropic grating formation in a holographic polymer-dispersed liquid crystal

H. Iioka, W. Weng, A. Yamahata, Y. Tomita, University of Electro-Communications, Tokyo, Japan

We report on the observation of strong recording- and readout-temperature dependences of a transmission-type anisotropic Bragg grating formed in a holographic polymer-dispersed liquid crystal film. Temperature dependences of electrical switching characteristics are also described.

CC-12-WED

Intracavity adaptive optics optimization of an end-pumped Nd:YVO_4 laser

P. Welp, H.M. Heuck, U. Wittrock, Münster University of Applied Sciences, Steinfurt, Germany

A closed-loop adaptive-optics resonator is demonstrated, achieving a beam quality enhancement from M^2=5 to M^2=1.7 when compared to the same resonator without adaptive optics. Output power stays nearly constant at 5.3 W.

CC-13-WED

Spatial evolution of coupled-optical vortices

J. Hamazaki, Y. Mineta, R. Morita, Hokkaido University, Sapporo, Japan

The spatial evolution of phase-singular points in complexes of two optical vortices with a topological charge +1, was investigated. Transverse motions like collision and scattering processes due to a vortex-vortex interaction were observed.

CC-14-WED

Optical read out of nanoparticle fluorescence using supercontinuum generation for optical data storage

B.J. Chick, J.W.M. Chon, M. Gu, Swinburne University of Technology, Hawthorn, Australia; R. Evans, Swinburne University of Technology, Hawthorn and CSIRO Molecular and Health Technologies, Clayton, Australia

We report on the use of Supercontinuum generation for the multicolor read out nanoparticle fluorescence. Such read out is particular useful for spectrally encoded optical data storage.

CC-15-WED

Photorefractive and photochromic properties of Ru-doped lithium niobate crystal

C.H. Chiang, J.C. Chen, National Central University, Jhongli, Taiwan; H. Hu, Industrial Technology Research Institute, Liujia Shiang, Taiwan

We investigate a novel single doping photorefractive material, Ru doped lithium niobate, which offers photochromism for nonvolatile holographic storage.

CC-16-WED

A new reconstruction algorithm for in-line digital holography

G. Situ, J.T. Sheridan, Univ. College, Dublin, Ireland

An algorithm based on algebraic manipulations of the recorded holograms in the Fourier frequency domain is reported for the reconstruction of in-line digital holography. Numerical simulation is carried out to demonstrate this concept.

CC-17-WED

Unitary matrices for phase-coded holographic memories

W. Horn, G. Berger, M. Dietz, C. Denz, Westfälische Wilhelms-University, Münster, Germany; X. Zhang, TEDA Applied Physics School, Nankai, China

The crosstalk noise in phase coded holographic memories employing a novel type of unitary matrices is investigated. The unitary matrices ensure an optimal utilization of the SLM to obtain the maximum possible storage capacity.

CC-18-WED

Dye-doped polymer films for dynamic echo-holography applications

K. Khasanov, O. Fedotova, Belarus National Academy of Sciences, Minsk, Belarus; A. Leontiev, V. Lobkov, G. Safiullin, V. Samartsev, K. Salikhov, Technical Institute KSC RAS, Kazan', Russia

We analyse the non-collinear scheme of echo-hologram recording in thin dye-doped polyvinylbutural films in large temperature interval from liquid helium to room one. Temporal structure and spectrum of the two-pulse photon echo signals are discussed.

CC-19-WED

Application of a phase-SLM and low-pass Fourier filtering to generate spatial patterns simultaneously modulated in phase and amplitude

Z. Göröcs, P. Koppa, J. Remenyi, E. Lörincz, G. Erdei, T. Sarkadi, F. Ujhelyi, Budapest University of Technology and Economics, Budapest, Hungary

Holographic data storage techniques often require simultaneous spatial phase and amplitude modulation of the input light beams. We present results of modeling and experimental verification of a novel method exhibiting excellent modulation characteristics and simplicity.

CC-20-WED

Characterization of volume gratings formed in ZrO_2 nanoparticle-dispersed photopolymers

N. Suzuki, Y. Tomita, University of Electro-Communications, Chofu, Japan; K. Ohmori, M. Hidaka, K. Chikama, Nissan Chemical Industries, Funabashi, Japan

We investigate the holographic grating formation in ZrO_2 nanoparticle-dispersed photopolymers by means of optical and physical analyses. The effect of surface treatment condition of ZrO_2 nanoparticles on the grating formation dynamics is also discussed.

CC-21-WED

Investigation of light induced material transport in azobenzene photopolymers with x-ray diffraction and laser light spectroscopy

O. Henneberg, C. Spitz, A. Betke, University of Potsdam, Germany

Laser light interference induces a material transport in the solid phase of azobenzene polymers. X-ray and laser light diffraction monitor the dynamics of surface relief grating formation.

CD-1-WED

Second-harmonic pulse shaping with engineered quasi-phase-matching gratings in the strongly depleted pump regime

U. Sapaev, G. Assanto, University Roma Tre, Rome, Italy

We develop a simulated-annealing algorithm for the design of arbitrary quasi-phase-matched nonlinear crystals capable of producing second-harmonic pulses of any chosen amplitude and phase profile under significant pump depletion.

CD-2-WED

Spectro-temporal dynamics of a nanosecond-pulsed, injection-seeded optical parametric oscillator

R.T. White, Energy Efficiency and Conservation Authority, Wellington, New Zealand; K.G.H. Baldwin, M. Kono, Australian National University, Canberra, Australia; Y. He, B.J. Orr, Macquarie University, Sydney, Australia

We simulate spectro-temporal processes in a nanosecond injection-seeded optical parametric oscillator. Our simulations accurately predict the experimental behavior for the frequency chirp, optical bandwidth, and spectral purity, including effects that are not readily observed directly.

CD-3-WED

Near-stoichiometric LiTaO3 for deep UV electro-optical applications

F. Juvalta, M. Jazbinsek, P. Gunter, ETH Zurich, Switzerland; G. Montemezzani, LMOPS, Metz, France; K. Kitamura, National Institute for Material Science, Tsukuba, Japan

Electro-optic coefficients were measured in congruent and near-stoichiometric $LiTaO_3$ in the UV (r_{33}>=52pm/V at 275nm). We demonstrate dynamic deep-UV induced waveguides by electro-optic effect and interband electric field screening beneath the surface of the crystals.

CD-4-WED

Light stopping and time reversal in dynamic nano-photonic structures via bloch oscillations

S. Longhi, Politecnico di Milano, Milano, Italy

The possibility of stopping or time-reverse optical pulses in dynamically-tuned photonic structures is theoretically demonstrated. Pulse stopping and time-reversal exploits an optical analog of the periodic Bloch motion induced by an index gradient.

CD-5-WED

1.3 micron photonic crystal fiber Raman laser

S.K Varshney, K. Sasaki, K. Saitoh, N.J Florous, M. Koshiba, Hokkaido University, Sapporo, Japan

An efficient, continuous wave Raman laser with a 20 m length of photonic crystal fiber, a low-threshold of 1.96 W, 47% of conversion efficiency, and 62% of slope efficiency is achieved at 1.3 micron.

CD-6-WED

Excitation of X-waves by downconversion of Bessel beam in optical parametric amplifier

A. Stabinis, S. Orlov, V. Smilgevicius, A. Piskarskas, G. Valiulis, Vilnius University, Lithuania

An appearance of nondiffracting X-waves from quantum noise parametric amplification by the Bessel beam pump is investigated. The numerical simulation results in ADP crystal and preliminary experimental data are presented.

CD-7-WED

Observation of aging of the nonlinear susceptibility in soft-matter

C. Conti, Research Center Enrico Fermi, Rome, Italy; N. Ghofraniha, G. Ruocco, Universita La Sapienza, Rome, Italy

We report on the experimental investigation of the out of equilibrium dynamics of the nonlinear susceptibility in a doped colloidal solution undergoing an aging process.

CD-8-WED

Intensity noise in SBS with Seed Signal Generated through Injection Locking

V.V Spirin, CICESE, Ensenada, Mexico; J. Kellerman, P.L Swart, University of Johannesburg, South Africa; A.A Fotiadi, Faculté Polytechnique de Mons, Belgium

We report Brillouin scattering in a fiber configuration involving injection-locking for generation of the Stokes signal. Significant suppression of the Stokes intensity-noise near the Brillouin resonance is discovered and analytically explained for the first time.

CD-9-WED

Removing modulational instabilities in low dispersion fiber cavities

A. Mussot, E. Louvergneaux, M. Taki, Université des Sciences et Technologies de Lille, Villeneuve d'Asq, France; M. Tlidi, G. Kozyreff, Université Libre de Bruxelles, Brussels, Belgium; A. Vladimirov, Weierstrass Institute for applied analysis and stochastics, Berlin, Germany

We theorerically investigate Modulationnal Instability in a low dispersion fiber cavity. A second frequency of instability is found at the primary threshold and the stationary state can be recovered for high enough pumping intensities.

CD-10-WED

Managing thermal effects in eclipse Z-scan technique

A.S.L. Gomes, R.E. de Araujo, E.L. Falcao Filho, C.B. de Araujo, R. Rativa, Universidade Federal de Pernambuco, Recife, Brazil

We introduced a novel variation of the eclipse Z-scan method with a thermal nonlinearity management technique, which allows to simultaneously characterize the thermal and nonthermal nonlinearity of optical materials using relatively low laser intensities

CD-11-WED

Polariton laser bistability behavior in a GaAs microcavity

E.A. Cotta, F.M. Matinaga UFMG/ICEX, Belo Horizonte, Brazil

Polariton laser generated by resonant excitation presents a bistability for a modulated excitation beam. We observed one or two crossing on the bistability curve due to the thermal and Kerr competition in the microcavity

CD-12-WED

Wide-band wavelength conversion and Raman amplifier using a nonlinear microstructure fibe

Y.Q. Yu, S.C. Ruan, C.L. Du, J.H. Zhao, Y. Huang, Shenzhen University, China

A wavelength converter and a Raman amplifier with widely tunable operation wavelength range have been obtained in a 100m dispersion flattened nonlinear microstructure fiber pumped by CW lasers at 1521 nm and 1480 nm, respectively.

CD-13-WED

Ultra-wide bandwidth λ-converter with regeneration properties

D.M. Forin, ISCOM - Tor Vergata and Universita di Roma, Rome, Italy; G.M. Tosi Beleffi, F. Curti, M. Guglielmucci, ISCOM - Tor Vergata, Rome, Italy; S. Taccheo, Politecnico di Milano, Italy; K. Ennser, Swansea University, United Kingdom; M. Karasek, Academy of Science, Prague, Czech Republic; A.L.J. Teixeira, Instituto de Telecomunicacoes, Aveiro, Portugal

We present an unlimited bandwidth lambda-converter based on Supercontinuum generation with 2R capabilities in an high non linear fibre. Effect is based on cross-phase modulation between Supercontinuum and an out-of-band auxiliary carrier.

CD-14-WED

Enhanced light self-action in mesoporous silicon

L. Golovan, S.V. Zabotnov, N.A. Piskunov, P.K. Kashkarov, V.Y. Timoshenko, A.M. Zheltikov, Moscow State University, Moscow, Russia; S. Yakunin, Y. Gromov, M. Kopylovsky, V.Y. Gayvoronsky, National Academy of Science, Kiev, Ukraine; G.Y. Fang, C.F. Li, Harbin Institute of Technology, Harbin, China

Experiments on two-photon absorption and self-focusing in birefringent mesoporous silicon reveal three-orders-of-magnitude increase of the effective cubic susceptibility as well as modification of its polarization properties in comparison with crystalline silicon.

CD-15-WED

Elastic collisions and scattering of optical beams with three-wave parametric interactions

A.P. Sukhorukov, V.E. Lobanov, Lomonosov Moscow State University, Moscow, Russia

Elastic reflection of signal wave from power pump beam with three-wave mismatched interaction is first considered. Conditions of complete reflection and signal trajectories are found. In three-dimensional geometry reflection changes into scattering on parametric inhomogeneity.

CD-16-WED

Characterization of multilayer self-organized InAs quantum dot embedded waveguides at 1.3 and 1.5 um

B.I. Akca, A. Dana, A. Aydinli, Bilkent University, Ankara, Turkey; N. Dagli, University of California at Santa Barbara, USA; A. Fiore, L. Li, M. Rossetti, Ecole Polytechnique Fédérale de Lausanne, Switzerland

The characterization of InAs quantum dot embedded waveguides have been performed at 1.3 and 1.5 um. Enhanced electro-optic coefficients compared to bulk GaAs were observed at 1.5 um and voltage dependent loss at 1.3 um was measured.

CD-17-WED

Snell's law for Kerr bright and dark solitons

J. Sanchez-Curto, P. Chamorro-Posada, Univ. of Valladolid, Spain; G.S. McDonald, Univ. of Salford, UK

The universal problem of Kerr soliton refraction at planar interfaces between different nonlinear materials is quantified in terms of a Snell's law generalisation, shown valid for different soliton types (bright and dark) and arbitrary angles.

CD-18-WED

Whispering gallery mode for second-harmonic generation in microresonators

G. Kozyreff, ICFO Institut de Ciencies Fotoniques, Barcelona, Spain and ONT Université Libre de Bruxelles, Brussels, Belgium; J.L. Dominguez Juarez, ICFO Institut de Ciencies Fotoniques, Barcelona, Spain; J. Martorell, ICFO Institut de Ciencies Fotoniques, Barcelona, and Universitat de Catalunya, Terrassa, Spain

Whispering gallery modes are considered to enhance the quadratic nonlinear interaction at the surface of a micro-spherical resonators. The conditions to simultaneously satisfy resonance at all interacting frequencies and phase matching are found.

CD-19-WED

Nonlinear coefficients of hafnium doped lithium niobate crystals

I. Cristiani, J. Yu, V. Degiorgio, P. Minzioni, L. Tartara, J. Parravicini, University of Pavia, Italy; E.P. Kokanyan, Institute for Physical Research, National Academy of Sciences of Armenia, Ashtarak-2, Armenia

Nonlinear coefficients of photorefractive resistant Hafnium-doped lithium-niobate crystals are measured. For doping concentrations up to 3mol% their nonlinear efficiency is comparable to that of congruent crystals, representing a very attractive material for nonlinear optical devices

CD-20-WED

Propagation of high power chirped pulse in disperison decreasing tapered fiber

A. Plotski, A.A. Sysoliatin, Fiber Optics Research Center, Moscow, Russia; A.I. Latkin, Institute of Automation and Electrometry, Novosibirsk, Russia; P. Harper, J. Harrison, S.K. Turitsyn, Aston University, Birmingham, United Kingdom

High powered chirped pulse propagation in tapered decreasing normal dispersion fibre is studied experimentally. Wave breaking suppression is achieved by tailoring both fibre characteristics and launch conditions.

CD-21-WED

Generation of frequency combs by stimulated Raman scattering in crystalline materials

H. Rhee, H.J. Eichler, Institute for Optics and Atomic Physics, Berlin, Germany; A.A. Kaminskii, Russian Academy of Sciences, Moscow, Russia

Cascading stimulated Raman scattering in crystals generates frequency combs with a frequency distance determined by the energy of the related vibrational mode. By this method reference lines can be shifted for frequency comparison.

CD-22-WED

Generation of nanosecond broadband UV pulses for multiplex non-resonant pump four-wave mixing spectroscopy of OH radicals

E.S. Lee, J.Y. Lee, Korea Research Institute of Standards and Science, Taejeon, South Korea

We report on the efficient generation of broadband ultraviolet pulses from the second harmonic generation of 7 ns broadband dye laser using two thin BBO crystals of 0.5 mm. The result is compared to theoretical calculation.

CD-23-WED

Tailoring strong cw supercontinuum generation in microstructured fibers with two-zero dispersion wavelengths

A. Mussot, M. Beaugeois, M. Bouazaoui, Laboratoire de Physique des Lasers Atomes et Molécules, Villeneuve d'Ascq, France; T. Sylvestre, Institut FEMTO-ST, Besançon, France

We numerically demonstrate that quite flat and strong supercontinuum can be generated with a CW fiber laser launched in a PCF with 2 zeros dispersion wavelength. Furthermore, the SC extension is adjusted by properly tailoring the PCF dispersion curve.

CD-24-WED

Fluorescence lifetime spectroscopy using tunable visible light generated by high-order mode propagation in microstructured fiber

POSTERS

C. D'Andrea, R. Ferrari, A. Bassi, S. Taccheo, R. Cubeddu, Politecnico di Milano, Italy; K. Schuster, J. Kobelke, Institut für Physikalische Hochtechnologie, Jena, Germany

We evaluate a new approach for generating tunable visible light (400-600 nm) for biomedical application by high order mode propagation in microstructured fiber. To demonstrate the potential applications, fluorescence lifetime spectroscopy measurement is performed.

CD-25-WED

Modeling of spectral broadening in second-harmonic generation

R. Holzlöhner, L. Taylor, Y. Feng, D. Bonaccini Calia, W. Hackenberg, European Southern Observatory, Garching, Germany

We numerically model high-power cw second-harmonic generation in periodically-poled crystals using an opto-thermal iteration method. The conversion efficiency is limited by the bandwidth and spectral coherence of the pump laser.

CD-26-WED

All optical limiter based on self phase modulation and dispersive chirping

M. Holtmannspoetter, B. Schmauss, Friedrich Alexander University, Erlangen, Germany

An all optical limiter is presented which exhibits a transfer function with low threshold and little fluctuation in output power. These qualities are achieved by centre frequency filtering of SPM-broadened spectrum and negative dispersive chirping.

CD-27-WED

Reduced pump-requirement for group-velocity slowdown in quantum-dot quantum-coherence

S. Michael, H.C. Schneider, Kaiserslautern University, Germany; W.W. Chow, Sandia, National Laboratories, Albuquerque, USA

We present theoretical results on the realization of group-velocity slowdown in quantum-dot systems including many-particle Coulomb effects. We obtain reduced pump requirements as compared to atomic-like quantum-coherence theory.

CG-1-WED

High power, 1-THz source based on a femtosecond laser-pumped DC to AC radiation converter scheme

N. Ohata, K. Li, H. Kawanago, K. Yaegashi, T. Higashiguchi, N. Yugami, Utsunomiya University, Japan

We demonstrated a high power THz source using a 100-fs pumped DC to AC radiation converter (DARC) scheme. We observed a center frequency of 1.2 THz by use of an electro-optic sampling diagnostic.

CG-2-WED

Pump beams homogenization for Terawatt / Petawatt class Ti:Sapphire amplifiers

F. Canova, J.P. Chambaret, LOA - Ecole Polytechnique, Palaiseau, France; F. Reversat, S. Tisserand, Silios Technologies, Peyner, France; F. Plé, M. Pittman, LIXAM, Orsay, France

Our goal is to design robust configurations for Terawatt/Petawatt-class power amplifiers. We investigate the processes involved in Ti:Sa pumping: damage threshold of amplifying material, beam transport (relay-image or homogenization) and coherence properties of pump lasers.

CG-3-WED

Wavefront correction and aberrations pre-compensation in the middle of Petawatt-class CPA laser chains

F. Canova, L. Canova, J.P. Chambaret, LOA-Ecole Polytechnique, Palaiseau, France; X. Levecq, E. Lavergne, G. Dovillaire, Imagine Optic, Orsay, France

We describe preliminary experiences to validate correction of wavefront aberrations in middle of laser chain. This technique allows correction of aberrations from first part, and the pre-compensation of aberrations built in second part of laser.

CG-4-WED

Investigation of X-ray lasers on the SOKOL-P facility at RFNC-VNIITF

D.S. Gavrilov, A.V. Andriyash, D.A. Vikhlyaev, S.A. Gorokhov, D.A. Dmitrov, A.L. Zapysov, A.G. Kakshin, I.A. Kapustin, E.A. Loboda, V.A. Lykov, V.Y. Politov, A.V. Potapov, V.A. Pronin, G.N. Rykovanov, V.N. Sukhanov, A.S. Tischenko, A.A. Ugodenko, O.V. Chefonov, RFNC-VNIITF, Snezhinsk, Russia

The paper gives results of experiments on generation of the laser X-radiation with non-stationary collisional pumping. The saturated lasing regime was obtained with the pumping by the traveling wave on 3p-3s transitions of Ne-like titanium (wavelength 326 A) and 4d-4p transitions of Ni-like molybdenum (wavelength 189 A).

CG-5-WED

Paradox in the measurement of the FM-to-AM conversion in high power lasers

D. Penninckx, S. Hocquet, J.M. Di-Nicola, J.F. Gleyze, CEA, Le Barp, France

FM-to-AM conversion can induce amplitude modulations at very high frequencies that cannot be measured. The spectral bandwidth of the measurement creates a paradox we will present and explain.

CG-6-WED

10 fs, high temporal contrast front-end for PW class laser system

G. Cheriaux, L. Antonucci, A. Jullien, O. Albert, D. Douillet, J.P Rousseau, LOA-ENSTA, Palaiseau, France

A laser front-end delivering 10-fs pulses and exhibiting a temporal contrast higher than 1011 will be presented. The system is based on CPA in TiSa and on cross-polarized-wave generation for contrast improvement and pulse shortening.

CG-7-WED

Soft X-ray Fresnel-like diffraction from thin films edges by an ultrafast laser plasma source

S. Stagira, S. De Silvestri, F. Calegari, J. Cabanillas-Gonzalez, G. Valentini, C. Vozzi, M. Nisoli, S. Gasilov, Politecnico di Milano, Italy; A. Faenov, T. Pikuz, Russian Academia of Science, Moscow, Russia; R. Cerbino, Fribourg University, Fribourg, Switzerland; L. Poletto, P. Villoresi, CNR-INFM, Padua University,Italy

Soft X-ray Fresnel-like diffraction experiments from thin films edges is performed using an ultrafast laser plasma source. Results show that coherence properties of the source can be manipulated by spectral filtering.

CG-8-WED

Optical guiding in gas-filled capillary discharge plasmas waveguide for electron acceleration application

K. Li, T. Oshima, M. Hikita, T. Higashiguchi, N. Yugami, Utsunomiya University, Japan

Optical guiding of intense, 130-fs laser pulse by gas-filled capillary slow-discharged plasma waveguide was demonstrated. Electron emission of 1.6 MeV was observed from the 1-cm plasma waveguide.

CG-9-WED

Influence of the chirp and repetition rate of ultrashort laser pulses on the Kα yield from laser-produced plasmas

M. Silies, H. Witte, T. Haarlammert, S. Linden, H. Zacharias, University of Münster, Germany

The process of hard x-ray generation with ultrashort laser pulses is investigated concerning the influence of the chirp of the irradiating laser pulses and the influence of the repetition rate of the laser system.

CG-10-WED

Synchronization of three master oscillators for multi-petawatt OPCPA laser system

O. Palashov, E. Khazanov, E. Katin, G. Luchinin, Institute of Applied Physics, Nizhny Novgorod, Russia

In experiment we achieved a jitter between the cw femtosecond laser and two Nd:YLF Q-switched lasers as low as 100ps. It satisfies requirements for the multi-petawatt laser based on optical parametrical chirped pulsed amplification.

CG-11-WED

Understanding laser stabilization using spectral hole burning

B. Julsgaard, Technical University of Denmark, Lyngby, Denmark; L. Rippe, A. Walther, S. Kroll, Lund Institute of Technology, Lund, Sweden

We introduce an analytical theory for frequency stabilization of lasers to spectral-hole-burning materials. The parameter settings of a stabilization feedback loop can thus be optimized for large signal-to-noise ratio and low frequency drift.

CG-12-WED

Two-photon resonance absorption of relativistic-intensity laser pulses in steep overcritical plasmas

J.M. Mikhailova, M.V. Lomonosov Moscow State University and A.M. Prokhorov General Physics Institute, Moscow, Russia; V.T. Platonenko, M.V. Lomonosov Moscow State University, Moscow, Russia

Resonant excitation of electron plasma waves at a double-laser frequency is shown to contribute strongly to plasma heating in the case, when the relativistic-intensity linearly-polarized laser pulse is normally incident on steep overdense plasma.

CG-13-WED

Optical design of astra gemini Petawatt amplification system

O. Chekhlov, K. Ertel, E.J Divall, C.J. Hooker, S.J. Hawkes, S. Hancock, A.J. Langley, J.L. Collier, CCLRC Rutherford Appleton Lab., Didcot, UK

We present the design of a dual-beam petawatt class chirped pulse amplification Ti:sapphire laser system. Relative radial delays of the optical system and B-integral parameter have been investigated.

CG-14-WED

Focusing of high power ultrashort Gaussian pulses to thin targets

K. Osvay, University of Szeged, Hungary and Max Born Institute, Berlin, Germany; Z.L. Horvath, University of Szeged, Hungary; M.P. Kalashnikov, Max Born Institute, Berlin, Germany

POSTERS

The intensity of a broadband laser pulse focused through a circular aperture changes periodically along the optical axis in the vicinity of the focal point, resulting in always minimum in the geometrical focus.

CL-1-WED

Enhancing Raman analysis in optical tweezers by phase-sensitive detection

G. Rusciano, A.C. De Luca, G. Pesce, A. Sasso, Universita' di Napoli "Federico II", Napoli, Italy

In this paper we report on a novel method for the acquisition of Raman spectra of an optically trapped particle. The obtained signal is free from any background contribution due to the environment.

CL-2-WED

Monitoring of xylem sap flow in trees by a non-intrusive, laser-based heat tracing technique and comparison with MRI flow imaging

C. Helfter, D.P. Hand, D. Shephard, Heriot-Watt Univ., Edinburgh, UK; M. Mencuccini, The Univ. of Edinburgh, UK; C.W. Windt, H. Van As, Wageningen Univ., Netherlands

A novel, non-invasive laser-based heat pulse technique for the estimation of water flow rates in trees without damaging the plant has been developed. Xylem flow velocities are compared to MRI flow imaging data.

CL-3-WED

Holographic optical manipulation of hyphal growth in filamentous fungi

D. McGloin, D. Burnham, Univ. of St. Andrews, UK; G. Wright, N. Read, Univ. of Edinburgh, UK

We make use of holographic fields to perturb the growth of filamentus fungi. We observe branching, redirection and constriction of hyphal growth. We all measure the response of the fungi at different wavelengths.

CL-4-WED

Design and application of shaper-assisted collinear (SAC-) SPIDER for pulse compression in high-contrast multiphoton microscopy von

B. von Vacano, T. Buckup, M. Motzkus, Philipps-University, Marburg, Germany

In a simplified approach, a shaper-assisted collinear (SAC-) SPIDER allows in situ pulse measurement and phase compensation in nonlinear microscopy. Here, design considerations and application examples are presented to show how SAC-SPIDER improves multiphoton imaging.

CL-5-WED

Micro-patterned microscope slides for position referencing in optical microscopy

P. Sandoz, R. Zeggari, L. Froehly, M.P Bernal, FEMTO-ST / LOPMD UMR C.N.R.S 6174 / UFC, Besançon, France; J.L Pretet, C. Mougin, IFR 133 - EA3181 - UFC - CHU J. Minjoz, Besançon, France

We developed smart microscope slides including an in-depth micro-patterned grid. Lateral position coordinates are retrieved from the grid image and used for the tissue section images. The later are then superimposed numerically with sub-pixel accuracy.

CL-6-WED

Force microscopy using backscattered light

G. Volpe, ICFO, Castelldefels, Spain; K. Kozyreff, ICFO, Castelldefels, Spain and Université Libre de Bruxelles, Brussels, Belgium; P. Petrov, ICFO, Castelldefels and ICREA, Barcelona, Spain

The Photonic Force Microscope performances in the forward-scattering and backward-scattering geometries are compared, calculating the total-scattered electromagnetic field from a dielectric bead in an optical trap using a Mie-Debye approach.

CL-7-WED

New method of laser beam energy distribution evaluation in biological tissue based on wavelet analysis.

A.S Zajac, L. Urbanski, D. Podniesinski, J. Swiderski, Military University of Technology, Warsaw, Poland

The problem of laser beam energy distribution in biological media is crucial within the laser tissue welding process. Unlike the classical deterministic calculus, the wavelet analysis based approach provides eligible results.

CL-8-WED

Integration of femtosecond laser fabricated optical waveguides and microfluidic channels for lab-on-chip devices

R. Martinez Vazquez, R. Osellame, IFN – CNR, Milano, Italy; V. Maselli, R. Ramponi, G. Cerullo, Politecnico di Milano, Italy

A femtosecond laser is used to fabricate on a glass substrate both microfluidic channels and high quality optical waveguides, intersecting each other. Waveguide-channel integration opens new prospects for in-situ sensing in lab-on-chip devices.

CL-9-WED

Widening of high resolution area of fundus imager

V. Dubinin, V. Kudryashov, Yu. Cherezova, Moscow State University, Moscow, Russia

We suggest different methods to enlarge the fundus-camera high-resolution area by applying isoplanatic patch size widening techniques.

CL-10-WED

Estimation of the polarization rotation in biological tissues using a Mueller OCT system

D. Pereda-Cubian, M. Todorovic, Texas A&M University, College Station, Texas, USA; F. Fanjul-Velez, J.L Arce-Diego, University of Cantabria, Santander, Spain

The polarization rotation of the light propagating through an Intralipid solution subjected to an external magnetic field has been estimated using the Jones and Mueller matrices obtained by a Mueller OCT system.

CL-12-WED

Highly emissive CdTe nanowires grown in a phosphate buffer solution

Y.P Rakovich, Y. Gunko, J.F Donegan, Trinity College Dublin, Ireland; Y. Volkov, J.F Donegan, CRANN Nanoscience Institute, Dublin, Ireland; Y. Volkov, Molecular Medicine Centre and Department of Clinical Medicine, Dublin, Ireland

We present details on the CdTe nanowires formation and properties, which were found to grow in a standard phosphate-buffered solution, including micro-photoluminescence, fluorescence lifetime imaging, in-situ observation of growth with a confocal microscope and TEM.

CL-14-WED

Silicon-on-insulator photonic crystal slabs for biosensing

M. Patrini, M. Galli, M. Belotti, L.C. Andreani, A. Stella, University of Pavia, Italy; E. Di Fabrizio, University of Magna Graecia, Catanzaro, Italy; E. Froner, M. Scarpa, University of Trento, Trento, Italy; C. Peroz, Y. Chen, CNRS-LPN, Marcoussis, France

We investigated the optical response of silicon-on-insulator photonic crystal acting as biosensors. Microreflectance measurements show high sensitivity to the exposure to different analytes exploiting photonic crystal resonances.

CM-1-WED

Silicon micro- and nanostructures formed by femtosecond laser pulses

L. Golovan, S.V. Zabotnov, I.A. Ostapenko, A.A. Ezhov, M.A. Lastovkina, A.V. Chervyakov, V.Y. Timoshenko, V.I. Panov, P.K. Kashkarov, Moscow State University, Moscow, Russia; G.D. Shandybina, University of Information Technologies, St Petersburg, Russia

Femtosecond laser irradiation of crystalline silicon results in occurrence of both micrometer ripples and nanostructures (2-30 nm) at the treated surface. The formed nano- and microstructures demonstrate visible photoluminescence, Raman scattering enhancement, and modified third-harmonic signal.

CM-2-WED

DUV attenuating structures in fused silica induced by ultrafsat laser radiation

S. Oshemkov, V. Dmitriev, E. Zait, G. Ben-Zvi, Pixer Technology, Karmiel, Israel

The possibility of producing DUV attenuating structures in the bulk of fused silica induced by pico- and femtosecond laser pulses is studied. Applicability of created structures for photomasks repair and modification is discussed.

CM-3-WED

Scaling of femtosecond laser induced breakdown threshold in $Ti_xSi_{1-x}O_2$ composite films

I.V. Cravetchi, D. Nguyen, W. Rudolph, University of New Mexico, Albuquerque, USA; M. Jupe, M. Lappschies, K. Starke, D. Ristau, Laser Zentrum Hannover e.V., Hannover, Germany

A linear scaling of the subpicosecond laser-induced breakdown threshold with respect to the material band gap energy and a power law with respect to pulse duration were observed for $Ti_xSi_{1-x}O_2$ films and explained theoretically.

CM-4-WED

Absorption in laser drilling in percussion regime

L. Berthe, M. Schneider, R. Fabbro, M. Muller, M. Nivard, CNRS/ LALP, Arcueil, France

This paper presents some new results concerning absorption measurements in laser drilling in percussion regime used in aeronautical engine industries. Aborption level measured is up to 90%. Mechanisms responsible are discussed and the laser beam confinement by multi-reflexion could be the most important one.

CM-5-WED

Studies on polyethylene substrates modified by laser-assisted ion implantation

F. Belloni, A. Lorusso, V. Nassisi, A. Nassisi, University of Lecce, Italy; D. Margarone, L. Torrisi, A. Mezzasalma, University of Messina, Italy

The surface physical modifications of ultra-high-molecular-weight-polyethylene (UHMWPE) were studied after ion implantation by means of a suitable laser-ion-source, emitting multi-energetic ion streams. A UV pulsed laser was employed to produce the implanting ions.

POSTERS

CM-6-WED

Model based plasma monitoring methods for the predictive assessment of LSP applications

J.L. Ocaña, M. Morales, C. Molpeceres, R. Pecharroman, J.A. Porro, Universidad Politecnica de Madrid, Spain

Results obtained by the authors in model based monitoring methods for the experimental characterization of LSP applications are reported together with a critical evaluation of their capability for the validation of predictive assessment codes.

CM-7-WED

Deep hole drilling in metals by femtosecond laser pulses

D. Antonov, E. Weynant, Phasoptx inc, Sainte-Foy, Quebec, Canada; G. Petite, S. Guizard, Ecole Polytechnique – CEA, Palaiseau, France

We studied the high fluence deep-drilling efficiency of ultrashort laser pulses in different metals. The drilling velocity shows a saturation which depends on the metal nature, incident fluence and the hole depth.

CM-8-WED

Laser heating of metals: the question of reflectivity

B. Christensen, P. Balling, J. Byskov-Nielsen, University of Aarhus, Denmark

Coupling of energy to metallic samples relies on their finite reflectivity. The absorption efficiency is thus critically dependent on the physical and chemical properties of the surface. We report experimental investigations that elucidate both effects.

CM-9-WED

The pulsed CO^2 laser induced ablation of quartz, fused silica and natural silicates

A.F. Mukhamedgalieva, Moscow State Mining University, Moscow, Russia; A.M. Bondar, A.A. Ionin, Y.M. Klimachev, D.V. Sinitsin V.D. Zvorykin, Russian Academy of Sciences, Moscow, Russia

The laser ablation of quartz and natural silicates induced by pulsed CO_2 laser irradiation (total pulse time of 35 microseconds, pulse energy of 10 J) by use of high speed photography method has been studied.

CM-10-WED

Laser ablation threshold of cultural heritage metals

A. Lorusso, V. Nassisi, F. Belloni, A. Buccolieri, G. Buccolieri, A. Castellano, L.S. Leo, M. Di Giulio, University of Lecce, Italy; L. Torrisi, F. Caridi, A. Borrielli, University of Messina, Italy

In this work we studied the ablation process of copper, silver and their alloys in terms of laser fluence and crater depth. For every sample, we determined experimentally the ablation threshold at two different wavelengths

CM-11-WED

Crystalline structure and surface morphologyof CdTe thin films

K. Savchuk, I. Lesyuk, K. Kotlyarchuk, Institute for Applied Problems of Mechanics and Mathematics, Lviv, Ukraine; Y. Musiy, Institute of Physical Organic Chemistry and Coal Chemistry, Lviv, Ukraine; M. Oszaldowski, Poznan University of Technology, Poznan, Poland

Problems related to growth of CdTe thin films by Pulsed Laser Deposition are described. The structural and morphological properties of grown films are examined and discussed for applications as a material for designing optoelectronic devices.

NOTES

POSTERS

ICM Foyer 13:30-14:30
IQEC 2007 Poster Session

ID-1-WED
Dark-line atomic resonances in micrometric Rb-vapor layer
Y. Malakyan, D. Sarkisyan, A. Sargsyan, National Academy of Sciences, Ashtarak, Armenia; C. Leroy, Université de Bourgogne, CNRS, Dijon, France; Y. Pashayan-Leroy, National Academy of Sciences, Ashtarak, Armenia and Université de Bourgogne, CNRS, Dijon, France
The width and contrast of electromagnetically induced transparency (EIT) and velocity-selective optical pumping (VSOP) resonances were measured for micrometric cells (MC). A theoretical model describing the behavior of EIT and VSOP in MC is developed.

ID-2-WED
Accurate measurement of the Newtonian constant of gravity using atom interferometry
A. Bertoldi, G. Lamporesi, INFN and University of Firenze, Sesto Fiorentino, Italy; L. Cacciapuoti, European Space Agency, ESTEC, Nordwijk, Netherlands; M. Prevedelli, University of Bologna, Italy; G.M. Tino, INFN and University of Firenze, Italy
We present an accurate measurement of the Newtonian constant G using an atom interferometry based gravity-gradiometer.

ID-3-WED
Sensitive optical magnetometry based on nonlinear magneto-optical rotation with amplitude-modulated light
W. Gawlik, M. Gring, M. Kotyrba, S. Pustelny, A. Wojciechowski, J. Zachorowski, Jagiellonian University, Krakow, Poland; D. Budker, A. Cingöz, N. Leefer, University of California at Berkeley, USA
We report on new magnetometric technique based on nonlinear magneto-optical rotation with amplitude-modulated light. The method enables measurements of magnetic fields in a range including geomagnetic fields with a sensitivity exceeding 10^{-14} T Hz$^{-1/2}$.

ID-4-WED
Direct high precision measurement of optical Goos-Hänchen shift
H.G.L Schwefel, Z.H Lu, W. Köhler, L.J Wang, University of Erlangen, Germany; J. Fan, National Institute of Standards and Technology, Gaithersburg, MA, USA
We report a direct, high precision measurement of the optical Goos-Hänchen shift for all incident angles. The shift is measured for TE and TM polarization, after only one reflection.

ID-5-WED
Electronic spin lifetimes in alkali samples on the surface of helium nanodroplets
W.E. Ernst, G. Auböck, J. Nagl, C. Callegari, Graz University of Technology, Graz, Austria
In a 2.9 kG magnetic field, the population ratio of Zeeman sublevels of potassium atoms and molecules on superfluid helium droplets at 0.4 K temperature was measured, indicating different spin relaxation for atoms and molecules.

ID-6-WED
A laser optically-pumped Rubidium vapour-cell frequency standard using a DFB laser diode
C. Affolderbach, G. Mileti, Neuchatel University, Switzerland; F. Droz, Temex Neuchatel, Time, Neuchatel, Switzerland
We present the realisation of a compact atomic frequency standard based on a Rubidium vapour-cell optically pumped by an intrinsically single-mode DFB laser diode. A frequency stability of 1.5x10E^{-12} at one second is reached.

ID-7-WED
Coherent effects in Cs (nD) states in the presence of an external electric field
A. Jarmola, F. Gahbauer, M. Tamanis, K. Bluss, M. Auzinsh, R. Ferber, University of Latvia, Riga, Latvia; M.S. Safronova, University of Delaware, Newark, Delaware, USA; U.I Safronova, University of Nevada, Reno, Nevada, USA
We present experimental and theoretical studies of coherent excitation of magnetic sublevels in nD states of cesium that cross in an external electric field. The 7,9D$_{3/2}$ tensor polarizabilities and 7,9,10 D$_{5/2}$ hyperfine constants are obtained.

ID-8-WED
Lin | | lin coherent population trapping and its application for vapor-cell-atomic-clocks
E. Breschi, G. Mileti, University of Neuchatel, Switzerland; B. Matisov, G. Kazakov St. Petersburg State Polytechnic University, Russia; R. Lammegger, L. Windholz, Institute of Experimental Physics, Graz, Austria
Coherent Population Trapping (CPT) is a promising approach for developing compact frequency standards. We investigated experimentally and theoretically the CPT effect in a new light-atoms interaction scheme for application in vapour-cell-atomic-clocks.

ID-9-WED
Origin of the reaction of probe spectra on the coupling pump laser absorption
H. Friedmann, T. Zigdon, A.D. Wilson-Gordon, Bar-Ilan University, Ramat Gan, Israel
An explanation is proposed for the similarities or differences between the probe and pump absorption spectra in V, Lambda and N systems, when both spectra are considered as a function of the probe detuning from resonance.

NOTES

POSTERS

ICM Foyer 13:30-14:30
Joint Symposia Poster Session

JSI-1-WED
Experimental realisation of a deterministic secure quantum communication protocol based on entangled photons
N. Walenta, M. Ostermeyer, University of Potsdam, Germany
A novel deterministic secure direct communication protocol based on entangled photons was used for quantum key distribution utilizing parametric down conversion pumped with ps laser pulses.

JSI-2-WED
Dual detectors scheme in practical quantum key distribution systems
B. Qi, Y. Zhao, X. Ma, H.K Lo, L. Qian, University of Toronto, Canada
We propose a dual-detectors method in a quantum key distribution system: a quiet/slow detector is employed to bound eavesdropper's information while a fast/noisy detector is employed to generate secure key. Simulation results show significant improvements.

JSI-3-WED
One-way differential QPSK quantum key distribution with channel impairments compensation
Q. Xu, M.B Costa e Silva, P. Gallion, Ecole Nationale Supérieure des Télécommunications, Paris, France; F.J. Mendieta, CICESE, Ensenada, Mexico
We propose a one-way QKD system using a time-multiplexed differential QPSK scheme and report experimental measurements at 1550nm for photon counting and super homodyne configurations; including polarization control and phase drift compensation using QBER-based feedback.

JSI-4-WED
Statistical complexity analysis of the chaotic response of a semi-

conductor laser subject to optical feedback

M. Cornelles Soriano, C. Mirasso, P. Colet, IMEDEA, Palma de Mallorca, Spain; O.A Rosso, Universidad de Buenos Aires, Argentina

Statistical complexity characterization of deterministic sources of apparent randomness allows for the detection and quantification of deterministic chaotic behaviors. Using this mathematical tool, we study the chaotic emission of a semiconductor laser subject to delayed optical feedback.

JSI-5-WED

Synchronization of chaos in mutually coupled VCSELs: numerical study

K.P. Panajotov, Vrije Universiteit, Brussels, Belgium; A. Uchida, Takushoku University, Tokyo, Japan; M. Sciamanna, Supelec, LMOPS CNRS UMR-7132, Metz, France

We investigate numerically chaos synchronization of mutually coupled VCSELs and relate the exchange of leader-laggard role to injection locking mechanism. High level of correlation (anticorrelation) between the modes with the same (orthogonal) polarization is demonstrated.

JSII-1-WED

Multipolar effects in second-harmonic generation from gold nanoparticles

S. Kujala, B.K. Canfield, M. Kauranen, Tampere University of Technology, Tampere, Finland; Y. Svirko, J. Turunen, University of Joensuu, Finland

Comparison of polarized second-harmonic generation in reflection and transmission from arrays of gold nanoparticles reveals that multipole (magnetic-dipole and electric quadrupole) effects account ~20% of the components of the nonlinear response tensor.

JSII-2-WED

Imaging of second harmonic generation in the near field of ellipsoidal gold nanoparticles

M. Zavelani-Rossi, M. Celebrano, D. Polli, P. Biagioni, M. Finazzi, L. Duo, O. Svelto, G. Cerullo, Politecnico di Milano, Italy; M. Labardi, M. Allegrini, Universita di Pisa, Italy; J. Grand, P.M Adam, Université de Troyes, France

Second-harmonic generation by gold nanoellipsoids is experimentally investigated by a nonlinear near-field scanning optical microscope. The nonlinear response at the nanoscale is found to strongly depend on surface plasmon resonances and on local morphology.

JSII-3-WED

Experimental studies of binary metamaterials

I. Shadrivov, S. Morrison, D. Powell, Australian National University, Canberra, Australia; M. Milford, Y. Kivshar, Australian Defence Force Academy, Canberra, Australia

We introduce and study metamaterial superlattices in the form of binary structures of wires and split-ring resonators. We study experimentally scattering of microwaves and demonstrate resonance-band broadening and splitting in sandwich-type composites.

JSII-4-WED

Beam reshaping through excitation of magnetoinductive waves in metamaterials

A. Kozyrev, C. Qin, D. van der Weide, I. Chuang, University of Wisconsin, Madison, WI, USA; I. Shadrivov, Y. Kivshar, Australian National University, Canberra, Australia

We study reshaping of electromagnetic waves through the excitation of magnetoinductive waves in metamaterials. We develop a numerical algorithm for describing metamaterials in terms of interacting dipoles, and confirm qualitatively beam splitting observed in experiment.

JSII-5-WED

Emission properties of quantum dots in a levitated microdrop

J. Schaefer, J.P. Mondia, R. Sharma, Z.H Lu, L.J. Wang, University Erlangen-Nuremburg, Germany; A.S. Susha, A.L. Rogach, Ludwig-Maximilians-University, Munich, Germany

We present the emission properties of electrodynamically levitated liquid microdrops doped with CdTe nanocrystal quantum dots for different pump powers, droplet sizes, and quantum dot concentrations.

JSII-6-WED

Study of the angular acceptance of surface plasmon Bragg mirrors

M.U. Gonzalez, ICFO - Institut de Ciencies Fotoniques, Castelldefels, Barcelona, Spain and Laboratoire de Physique de l'Université de Bourgogne, Dijon, France; R. Quidant, ICFO - Institut de Ciencies Fotoniques, Castelldefels, Barcelona, Spain; A. Dereux, J.C. Weeber, Laboratoire de Physique de l'Université de Bourgogne, Dijon, France; A. Hohenau, J.R. Krenn, A.L. Stepanov, Karl-Franzens-University, Graz, Austria

Using leakage radiation microscopy, we have analyzed the angular acceptance behaviour of surface plasmon Bragg mirrors. The results can be understood from the dispersion relation of the surface plasmon propagating on a corrugated film.

JSII-7-WED

Full processing of colloidal photonic c0ystals by spin-coating

H. Miguez, G. Lozano, M. Ocaña, A. Mihi, R. Pozas, Institute of Materials Science of Seville, Spain

Herein we will show how to use spin coating, a technique widely employed in current optoelectronics technology, to fully process colloidal photonic crystals.

JSII-8-WED

Investigation of the second-harmonic light emission by KTiOPO4 nanometric-sized crystals as an in situ nonlinear nanosource

X.L Le, D. Chauvat, C. Zhou, N. Sandeau, J.F. Roch, F. Treussart, S. Brasselet, ENS Cachan, France ; T. Gacoin, C. Tard, S. Perruchas, Ecole Polytechnique, Palaiseau, France

We propose KTiOPO4 nanometric-sized crystals as a perfectly photostable nonlinear probe of the electromagnetic field at nanometer scale. Crystals of 50 nm size are characterized using second-harmonic generation microscopy and a defocused imaging technique.

JSII-9-WED

Theory of spectroscopy and microscopy with resonant radiation force

T. Iida, H. Ishihara, Osaka Prefecture University, Sakai, Osaka, Japan

We theoretically study a novel microscopy using resonant interparticle radiation force (IRF) between a probe and a nanoscale sample. Results indicate the potential of IRF to analyze quantum properties of the sample from various directions.

JSII-10-WED

Theory of spatial structure of nonlinear lasing modes

H.E Türeci, ETH Zurich, Switzerland; A.D Stone, Yale University, New Haven, USA

A self-consistent semiclassical laser theory is formulated and solved iteratively which determines the steady-state lasing modes of open multi-mode lasers. We illustrate some surprising results which might be relevant to lasing in complex media.

JSII-11-WED

Intraband InAs/InAlGaAs/InP quantum dot detectors for the MIR

T. Gebhard, K. Unterrainer, W. Parz, Technical University, Vienna, Austria; M.P Pamplona Pirez, UFRJ, Instituto de Fisica, Rio de Janeiro, Brazil; N. Studart, UFSCar, Instituto de Fisica, Sao Carlos, Brazil; J.M. Villas-Boas, Ohio University, USA; A.J. Artur Jorge, P.L. Lustoza, CETUC, PUC, Rio de Janeiro, Brazil

A novel quantum dot structure for infrared photodetectors is proposed. Several peaks can be identified in the photocurrent for normal incidence and for temperatures above liquid nitrogene.

JSII-12-WED

Stimulated emission in nano-structured Zinc oxide on lattice-mismatched Si substrate

S.Y. Kuo, Chang Gung University, Tao-Yuan, Taiwan; W.C. Chen, Instrument Technology Research Center, Hsinchu, Taiwan; F.I. Lai, Yuan-Ze University, Chung-Li, Taiwan

Stimulated emission in nano-structured ZnO on lattice-mismatched Si substrate has been demonstrated by simple chemical-solution and vapor-transport techniques. These results indicate that non-epitaxial techniques might be potential for fabricating novel photonic devices.

ROOM 1

08:30 – 10:00
IF3 Session: Joint session IA, IC & IF Quantum dots
Chair: *Alexander Sergienko, Boston University, USA*

IF3-1-THU 08:30
Giant optical non-linearity induced by a single quantum dot in a semiconducting microcavity
A. Mosset, A. Auffeves-Garnier, M. Munsch, J.P Poizat, J.M Gérard, CNRS-Institut Neel, Grenoble, France; C. Simon, GAP, Genève, Switzerland
A single quantum dot in a micropillar in Purcell regime provides a giant optical non- linearity. We will show that this effect should be observable using state-of-the-art devices, and present the ongoing experiments.

IF3-2-THU 08:45
Optical transitions in a quantum dot pair with stark-field induced coupling
S. Fält, A. Imamoglu, M. Atatüre, H. Tureci, A. Badolato, ETH Zurich, Switzerland
Tunnel and dipolar coupling of two vertically stacked quantum dots are studied with photoluminescence and differential transmission measurements. Single charge sensing and counter-intuitive interactions such as mixing of bright and dark excitons are demonstrated.

ROOM 4a

08:30 – 10:00
JSI1 Session: Chaos-based cryptography
Chair: *Mirvais Yousefi, University of Eindhoven, Netherlands*

JSI1-1-THU 08:30
Optical cryptography by phase modulation of a chaotic carrier
V. Annovazzi-Lodi, S. Merlo, M. Benedetti, Universita' di Pavia, Italy; C.R Mirasso, P. Colet, P. Perez, Universitat de les Illes Balears, Palma de Mallorca, Spain
Message encryption by phase modulation of a chaotic carrier, generated by a laser with optical feedback, has been tested both numerically and experimentally. This approach is expected to offer better security than conventional amplitude modulation.

JSI1-2-THU 08:45
Injection driven chaotic dynamics of a two-colour Fabry-Perot laser diode
S. Osborne, A. Amann, K. Buckley, S.P Hegarty, S. O'Brien, E.P O'Reilly, Tyndall National Institute, Cork, Ireland; G. Huyet, Tyndall National Institute and Cork Institute of Technology, Cork, Ireland
A two-color Fabry-Perot laser diode is subjected to optical injection. Experimental results show a transfer of the 'chaotic' dynamics between the two Fabry-Perot lasing modes.

ROOM 4b

08:30 – 10:00
Session IB4: Spectroscopic applications of ultracold atoms and molecules
Chair: *Pepijn Pinkse, MPI für Quantenoptik, Garching, Germany*

IB4-1-THU 08:30
PHARAO space clock: preliminary tests on ground
M. Abgrall, ALTEN SO, Toulouse, France; Ph. Laurent, Ch. Jentsch, A. Clairon, P. Lemonde, G. Santarelli, LNE-SYRTE, Paris, France; C. Salomon, ENS-LKB, Paris, France; C. Sirmain, F. Picard, Ch. Delaroche, O. Grosjean, I. Zenone, N. Ladiette, D. Blonde, M. Chaubet, J.F Vega, B. Leger, CNES, Toulouse, France
We present the first results obtained with the engineering model of the cold atom space clock PHARAO operating on ground. A frequency stability of 4 10^{-13} at one second is already demonstrated.

IB4-2-THU 08:45
Van de Waals interactions between atoms and dispersive surfaces at finite temperature
M.P Gorza, M. Ducloy, D. Bloch, Université Paris 13 – CNRS, Villetaneuse, France
The long-range interaction exerted on an atom by a dispersive dielectric surface may depend critically on the surface temperature. A theoretical analysis shows how to control its amplitude and sign via temperature monitoring of surface quantum excitations.

ROOM 12

08:30 – 10:00
CC1 Session: Data storage
Chair: *Cornelia Denz, University of Munich, Germany*

CC1-1-THU (Invited) 08:30
Nanoparticle-photopolymer composites for holographic applications
Y. Tomita, University of Electro-Communications, Tokyo, Japan
The physico-chemical and optical properties of inorganic or organic nanoparticle-photopolymer composites are investigated. Characterization of their volume holographic storage capability and their application to photonic lattice structures are also described.

ROOM 13a

08:30 – 10:00
CD7 Session: Nonlinear optics for measurement and sources
Chair: *Paul Westbrook, OFS Lab, Somerset, NJ, USA*

CD7-1-THU 08:30
Wavelength tuneable pulse monitoring using a two-photon-absorption microcavity
K. Bondarczuk, P.J Maguire, L.P Barry, Dublin City University, Dublin, Ireland; J.O Dowd, W.H Guo, M. Lynch, A.L Bradley, J.F Donegan, Trinity College, Dublin, Ireland; H. Folliot, Laboratoire de Physique des Solides, INSA, Rennes, France
We demonstrate wavelength selectivity of a specially designed Two-Photon-Absorption microcavity structure, and investigate how it can be used for monitoring an optical pulses source at one wavelength channel when a second wavelength channel is present.

CD7-2-THU 08:45
Pulse duration measurement using nonlinear detection in As_2Se_3 chalcogenide glass fibre
R.T Watts, J.D Harvey, The University of Auckland, New Zealand; H.C Nguyen, B.J Eggleton, The University of Sydney, Australia
A simple technique of measuring the pulse duration of a signal through nonlinear absorption in Chalogenide-glass fibre is presented. The pulse duration of a mode-locked laser source is measured using this method.

ROOM 13b

08:30 – 10:00
CB11 Session: New devices and applications - I
Chair: *Götz Erbert, Ferdinand Braun Institute, Berlin, Germany*

CB11-1-THU 08:30
Fundamental-lateral mode stabilized high-power ridge-waveguide lasers
H. Wenzel, M. Dallmer, F. Bugge, J. Fricke, K.H Hasler, G. Erbert, Ferdinand-Braun-Institut, Berlin, Germany
The impact of lateral radiation losses due to finite trench widths in ridge waveguide lasers emitting around 1064nm is investigated. A fundamental-lateral mode power of more than 1.3W is obtained.

CB11-2-THU 08:45
Coherent coupling of tapered laser diodes in an external Talbot cavity
I. Hassiaoui, N. Michel, M. Lecomte, O. Parillaud, M. Calligaro, M. Krakowski, Alcatel Thales 3-5Lab, Palaiseau, France
We demonstrate the first operation of a tapered laser diode array in an external Talbot cavity. The in-phase supermode is selected by tilting the reflected wave. The divergence of the central peak is 0.4deg FWHM.

ROOM 14a

08:30 – 10:00
CE7 Session: Nonlinear and laser-active optical waveguides
Chair: *Wolfgang Sohler, University of Paderborn, Germany*

CE7-1-THU 08:30
Fabrication of high aspect ratio photonic crystal structures in lithium niobate
H. Hartung, E.B Kley, A. Tünnermann, T. Gischkat, F. Schrempel, Friedrich-Schiller University, Jena, Germany
We present a method for fabrication of sub micron pattern in lithium niobate using Ion Beam Enhanced Etching. This technique consists of a high energy ion irradiation and a wet etching step in hydrofluoric acid.

CE7-2-THU 08:45
Latent ultrafast laser-assisted domain inversion in congruent lithium niobate
S. Mailis, C.E Valdivia, C.L Sones, A.C Muir, R.W Eason, University of Southampton, United Kingdom
Ultra-fast laser pre-illumination induces significant reduction (~70%) of the coercive field in congruent undoped lithium niobate single crystals. The effect persists long after the illumination takes place.

ROOM 14b

08:30 – 10:00
CF6 Session: New pulse compression techniques and fibre lasers
***Chair:** Luc Bergé, Commissariat Energie Atomique, Bruyères-le-Châtel, France*

CF6-1-THU 08:30
Generation of supercontinua with parabolic pulses
O. Prochnow, D. Wandt, A. Ruehl, M. Schultz, D. Kracht, Laser Zentrum Hannover e.V., Hannover, Germany
We report on the supercontinuum generation with parabolic pulses directly out of an ultrafast ytterbium fiber oscillator based on the soliton fission process.

CF6-2-THU 08:45
All-fibered high-quality low-duty cycle 20-GHz picosecond pulse source
C. Finot, J. Fatome, S. Pitois, G. Millot, Institut Carnot de Bourgogne, Dijon, France
We demonstrate an all-fibered 20-GHz picosecond pulse source with a duty cycle as low as 1/15. The pulse train is achieved via the high-quality compression of an initial sinusoidal beating through four segments of fibers.

ROOM 21

08:30 – 10:00
CK10 Session: Disorder in photonic nanostructures
***Chair:** Remi Carminati, Ecole Centrale, Paris, France*

CK10-1-THU 08:30
Structural disorder induced polarization and mode scrambling
S. Combrie, A. De Rossi, N.V.Q Tran S. Cassette Thales Res. & Technology, Palaiseau, France; A. Talneau, CNRS, Lab. de Photonique et de nanostructures, Marcoussis, France; P. Hamel, Y. Jaouen, R. Gabet, GET Télécom Paris, France
Optical low-coherence reflectometry is applied to measure the group velocity in a line-defect slab photonic crystal waveguide. Evidence of the impact of structural disorder on the propagation is reported. The role of slow-light is discussed.

CK10-2-THU 08:45
Light transport through Mie resonances in photonic glasses
R.S Sapienza, P.D Garcia, C. Lopez, Ins. de Ciencia de Materiales de Madrid - CSIC Cantoblanco, Madrid, Spain; S. Stefano, J. Bertolotti, S. Gottardo, LENS, Firenze, Italy; M.D Martin, L. Vina, Univ. Autonoma de Madrid, Spain; D.S Wiersma, LENS - and INFM-MATIS, Firenze, Italy
We present novel photonic materials, photonic glasses, as solid, disordered, macroscopic assemblies of monodisperse dielectric spheres, and the first measures of resonances in the energy velocity of the diffused light, mean free paths and diffusion constant.

ROOM 22

08:30 – 10:00
CJ3 Session: Properties and dynamics of active fibres
***Chair:** Stefano Taccheo, Politecnico di Milano, Italy*

CJ3-1-THU 08:30
Photodarkening of alumosilicate and phosphosilicate Yb-doped fibers
A.V Shubin, M.A Melkumov S.A Smirnov E.M Dianov Center of the Russian Academy of Sciences, Moscow, Russia; M.V Yashkov, Russian Academy of Sciences, Nizhny Novgorod, Russia
Comparison of the photodarkening paremeters for alumosilicate and phosphosilicate Yb-doped fibers is perfomed for the first time. Phosphosilicate fibers offer an essential advantage over alumosilicate ones as highly tolerant to photodarkening.

CJ3-2-THU 08:45
Temporal evolution of photodarkening and successive photobleaching of an Ytterbium-doped silica double-clad LMA fiber
I. Manek- Hönninger, J. Boullet, CELIA-PALA, Talence, France; S. Ermeneux, Alphanov, Talence, France; R. Bello Doua, M. Podgorski, F. Salin, Eolite, Pessac, France; T. Cardinal, F. Guillen, ICMCB-CNRS, Pessac, France
We study the temporal behaviour of photodarkening in an Yb-doped LMA fiber and show photobleaching of the same fiber. The absorption spectra and the influence on the lasing properties are shown.

ROOM BOR1

08:30 – 10:00
CI4 Session: All optical signal processing
***Chair:** Liam Barry, Dublin City University, Ireland*

CI4-1-THU 08:30
All-optical phase multiplexing from DPSK WDM signals to DQPSK using four-wave mixing in highly-nonlinear fiber
G.W Lu, K.S Abedin, T. Miyazaki, National Institute of Information and Communications Technology, Tokyo, Japan
We experimentally demonstrate all-optical phase multiplexing from two 10-Gb/s DPSK WDM channels to one spectrum-efficient 20-Gb/s DQPSK using FWM in a highly-nonlinear fiber with a 1-dB negative power penalty, enabling the cross-connection of different networks.

CI4-2-THU 08:45
40-Gb/s polarization multiplexed RZ-ASK-DPSK signal wavelength conversion using a 32-cm Bismuth-Oxide highly nonlinear fiber
M.P Fok, C. Shu, The Chinese University of Hong Kong, Hong Kong; D.J Blumenthal, University of California, Santa Barbara, USA
We demonstrate wavelength conversion of a polarization multiplexed RZ-ASK-DPSK signal using four-wave mixing in a bismuth-oxide highly nonlinear fiber incorporated in a polarization diversity loop. An optical signal-to-noise ratio of over 20 dB is obtained.

ROOM BOR2

08:30 – 10:00
JSII1 Session: Tailoring light-matter interactions
***Chair:** Cefe Lopez, Instituto de Ciencia de Materiales, Madrid, Spain*

JSII1-1-THU (Keynote) 08:30
Tailoring NanoMaterials for light-matter interactions
J. Baumberg, University of Southampton, United Kingdom
We demonstrate straightforward and scalable routes to cast novel nano-photonic materials with 10-100nm periodicity in 2D and 3D. Applications include nanostructured metals for plasmonic-enhanced Raman sensing of molecules and elastomeric opals for structural colour which changes on deformation.

ROOM B11

08:30 – 10:00
CL1 Session: Enhanced bio sensing
***Chair:** Benoît Forget, Université Pierre et Marie Curie, Paris VI, France*

CL1-1-THU 08:30
The polarisation dependence of infra-red surface plasmon resonances generated by tilted fibre bragg gratings
D.P Allsop, J. Webb, I. Bennion, Aston University, Aston, United Kingdom; D. Mapps, R. Neal, University of Plymouth, United Kingdom; S. Rehman, FiberLogix Ltd, Watford, United Kingdom
We demonstrate the generation and large polarisation-controlled spectral tunability (~100nm) of infra-red surface plasmon resonances produced by a lapped tilted fibre Bragg grating device operating in the aqueous index regime

CL1-2-THU 08:45
Interaction between nanoparticles and metallic substrates: enhanced scattering detection and accurate vertical positioning
Y.G.H Goulam-Houssen, C.R. Ricolleau, E.F Fort, Lab. Matériaux et Phénomènes Quantiques, Paris, France; E.L.M Le Moal, S.L.F Lévêque-Fort, Lab. de Photophysique Moléculaire, Orsay, France
Metallic Nanoparticles have large scattering cross sections induced by the plasmon resonance, offering an alternative to fluorescence labelling. We'll show how metallic substrates influences their resonance wavelength and scattering efficiency. Biosensing applications will be presented.

NOTES

ROOM 1

IF3-3-THU (Invited) 09:00

Observation of Faraday rotation from a single quantum-dot spin

J. Dreiser, M. Atature, A. Badolato, A. Imamoglu, ETH Zurich, Switzerland

We demonstrate an all-optical dispersive measurement of a single optically prepared quantum dot spin via Faraday rotation of a spectrally detuned laser. These results represent an important step towards single-shot spin read-out.

ROOM 4a

JSI1-3-THU 09:00

Nonlinear dynamics reconstruction of chaotic cryptosystems based on delayed optoelectronic feedback

S. Ortin, L. Pesquera, Instituto de Fisica de Cantabria, Santander, Spain; M. Jacquot, M. Peil, L. Larger, Université de Franche-Comté, Besancon, France

The nonlinear dynamics of a high-dimensional transmitter of an optical chaotic cryptosystem is reconstructed from experimental data using neural networks. The system is based on delayed optoelectronic feedback with a nonlinearity in wavelength.

JSI1-4-THU 09:15

Nonlinear amplitude response of slave laser induces the chaos pass filtering effect in synchronized semiconductor laser diodes

S. Lea, P.S Spencer, University of Wales-Bangor, United Kingdom

It is demonstrated for the first time that in injection locked based chaotic synchronization schemes the chaos pass filter effect is caused by the nonlinear amplitude dependent modulation response of the slave laser

ROOM 4b

IB4-3-THU 09:00

Submegahertz infrared spectroscopy of trapped HD^+ molecular ions at millikelvin temperatures

B. Roth, J.C.J Koelemeij, I. Ernsting, A. Wicht, S. Schiller, Heinrich-Heine University, Düsseldorf, Germany

We have performed an absolute frequency measurement of a rovibrational transition in HD^+ molecular ions. Our result is 500 times more accurate than previous results and is in good agreement with recent ab initio calculations.

IB4-4-THU 09:15

Spectroscopy on high-density mesoscopic atom samples

H. Crepaz, J. Eschner, M. Kubasik, M. Koschorreck, S.R de Echaniz, ICFO - The Institute of Photonic Sciences, Castelldefels, Spain

We characterize high density, elliptical, micron-sized cold atom clouds. Tight confinement and high collision rates manifest themselves in trap-geometry-sensitive population distributions allowing determination of sample extensions, energy distribution and level shifts.

ROOM 12

CC1-2-THU 09:00

Nondestructive readout of volume hologram by use of the broadband light source

R. Fujimura, K. Kuroda, T. Shimura, University of Tokyo, Tokyo, Japan

We propose a method to read the volume hologram at a wavelength different from the recording one. Whole the image can be reconstructed using a spectrally broad but spatially coherent light source.

CC1-3-THU 09:15

High resolution optical data storage in composite polymeric blue sensitive materials

L. Criante, F. Vita, R. Castagna, D.E. Lucchetta, F. Simoni,Universita Politecnica delle Marche, Ancona, Italy

High resolution reflection gratings have been recorded at 405 nm in polymer composites. They exhibited high diffraction efficiency and sensitivity, low losses, and index modulation over 0.01. Finally recording of micro-gratings has been carried out.

ROOM 13a

CD7-3-THU 09:00

Mid-IR detection inside a near-IR broadband ring laser with cascaded down and upconversion

P. Gross, K.J Boller, P. Bhardwaj, M.D. Leistikow, I.D. Lindsay, C.J. Lee, A.F. Nieuwenhuis, University of Twente, Enschede, Netherlands; M.E Klein, Art Innovation B.V., Oldenzaal, Netherlands

We present a novel concept for parametric amplification and upconversion of mid-IR seed spectra, based on a ring laser with intracavity cascaded down and upconversion. The basic working is demonstrated with a numerical model.

CD7-4-THU 09:15

Application of second-harmonic generation to determine the structure of langmuir-blodgett films of low symmetry

M. Siltanen, M. Kauranen, Tampere University of Technology, Tampere, Finland

We study X- and Y-type Langmuir-Blodgett -films of low symmetry using second-harmonic generation. Our technique reveals essentially identical susceptibility tensors for both types but significant differences in the in-plane axis orientations.

ROOM 13b

CB11-3-THU 09:00

High efficient single pass second harmonic generation of a broad area laser diode in an external cavity using a PPLN waveguide crystal

A. Jechow, D. Skoczowsky, A. Heuer, R. Menzel, University of Potsdam, Germany

The infrared light of a broad area laser diode in an external cavity is frequency doubled by the use of a PPLN waveguide crystal. More than 45 mW visible light are generated resulting in 33% internal conversion efficiency.

CB11-4-THU 09:15

Low threshold (GaIn)(NAs) semiconductor disk laser emitting at 1260nm

W. Diehl, P. Brick, OSRAM Opto Semiconductors GmbH, Regensburg, Germany; S. Reinhard, B. Kunert, W. Stolz, Philipps-University Marburg, Germany

We demonstrate a 1260nm GaInNAs semiconductor disk laser grown by MOVPE showing threshold densities as low as $1.1kW/cm^2$ and slope efficiencies of almost 13% at ROOM temperature while pumping at 808nm.

ROOM 14a

CE7-3-THU 09:00

Mg-doped congruent $LiTaO_3$ for high power quasi-phase matching device

H. Ishizuki, T. Taira, Institute for Molecular Science, Okazaki, Japan

Characterization of optical- and thermal-properties in Mg-doped congruent LiTaO3 will be presented, and compared with Mg-doped congruent $LiNbO_3$. The coercive field to invert the crystal polarization will be evaluated by realizing a periodically poled structure.

CE7-4-THU 09:15

UV laser-induced ferroelectric domain structures investigated by piezoresponse force microscopy

E. Soergel, T. Jungk, A. Hoffmann, University of Bonn, Germany; C.L Sones, C.E Valdivia, R.W Eason, I.T Wellington, S. Mailis, A.C Muir, University of Southampton, United Kingdom

We have fabricated surface ferroelectric domains on $LiNbO_3$ z faces by direct c.w. UV laser-writing. The dependence of the domain width and depth on the laser intensity was investigated by piezoresponse force microscopy

ROOM 14b

CF6-3-THU (Invited) 09:00

Novel concepts in high-energy femtosecond fiber lasers

F. Wise, Cornell University, Ithaca, USA

Fiber lasers based on new modes of pulse evolution, such as self-similar evolution, allow major increases in the stable pulse energy. These will be reviewed. Such lasers now compete with solid-state modelocked lasers.

ROOM 21

CK10-3-THU 09:00

Transport of light in amorphous photonic materials

F. Scheffold, M. Reufer, C. Dagallier, University of Fribourg, Switzerland; L.S, Froufe Perez, Ecole Centrale Paris, France; L.F Rojas J.J Saenz, Universidad Autonoma de Madrid, Spain; Ochoa, Cinvestav, Mexico City, Mexico and University of Fribourg, Switzerland.

We discuss the propagation of light in dense colloidal assemblies with liquid like order. By tuning the interaction potential we control the degree of order or disorder and thus can explore new photonic properties.

CK10-4-THU 09:15

Second harmonic generation in AlGaAs/AlOx random structures

M. Centini, M. Bertolotti, C. Sibilia, University of Roma "La Sapienza", Rome, Italy; F. Fabrice, R. Raj, I. Sagnes, Laboratoire de Photonique et de Nanostructures (CNRS UPR 20), Marcoussis, France, D. Wiersma, European Laboratory for Non-linear Spectroscopy (LENS) and INFM-Matis, Sesto Fiorentino, Italy; D. Felbacq, Groupe d'Etude des Semi-Conducteurs UMR 5650, Montpellier, France; M. Michael, Charles Bowden Research Center, Redstone Arsenal, USA

We applied our theoretical results to design, realize and experimentally verify the predicted second harmonic enhanced efficiency on a sample made of AlGaAs/AlOx random layers grown in a GaAs substrate.

ROOM 22

CJ3-3-THU 09:00

Properties of rare earth doped silica fibers obtained by Silica powder sol gel technology and MCVD: a comparative study

V. Romano, L. Di Labio, R. Renner-Erny, W. Lüthy, Th. Feurer, University of Bern, Switzerland; F. Sandoz, Daetwyler Fiber Optics AG, Boudry, Switzerland

Nd3+ and Yb3+ doped preforms produced by the sol-gel or silica powder method have been drawn to fibers and characterised. Their properties are compared with those of fibers produced by standard MCVD technology.

CJ3-4-THU 09:15

Dynamics of pump/signal-induced index change in Yb-doped fiber amplifier

A. Fotiadi, P. Mégret, Facultés Polytechnique de Mons, Belgium and Ioffe Physico-Technical Institute of Russian Academy of Sciences, St Petersburg, Russia; O. Antipov, Institute of Applied Physics of Russian Academy of Science, Nizhny Novgorod, Russia

Testing of Yb-doped fibers with a Mach-Zehnder interferometer at 1550nm indicates to refractive index changes due to a polarizability difference enhanced by UV transitions. The polarizability difference of the excited and unexcited Yb-ions was determined.

ROOM BOR1

CI4-3-THU 09:00

Phase-to-amplitude conversion using long period fiber grating for wavelength conversion at 160 Gb/s

P. Honzatko, R. Slavik, A. Kumpera, P. Skoda, Institute of Photonics and Electronics, AS CR, Prague, Czech Republic

A newly-developed long-period-grating-based all-fiber filter is demonstrated to perform a phase-to-amplitude modulation conversion. This feature is tested in an ultrafast (160 GHz shown here) SOA-based wavelength converter.

CI4-4-THU 09:15

All-optical 42.6Gbit/s NRZ to RZ format conversion

X. Yang, A.K Mishra, R.J Manning, Tyndall National Institute, Cork, Ireland

We present for the first time error-free 42.6Gbit/s all-optical NRZ to RZ format conversion using a single SOA. The RZ output is correctly coded, wavelength and polarity preserved, and has the flexibility of variable duty-cycle.

ROOM B11

CL1-3-THU (Invited) 09:00

Sensitive optical biosensor based on whispering-gallery modes of dielectric microspheres

J. Lutti, W. Langbein, P. Borri, Cardiff University, United Kingdom

We have developed an optical biosensor that exploits photonic resonances of polystyrene microspheres held in aqueous buffer by a novel optical tweezers set-up. We estimate sensitivity 40 times better than surface plasmon resonance methods.

NOTES

ROOM 1

IF3-4-THU 09:30

Parallel electrical spin preparation in InGaAs/GaAs quantum dots with high fidelity

W. Löffler, T. Passow, C. Mauser, N. Höpcke, H. Kalt, S. Li, H. Reimer, M. Hetterich, University Karlsruhe, Germany

We report on the concurrent preparation of many spin-polarized electrons in single InGaAs/GaAs quantum dots with high fidelity. This is done electrically in a diode structure with the semimagnetic spin-aligner ZnMnSe on top.

IF3-5-THU 09:45

Nonlinear dynamics of quantum dot nuclear spins

P.M Maletinsky, C.W Lai, A. Badolato, A. Imamoglu, ETH Zurich, Switzerland

We report manifestly nonlinear dependence of optically induced quantum dot nuclear spin polarization on external magnetic fields. The resulting nuclear field is bistable and changes by ~1 Tesla upon slight variations in the external field.

ROOM 4a

JSI1-5-THU (Invited) 09:30

Finding a needle in a haystack: chaos, noise and information

R. Roy, University of Maryland, College Park, USA

Concealment, privacy, and encryption of messages using chaotic laser systems for communication will be discussed. The role of synchronization of dynamical systems, including generalized synchrony as well as bidirectional communication will be described.

ROOM 4b

IB4-5-THU 09:30

Spin squeezing experiments in a cold ensemble of 87Rb

M. Kubasik, M. Koschorreck, H. Crepaz, S.R de Echaniz, M.W Mitchell, ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; E.S Polzik, Copenhagen University, Copenhagen, Denmark

We describe an experiment to study spin squeezing via a quantum non-demolition measurement in a sample of Rb atoms in a far detuned optical dipole trap.

IB4-6-THU 09:45

Center-of-mass measurements and coherence properties of quantum gases

P.D Drummond, F. Corney, G. Vaughan, ARC Centre of Excellence for Quantum-Atom Optics, Brisbane, Australia; G. Leuchs, Max-Planck Forschungsgruppe, Erlangen, Germany

We analyse the coherence properties of ultra-cold gases by means of direct first-principles quantum simulations. This leads to new definitions of condensation measures and center-of-mass quantum limits for bosons and fermions.

ROOM 12

CC1-4-THU 09:30

Numerical modeling of shift multiplexed holographic data storage

B. Gombköto, P. Koppa, E. Lorincz, Budapest Univ. of Technology and Economics, Budapest, Hungary; A. Suto, Optilink Ltd., Budapest, Hungary

Developing holographic data storage systems requires modeling to support experiments. Shift-multiplexing promises high data density and good compatibility with existing disk technology. Our computer model can provide shift-selectivity, SNR and error rates for such systems.

CC1-5-THU 09:45

3D write-read-erase memory bits recording by fs-pulses in $LiNbO_3$

S. Juodkazis, V. Mizeikis, H. Misawa, Hokkaido University, Sapporo, Japan; A.V Rode, E.G. Gamaly, W.Z. Krolikowski, The Australian National Univ., Canberra, Australia

We demonstrate rewritable optical memory bits formed by fs-pulses at close to dielectric breakdown intensity ~TW/cm^2 in Fe-doped $LiNbO_3$, with refractive index modulation of ~10-3 due to preferential photovoltaic effect.

ROOM 13a

CD7-5-THU 09:30

Dynamical instabilities in opto-electronic ultra-pure microwave generators

Y. Chembo Kouomou, P. Colet, IMEDEA (CSIC-UIB), Palma de Mallorca, Spain; L. Larger, H. Tavernier, R. Bendoula, E. Rubiola, Université de Franche-Comté, Besançon, France

Opto-electronic oscillators can be used to generate ultra-pure microwaves. We model its dynamics and show the existence of instabilities for large gain, which may be detrimental for applications. Our experiments fully validate the analytical predictions.

CD7-6-THU 09:45

Generation of 5 μJ ultrahort THz pulses by optical rectification

J. Hebling, K.L Yeh, M. Hoffmann, K.A Nelson, Massachusetts Institute of Technology, Cambridge, USA

Generation of sub-μJ and 5 μJ ultrashort THz pulses with up to 2 MW peak power is demonstrated by tilting the intensity front of the pump pulses from 1 kHz and 10 Hz lasers, respectively.

ROOM 13b

CB11-5-THU 09:30

Optically pumped GaInNAs disk laser frequency doubled to 615 nm

A. Härkönen, J. Rautiainen, M.Guina, O.G Okhotnikov, M. Pessa, Optoelectronics Res. Centre, Tampere Univ. of Technology, Tampere, Finland; J. Konttinen, P. Tuomisto, Optoelectronics Res. Centre, Tampere Univ. of Technology and EpiCrystals Ltd., Tampere, Finland

We report on frequency-doubled GaInNAs semiconductor disk laser emitting at 615 nm. Maximum power of 170 mW was achieved from single output in narrow spectral band.

CB11-6-THU 09:45

Compact and efficient green laser modules

H. Unold, U. Steegmüller, M. Kühnelt, T. Schwarz, R. Schulz, F. Singer, OSRAM Opto Semiconductors GmbH, Regensburg, Germany

We report on a compact green laser source based on an intracavity frequency doubled Optically Pumped Semiconductor Disk Laser. Maximum output power is 74mW at 2.2W electrical input power, resulting in >3% wall-plug efficiency.

ROOM 14a

CE7-5-THU 09:30

Broadband fluorescence source based on Cr:LiSrAlF6 channel waveguides

A. Majkic, G. Poberaj, R. Degl'Innocenti, P. Günter, M. Döbeli, ETH Zurich, Switzerland

We demonstrate the first active channel waveguides in Cr:LiSrAlF$_6$, serving as compact low-coherence broadband light sources. Pumped by a 165-mW diode laser, these waveguides emit 13 microwatt of spatially confined light at 800nm (75nm FWHM).

CE7-6-THU 09:45

Low-loss Rib waveguides in Al_2O_3 layers for active integrated optical devices

J.D.B Bradley, F. Ay, K. Worhoff, M. Pollnau, University of Twente, Enschede, Netherlands

A method for deposition of aluminum oxide layers with low optical loss (0.11 dB/cm at 1523nm) has been developed. Low-loss rib waveguides have been fabricated in such layers using a dry-etching process.

ROOM 14b

CF6-4-THU 09:30

Soliton compression to few-cycle pulses by cascaded quadratic nonlinearities

M. Bache, O. Bang, COM.DTU, Technical Univ. of Denmark, Lyngby, Denmark; J. Moses, W. Wise, Cornell Univ., Ithaca, USA

Introducing a quadratic soliton number for cascaded quadratic pulse-interaction, we show that pulse compression occurs only when it is larger than the cubic one. Numerics at 1060 nm demonstrate compressed pulses below two optical cycles.

CF6-5-THU 09:45

Low noise femtosecond fiber laser mode-locked using a Single-Walled Carbon Nanotube-based saturable absorber

G. Martel, A. Hideur, J.B Lecourt, A. Cabasse, UMR6614-CORIA, Saint Etienne du Rouvray, France; Ph. Roussignol, S. Berger, Laboratoire Pierre Aigrain, ENS, Paris, France

With a saturable absorber mirror incorporating nanotubes we have drastically decreased the noise level and improved the output characteristics of an energetic self-started mode-locked femtosecond erbium-doped fiber laser.

ROOM 21

CK10-5-THU 09:30

Linear and nonlinear light diffusion in disordered photonic structures

C. Conti, Research Center Enrico Fermi, Rome, Italy; L. Angelani, G. Ruocco, University La Sapienza, Rome, Italy

By using a parallel 3D FDTD code we numerically investigate light diffusion in a disordered system of colloidal particles with quantitative agreement with reported experiments and unveil a non-exponential trasmission tail in the nonlinear regime.

CK10-6-THU 09:45

Random cavity formation in an Er-doped fiber laser

E.I Chaikina, N. Lizarraga, E.R Mendez, CICESE, Ensenada, Mexico

We study the properties of a random laser consisting of a single-mode Er/Ge-doped optical fiber with an optical cavity formed by Bragg gratings written in random positions along the fiber core. Results for the output spectrum as a function of pump are presented.

ROOM 22

CJ3-5-THU 09:30

High resolution optical frequency domain ranging with an integrated frequency shifted feedback (FSF) laser

S. Reza, R. Ricken, W. Sohler, V. Quiring, University of Paderborn, Germany

An integrated frequency shifted feedback laser (in Erbium-doped Lithium Niobate) is used for optical frequency domain ranging. Its unique spectral properties enable to achieve a resolution of 5 microns with one second acquisition time.

ROOM BOR1

CI4-5-THU (Invited) 09:30

Applications of SOAs in ultra-high speed networking

H. de Waardt, E. Tangdiongga, Y. Liu, H.J.S Dorren, G.D Khoe, A.M.J Koonen, Eindhoven University of Technology, Eindhoven, Netherlands

The potential of semiconductor optical amplifiers as ultrafast wavelength converters and optical gates has been explored. 320 Gbit/s wavelength conversion and 640 Gbit/s to 40 Gbit/s demultiplexing experiments with filter-assisted SOAs will be discussed

ROOM BOR2

JSII1-2-THU 09:30

Plasmons in coupled voids

I. Romero, T. Teperik, Donostia International Physics Center (DIPC), San Sebastian, Spain; F.J Garcia de Abajo, Instituto de Optica – CSIC, Madrid and Donostia International Physics Center (DIPC), San Sebastian, Spain

Coupled voids buried in metal are shown to exhibit colourful optical behaviour, strongly dependent on the degree of overlap between voids, while void arrays display transmission bands of buried plasmons for signal transmission and processing.

JSII1-3-THU 09:45

Optical and local tuning of planar photonic crystals infiltrated with organic molecules

P. El-Kallassi, R. Ferrini, L. Zuppiroli, N. Le Thomas, R. Houdré, EPFL, Lausanne, Switzerland; A. Berrier, S. Anand, KTH, Kista, Sweden; A. Talneau, CNRS, Marcoussis, France

We report on the optical tuning of InP-based planar photonic crystals infiltrated with a photoresponsive liquid crystal system. Preliminary results on the local tuning of infiltrated structures are also presented.

ROOM B11

CL1-4-THU 09:30

Probing nonlinear optical properties of nanoparticles and supramolecular assembles by third-harmonic Rayleigh scattering

V.I Shcheslavskiy, T. Lasser, Ecole Polytechnique Féderale de Lausanne, Switzerland; S.M Saltiel, Sofia University, Bulgaria; V.V Yakovlev, University of Milwaukee, USA

We use third-harmonic generation to evaluate sizes and nonlinear optical properties of nanoparticles and supramolecular assembles of type-I collagen in solution.

CL1-5-THU 09:45

Spatio-temporal self-calibration of optical dynamical biochip

J. Hottin, G. Roger, P. Lecaruyer, J. Spadavecchia, J. Moreau, M. Canva, Institut d'Optique, Palaiseau, France

We propose a self-calibration approach to compensate the response dispersion on biochips due to the non homogeneous surface layers. Such effect of probe concentration has been quantified in the case of a DNA biochip.

NOTES

ROOM 1

10:30 – 12:00

IF4 Session: Measurements at the quantum level

Chair: Hans Bachor, Australian National Univ., Canberra, Australia

IF4-1-THU (Invited) 10:30

Quantum measurement and feedback control

H. Mabuchi, L. Bouten, R. van Handel, A.E Miller, G. Sarma, California Institute of Technology, Pasadena, CA, USA

We discuss emerging themes in quantum feedback control: the use of control theory to improve experimental strategies in quantum optics, theory and applications of measurement-based quantum feedback, and control via coherent feedback of quantum fields.

ROOM 4a

10:30 – 12:00

JSI2 Session: Quantum-based cryptography

Chair: Jeremy Baumberg, University of Southampton, UK

JSI2-1-THU 10:30

Decoy state protocols for quantum cryptography with parametric down conversion sources

X. Ma, H.K Lo, C.F Fung, University of Toronto, Canada

We investigate various decoy methods for quantum key distribution with parametric down conversion sources. Our work shows that decoy states are very simple to implement for QKD with PDC sources.

JSI2-2-THU 10:45

Effect of double pair emission to entanglement based QKD

S. Bettelli, T. Lorünser, M. Peev, E. Querasser, Austrian Research Centers GmbH, Wien, Austria; M. Dusek, L. Bartuskova, Univ. Palackeho, Olomouc, Czech Republic; A. Poppe, H. Hübel, Blauensteiner, Univ. Wien, Austria; A. Zeilinger, Univ. Wien and Austrian Academy of Sciences, Wien, Austria

We investigated the relevance of multi-pairs in a quantum cryptographic scheme based on entangled photons from spontaneous parametric down-conversion, and found the security risk is very weak with respect to competing schemes.

ROOM 4b

10:30 – 12:00

IB5 Session: Correlations in bosonic and fermionic quantum gases

Chair: Niels Syassen, Max Planck Inst. für Quantenoptik, Garching, Germany

IB5-1-THU 10:30

Universal thermodynamics of strongly interacting Fermi gases

P. Drummond, X.J Liu, University of Queensland, Brisbane, Australia; H. Hui, Renmin, University, Beijing, China and University of Queensland, Brisbane, Australia

We analyze thermodynamic results from three ultra-cold fermion BEC-BCS crossover experiments. The data is compared with the universal energy versus entropy predictions of fermionic strong interaction theory. We obtain excellent agreement, with no adjustable parameters.

IB5-2-THU 10:45

Quantum scaling laws in the onset of dynamical delocalization

J. Chabé, J.C Garreau, P. Szriftgiser, Lab. de Physique des Lasers, Atomes et Molecules, Lille, France; H. Lignier, Univ. di Pisa, Italy; H. Cavalcante, Univ. Federal de Pernambuco, Recife, Brazil; D. Delande, Lab. Kastler-Brossel, Paris, France

We present experimental results about the phenomenon called dynamical localization observed in a simple quantum chaos experiment (Kicked Rotor). In this work, we study the destruction of dynamical localization by a perturbation showing that this destruction is progressive with well-defined scaling laws.

ROOM 12

10:30 – 12:00

CC2 Session: Solitons and photoinduced lattices

Chair: Gilles Pauliat, Laboratoire Charles Fabry de L'Institut d'Optique, Orsay, France

CC2-1-THU 10:30

Dynamical behaviour of vortices in photorefractive medium

R. Passier, M. Chauvet, F. Devaux, Institut Femto-ST, Besançon, France

We present numerical simulations along with experimental results on propagation of multiple optical vortices in $LiNbO_3$:Fe samples. Formation of interacting dark solitons inducing 3-D guiding structures like Y-junctions is demonstrated.

CC2-2-THU 10:45

Near infrared steady state photorefractive self focusing in $Sn_2P_2S_6$: Te crystals

C. Dan, D. Wolfersberger, N. Fressengeas, G. Montemezzani, "Paul Verlaine" University and Supelec, Metz, France; A.A Grabar, Uzhgorod National University, Uzhgorod, Ukraine

Photorefractive self focusing in SPS:Te is investigated for the first time at 1.06 micrometer; its steady state is characterized as a function of beam input power and external applied field.

ROOM 13a

10:30 – 12:00

CD8 Session: Engineered quasi phase matched materials

Chair: Wolfgang Sohler, University of Paderborn, Germany

CD8-1-THU 10:30

Simple RGB source based on simultaneous quasi-phase-matched second and third harmonic generation in periodically poled lithium niobate

M. Robles-Agudo, R.S Cudney, L.A Rios, CICESE, Ensenada, Mexico

We present a simple source of red, green and blue light based on PPLN with two poling periodicities pumped by a Nd:YAG laser. These colors are produced by cascaded nonlinear interactions within the PPLN crystal.

CD8-2-THU 10:45

MgO-doped PPLN with cascaded structure for intracavity frequency doubling of optically pumped semiconductor disk lasers

R. Hartke, K. Seger, E. Heumann, G. Huber, Institute of Laser-Physics, Hamburg, Germany; M. Kühnelt, U. Steegmüller, OSRAM Opto Semiconductors GmbH, Regensburg, Germany

We report on the use of MgO:PPLN with segments of cascaded poling period for intracavity frequency doubling of an OPS disk-laser. A significantly increased temperature acceptance compared to a single period MgO:PPLN crysal is observed.

ROOM 13b

10:30–12:00

CB12 Session: New devices and applications - II

Chair: Guy Verschaffelt, Vrije Universiteit, Brussels, Belgium

CB12-1-THU 10:30

Antimonide-based DFB laser diodes in the 2-2.7 µm wavelength range

D. Barat, J. Angellier, A. Vicet, Y. Rouillard, Institut d'Electronique du Sud, Montpellier, France; A. Ramdane, S. Guilet, L. Le Gratiet, A. Martinez, Laboratoire de Photonique et de Nanostructures, Marcoussis, France

We present Distributed Feedback lasers made by molecular beam epitaxy on GaSb substrate processed by electron-beam lithography. The devices operate in continuous wave regime at ROOM temperature with a single frequency emission at 2.65 micrometers.

CB12-2-THU 10:45

Ultra-narrow (sub-MHz) linewidth emission from discrete mode laser diodes

C. Guignard, L.P Barry, Dublin City University, Dublin, Ireland; J. Patchell, D. Jones, B. Kelly, J. O'Gorman, Eblana Photonics Ltd., Dublin, Ireland

This paper demonstrates the ultra-narrow sub MHz linewidth emission from a Discrete-Mode Laser Diode. We present how the linewidth from these devices is around 200 times less than that from commercial DFB lasers.

ROOM 14a

10:30 – 12:00

CE8 Session: Laser waveguide fabrication

Chair: Christos Grivas, Univ. of Southampton, Southampton, UK

CE8-1-THU 10:30

Growth and luminescence study of Cr^{2+}:ZnSe films deposited by radio-frequency magnetron co-sputtering

N. Vivet, M. Morales, M. Levalois, Sifcom – Ensicaen, Caen, France; J.L Doualan, R. Moncorgé, Ciril – Ensicaen, Caen, France

Growth and spectroscopic characterization of Cr^{2+}:ZnSe films deposited by radio-frequency magnetron co-sputtering are reported for the first time. Influence of chromium concentration and excitation wavelength on mid-infrared (200-300 nm) luminescence is investigated.

CE8-2-THU 10:45

Annealing and lattice matching of rare-earth doped crystalline garnet PLD-films

B. Ileri, H. Scheife, G. Huber, University of Hamburg, Germany; S. Bär, University of Tübingen, Germany

We report on the systematic lattice mismatch reduction in garnet films, achieving theoretically calculated lattice-matching. X-ray diffraction analysis and atomic force microscopy indicate an improvement in comparison to non-epitaxially grown films.

ROOM 14b

10:30 – 12:00

CF7 Session: Novel applications of femtosecond pulses

Chair: *Uwe Griebner, Max-Born Institute, Berlin, Germany*

CF7-1-THU (Invited) 10:30

A nanometer-sized few femtosecond electron source at high repetition rates

C. Lienau, Universität Oldenburg, Germany; C.P Schulz, C. Ropers, D.R Solli, T. Elsaesser, Max-Born-Institut, Berlin, Germany

We demonstrate a novel approach towards realizing a nanometer-sized ultrafast electron source. By illuminating ultrasharp gold tips with 7-fs pulses from a Ti:sapphire oscillator, we induce emission of up to 10^7 electrons per second.

ROOM 21

10:30 – 12:00

IG6 Session: Instabilities in semiconductor lasers

Chair: *Ingo Fischer, Vrije Universiteit, VUB, Brussels, Belgium*

IG6-1-THU (Invited) 10:30

Instabilities in quantum dot semiconductor lasers 1.3 µm

G. Huyet, S. Melnik, O. Rasskazov, S.P Hegarty, Tyndall National Institute and Cork Institute of Technology, Cork, Ireland; D. Goulding, Tyndall National Institute, Cork, Ireland; D. Rachinskii, University College, Cork, Ireland

We describe instabilities in quantum dot lasers with optical injection where we observe multipulse excitability. We also show that similar behaviour can be observed in mutually coupled QD lasers.

ROOM 22

10:30 – 12:00

CJ4 Session: High power fibre lasers

Chair: *Dave Richardson, ORC, Southampton University, UK*

CJ4-1-THU 10:30

High-energy femtosecond Yb-doped fiber laser operating in the anomalous dispersion regime

B.O Ortac, J. Limpert, Friedrich Schiller University, Jena, Germany

We reported the generation of ultra-short pulses in an Ytterbium-doped large-mode-area air-clad photonic crystal fiber laser operating in the soliton-like regime. The fiber laser directly generates sub-500 fs pulse duration. In the single pulse regime, the laser delivers 880 mW of average power corresponding to pulse energy of more than 16.5 nJ with diffraction-limited quality.

CJ4-2-THU 10:45

Two-stage linearly-polarized ytterbium-doped fibre superfluorescent source with 106 W output power

P. Wang, W.A Clarkson, University of Southampton, UK

High-power single-mode and linearly-polarized operation of a two-stage ytterbium-doped fibre superfluorescent source is reported. The source yielded 106W of output centred at 1067nm with a slope efficiency of 67% and a 3dB bandwidth of 21nm

ROOM BOR1

10:30 – 12:00

CI5 Session: Signal monitoring and conditioning

Chair: *Huug de Waardt, Technische Univ. Eindhoven, Netherlands*

CI5-1-THU (Invited) 10:30

Reconfigurable dispersion trimming in an LCOS-based dynamic wavelength processor

M.A.F Roelens, B.J Eggleton, J. Bolger, University of Sydney, Australia; G. Baxter, S. Frisken, S. Poole, Optium, Sydney, Australia

We present reconfigurable dispersion compensation in a dynamic wavelength processor (DWP) based on Liquid Crystal on Silicon technology. 6ps pulses are transmitted over a short length of fibre, and then dispersion compensated by the DWP.

ROOM BOR2

10:30 – 12:00

IE5 Session: Coherent dynamics

Chair: *Alfred Leitenstorfer, University of Konstanz, Germany*

IE5-1-THU (Invited) 10:30

Ultrafast coherent control of magnetism

T. Rasing, University of Nijmegen, Netherlands

Using femtosecond laser pulses we have observed nonthermal excitation and coherent control of the magnetization in magnetically ordered materials.

ROOM B11

10:30 – 12:00

CL2 Session: Optical trapping, manipulation and modification

Chair: *Aristide Dogariu, CREOL, Univ. of Central Florida, Orlando, USA*

CL2-1-THU 10:30

Controlled fusion of femtoliter-volume aqueous droplets using holographic optical tweezers

D. McGloin, J. Buchanan, D. Burnham, University of St. Andrews, United Kingdom; R. Lorenz, J. Scott Edgar, G. Jeffries, Y. Zhao, D. Chiu, University of Washington, Seattle, USA

We demonstrate the use of Laguerre-Gaussian beams to optically control the fusion of two water droplets immersed in oil. We overcome the repulsive forces between the trapped droplets by translating the hologram generating the beam.

CL2-2-THU 10:45

All optical 3-D trapping through a single-fiber tweezer

C. Liberale, University of Magna Graecia, Catanzaro, Italy; P. Minzioni, I. Cristiani, University of Pavia, Italy

We propose an innovative single-fiber optical tweezer yielding to a purely-optical 3D trap. The structure exploits total internal reflection and is highly promising because it allows particles trapping, manipulation and analysis

NOTES

THURSDAY / ORAL

ROOM 1

IF4-2-THU 11:00

High-sensitivity imaging with quantum spatial correlation of twin beams

E. Brambilla, L. Caspani, A. Gatti, L.A Lugiato, O. Jedrkiewicz, Universita' dell'Insubria, Como, Italy

We propose a novel imaging technique which exploits the multi-mode correlation of twin beams produced through spontaneous down-conversion to measure the spatial distribution of weak objects with sensitivity beyond the standard quantum limit.

IF4-3-THU 11:15

Resolution in image rotation measurements

R. Zambrini, IMEDEA (UIB-CSIC), Palma de Mallorca, Spain; S.M Barnett, University of Strathclyde, Glasgow, United Kingdom

We propose two experiments to measure the rotation of a light beam about an axis. We show how the limiting resolution depends on the total number of quanta of orbital angular momentum of the beam.

ROOM 4a

JSI2-3-THU (Invited) 11:00

Robustness of polarization entanglement for long distance QKD

H. Hübel, B. Blauensteiner, M. Hentschel, M.R. Vanner, A. Poppe, University of Vienna, Vienna, Austria; A. Zeilinger, University Wien and Austrian Academy of Sciences, Wien, Austria; T. Lorunser, ARC, Vienna, Austria

We present a fully functional QKD setup based on polarization entanglement and routinely operate it at 25km with a secure rate of >1500bit/second. Additionally we demonstrate distribution of entanglement up to 100km.

ROOM 4b

IB5-3-THU (Invited) 11:00

Correlations in ultracold atomic gases

M. Koehl, University of Cambridge, United Kingdom; T. Esslinger, T. Donner, A. Öttl, S. Ritter, T. Bourdel, ETH Zurich, Switzerland

We have observed critical fluctuations of the order parameter near the phase transition of Bose-Einstein condensation. This allowed us to determine the critical exponent of the correlation length of a trapped interacting Bose gas.

ROOM 12

CC2-3-THU (Invited) 11:00

Nonlinear photonic structures in photorefractive media

C. Denz, B. Terhalle, S. Koke, C. Bersch, D. Träger, Ph. Jander, J. Imbrock, Westfaelische Wilhelms-Universitaet, Münster, Germany; A.S Desyatnikov, Yu.S Kivshar, W. Krolikowski, D. Neshev, Australian National University, Canberra, Australia

We demonstrate the realization of photonic structures exploiting the strong anisotropy and nonlinearity of the photorefractive response. Stable one- and two-dimensional photonic lattices, anisotropic mobility and the stabilization of dynamics in these lattices are shown.

ROOM 13a

CD8-3-THU 11:00

Design considerations for the manufacture of temperature-stable periodically-poled nonlinear crystals

H.E Major, A.C Peacock, C.B.E Gawith, P.G.R Smith, University of Southampton, United Kingdom

Synthesised response gratings have been fabricated in periodically poled lithium niobate to achieve a flat top profile and tested in the visible. We investigate routes to overcome focussing induced asymmetry to yield optimal flat-top response.

CD8-4-THU 11:15

Periodically poled KTP based high efficiency second harmonic generation of cesium D2 line for atomic quantum memory experiments

A. Chiummo, A. Bramati, J. Cviklinski, F. Villa, J. Ortalo, E. Giacobino, Laboratoire Kastler Brossel, Paris, France

We obtained a high efficiency SHG of a Ti:Sa laser at 852nm (Cesium D2 line), using a PPKTP. This doubler will pump an OPO thought as source of non-classical light for a quantum memory.

ROOM 13b

CB12-3-THU 11:00

Stabilisation of a vertical external-cavity surface-emitting laser using an intra-cavity high-reflectivity grating

S. Giet, S. Calvez, M.D Dawson, Institute of Photonics, Glasgow, United Kingdom; N. Destouches, O. Parriaux, Laboratoire Hubert Curien, Saint Etienne, France; S. Suomalainen, M. Guina, O.G Okhotnikov, M. Pessa, Optoelectronic Research Centre, Tampere, Finland

We report the stabilisation of a 1063nm Vertical External-Cavity Surface-Emitting Laser using an intra-cavity high-reflectivity grating. Polarisation stable, narrow-linewidth operation with up to 485mW of output power is demonstrated.

CB12-4-THU 11:15

Compact diode-pumped single-frequency VECSEL for cesium atomic clocks

B. Cocquelin, G. Lucas-Leclin, P. Georges, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France; A. Garnache, CEM2, CNRS, Montpellier, France; I. Sagnes, Laboratoire de Photonique et Nanostructures, Marcoussis, France

We describe an optically-pumped compact and tunable VECSEL designed at 852-nm. We achieved 15-mW output power in free-running operation and 2.2-mW single-frequency emission on the cesium D2 line under 100-mW diode-pumping.

ROOM 14a

CE8-3-THU 11:00

Er^{3+} luminescence sensitization by Si-nanoparticles in Al_2O_3 thin films with a controlled nanoscale dopant distribution

S. Nunez-Sanchez, R. Serna, J. Toudert, M. Jimenez de Castro, CSIC- Instituto de Optica, Madrid, Spain; A. Petford-Long, M. Tanase, B. Kabius, ANL-Materials Science Divison, Argonne, USA

The emission at 1.54 um of Al_2O_3 films codoped with Si-nanoparticles and Er^{3+} ions is analyzed as a function of the separation between the dopants. Controlled doping distribution is performed by alternate pulsed laser deposition

CE8-4-THU 11:15

Efficient luminescence response from nanoscale controlled Er-Yb distribution in Al_2O_3 waveguides

J. Toudert, S. Nunez-Sanchez, M. Jimenez de Castro, R. Serna, J. Cortes, C.N Afonso, Instituto de Optica, CSIC, Madrid, Spain; C. Borca, P. Hoffmann, Y. Luo, Swiss Federal Institute of Technology Lausanne, Switzerland

Efficient luminescence response of Er-Yb co-doped Al_2O_3 waveguides prepared by pulsed laser deposition has been achieved by controlling rare-earth distribution at the nanoscale. The possibility to get net gain in these waveguides will be discussed.

ROOM 14b

CF7-2-THU 11:00

Femtosecond electron diffractometry: a new approach and first steps

E.E Fill, M. Centurion, P. Reckenthäler, S. Naumov, L. Veisz, F. Krausz, Max-Planck-Institut für Quantenoptik, Garching, Germany; V. Tarnetsky, Budker G. Kurkin, Institute of Nuclear Physics, Novosibirsk, Russia; A. Apolonski, Ludwig-Maximilians-University, Munich, Germany

Simulations and first experimental results for significantly improving the temporal resolution of ultrafast electron diffraction are presented. Low-charge electron pulses are generated at a MHz repetition rate and bunched by means of an RF-cavity.

CF7-3-THU 11:15

Photonic device particle accelerators and light sources

T. Plettner, R.L. Byer, P.P. Lu, K. Sun, Stanford University, Stanford, USA

We present a proposed vacuum channel photonic device that can function as a laser-driven particle accelerator or as an active undulator. We will test a prototype structure with 60 MeV electrons in the near future.

ROOM 21

IG6-2-THU 11:00

Excitability of chaotic transients in a semiconductor laser

O. Ushakov, H.J Wünsche, F. Henneberger, Humboldt-University, Berlin, Germany; M. Radziunas, Weierstrass-Institut für Angewandte Analysis und Stochastik, Berlin, Germany

A multisection semiconductor laser is used to combine two fundamental phenomena observed so far only separately: excitability and chaotic transients. Prerequisite is a boundary crisis of a chaotic attractor colliding with a saddle focus.

IG6-3-THU 11:15

Stability of the mode-locking regime in quantum dot laser

E.A Viktorov, P. Mandel, Université Libre de Bruxelles, Brussels, Belgium; A.G Vladimirov, M. Wolfrum, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany; M. Kuntz, G. Fiol, D. Bimberg, Institut für Festkörperphysik, Berlin, Germany

We study the stability of the modelocking regime in quantum dot lasers and explain the appearance of instabilities as a tangency of the ML cycle to the basin of attraction of the unstable steady state.

ROOM 22

CJ4-3-THU (Invited) 11:00

High power pulsed sources

J.L Limpert, Friedrich Schiller University, Jena, Germany

A review of state-of-the-art rare-earth-doped fiber based laser sources in pulsed operation (ns to fs) will be given. Furthermore scaling concepts are discussed to overcome current performance limitations.

ROOM BOR1

CI5-2-THU 11:00

Optical channel monitoring using two photon absorption

J. O'Dowd, J.F Donegan, W.H Guo, CTVR, Trinity College Dublin, Ireland; D.C Kilper, S. Chandrasekhar, Alcatel-Lucent, Bell Laboratories, Holmdel, USA

A GaAs microcavity two-photon absorption detector is used in an optical channel monitor to distinguish signal bearing channels of varying bit rates, modulation formats and signal quality.

CI5-3-THU 11:15

Wideband all-order PMD emulation via ultrafast pulse shaping

A.M Weiner, H. Miao, Purdue University, West Lafayette, USA

We demonstrate a pulse shaper based polarization mode dispersion (PMD) emulator with the capability of generating arbitrary desired frequency-dependent PMD profiles.

ROOM BOR2

IE5-2-THU 11:00

Femtosecond wave-packet interferometry in all-trans retinal analyzed by high-performance liquid chromatography

K. Misawa, T. Kojiri, R. Lang, Tokyo University of A&T, Koganei, Japan

We demonstrate wave-packet interferometry in all-trans retinal using phase-locked pulses, combined with high-performance liquid chromatography. The decoherence of the excited-state wave-packet was found to be faster than 80 fs.

IE5-3-THU 11:15

Three-pulse photon echo peak shift spectroscopy in a dense potassium vapour

V.O Lorenz, JILA and Dpt of Physics, University of Colorado, Boulder, CO, USA; S.T, Cundiff JILA, University of Colorado, Boulder, CO, USA; S. Mukamel, University of California, Irvine, CA, USA

Experimental three-pulse photon echo peak shifts in a dense potassium vapor exhibit bi-exponential behavior at high temperatures and densities. The slow component is attributed to long-range resonant interactions through calculated peak shifts in an exciton picture.

ROOM B11

CL2-3-THU 11:00

Confocal microscopy and micromanipulation based on a femtosecond fiber laser with ultrawide tuning range

D. Träutlein, E. Ferrando-May, F. Adler, K. Moutzouris, A. Leitenstorfer, University of Konstanz, Germany; U. Camenisch, H. Nägeli, University of Zurich, Switzerland; A. Jeromin, University of Texas, Austin, USA

We present a confocal microscope equipped with a femtosecond Er-fiber laser. The laser provides continuously tunable light in the visible and the infrared region and is employed for linear and nonlinear imaging, and photomanipulation.

CL2-4-THU 11:15

Neuronal fillopodia respond to distant femtosecond pulses

M. Mathew, I. Amat-Roldan, I. G. Cormack, P. Loza-Alvarez, ICFO - Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; R. Andres, E. Soriano, Parc Cientific de Barcelona, Spain; D. Artigas, Universitat Polytecnica de Catalunya, Barcelona, Spain

We show that fillopodia of neurons from primary cell cultures, can be remotely attracted by the presence of focused femtosecond light. This has the potential to replace the use of traditional biomolecules to accomplish guidance.

NOTES

THURSDAY / ORAL

ROOM 1

IF4-4-THU 11:30

Spectral entanglement and precise measurement of optical dispersion

A. Sergienko, Boston University, MA, USA; C. Bonato, P. Villoresi, University of Padua, Italy

We discuss advantages that broadband spectral entanglement in parametric down conversion provides for precise determination of optical dispersion

IF4-5-THU 11:45

On the classical resolution limit of particle position measurement with optical tweezers

W.P. Bowen, J.W. Tay, X. Jiang, University of Otago, Dunedin, New Zealand

Optical tweezers enable microscopic particles to be monitored with remarkable resolution. We investigate the classical resolution limit and methods to surpass it using quantum resources, comparing with the resolution achievable with current state-of-the-art devices.

ROOM 4a

JSI2-4-THU 11:30

Low cost quantum secret key growing for consumer transactions

G. Rarity, M.S Godfrey, A.M Lynch, University of Bristol, United Kingdom; J.L Duligall, W.J Munro, K.J Harrison, Hewlett-Packard Laboratories, Bristol, United Kingdom

We review our low cost and short range quantum key exchange system designed for consumers to generate a store of secret key bits and discuss improvements in the receiver and minituarisation of electronics.

JSI2-5-THU 11:45

A simple, extremely large bandwidth, modulator-free QKD system

Z. Zhang, A.L Locquet, P.L.V Voss, Georgia Tech-C.N.R.S. 2958 UMI, Metz, France; P.G Gallion, ENST (GET/Télécom Paris and C.N.R.S. LTCI), Paris, France

We propose an inexpensive continuous variable quantum key distribution system, easily scalable to large bandwidths, based on the splitting of thermal light between Alice and Bob. This protocol has positive secrecy capacity with reverse reconciliation.

ROOM 4b

IB5-4-THU (Invited) 11:30

Fermionic superfluidity with imbalanced spin populations

M.W Zwierlein, Massachusetts Institute of Technology, Cambridge, MA, USA and Johanes Gutenberg-Universität, Mainz, Germany; A. Schirotzek, W. Ketterle, Y. Shin, C.H Schunck, Institute of Technology, Cambridge, MA, USA

We observed superfluidity in an imbalanced two-state mixture of ultracold fermionic atoms via detection of vortices. The superfluid core at equal spin densities was observed to phase separate from the normal state at unequal densities.

ROOM 12

CC2-4-THU 11:30

The interaction of photorefractive solitons in a SBN crystal

O. Kashin, A. Kiessling, V. Matusevich, D. Khmelnitzky, R. Kowarschik, Friedrich-Schiller-University Jena, Germany

The experimental and theoretical investigation of coherent interaction of photorefractive solitons in a SBN crystal is presented. The threshold values of distance between centers of input beams, to observe independent solitons, are obtained.

CC2-5-THU 11:45

Suppression of discrete diffraction within modulated one-dimensional photorefractive photonic lattices in lithium niobate

V. Shandarov, K. Shandarova, E. Smirnov, State University of Control Systems and Radioelectronics, Tomsk, Russia; D. Kip, C. Rueter, Clausthal University of Technology, Clausthal-Zellerfeld, Germany

The linear and nonlinear discrete diffraction of light beams within one-dimensional modulated photorefractive photonic lattices optically induced in bulk lithium niobate crystals is experimentally investigated and discussed.

ROOM 13a

CD8-5-THU 11:30

Frequency doubling in femtosecond-written periodically-poled potassium titanyl phosphate waveguides

S. Campbell, R.R Thomson, D.P Hand, D.T Reid, A.K Kar, Heriot Watt University, Edinburgh, United Kingdom; C. Canalias, F. Laurell, Royal Institute of Technology, Stockholm, Sweden

Frequency doubling is demonstrated in femtosecond-laser-created single-mode waveguides written in a periodically-poled potassium titanyl phosphate crystal. Conversion efficiencies of 0.22%/W (0.02%/W) were obtained for first (third) order phasematching at 980nm (800nm).

CD8-6-THU 11:45

Modulatable and monolithic SHG waveguide based on PPLN and EO-phase-modulator

Y. Oki, T. Okaguchi, H. Watanabe, T. Okada, Kyushu University, Fukuoka, Japan

Novel waveguide SHG device for green laser was proposed and demonstrated. Simple concatenation of PPLN waveguides and two EO modulators can provide modulation of conversion efficiency. Numerical calculations and experimental results were mentioned.

ROOM 13b

CB12-5-THU 11:30

High power monolithic two mode DFB laser diodes for the generation of Terahertz radiation

A. Klehr, G. Erbert, J. Fricke, A. Knauer, Ferdinand-Braun-Institut, Berlin, Germany; R. Wilk, M. Walther, M. Koch, Institut für Hochfrequenztechnik, Braunschweig, Germany

We report on high power DFB lasers emitting simultaneously on two longitudinal modes. The mode spacing is 0.45nm corresponding to 0.12THz. We demonstrate THz emission by mixing the two line laser emission in a LTGaAsSb photomixer.

CB12-6-THU 11:45

Stable dual-wavelength operation of InGaAs diode laser with volume Bragg gratings

S.A Zolotovskaya, N. Daghestani, E.U Rafailov, University of Dundee, United Kingdom; G.B Venus, L.B Glebov, University of Central Florida, Orlando, USA

Stable dual-wavelength operation of InGaAs diode laser coupled with volume Bragg gratings have been demonstrated for continuous wave and gain-switching regimes. Spectral separation from 0.5 nm (0.16 THz) to 6.5 nm (2.05 THz) was achieved.

ROOM 14a

CE8-5-THU 11:30

Emission propertie of Nd^{3+} coupled to Si nanoclusters in silica matrix and characterization of planar waveguide

D. Breard, C. Dufour, F. Gourbilleau, R. Rizk, SIFCOM, Caen, France; J.L Doualan, P. Camy, CIRIL, Caen, France

Spectroscopic and waveguide properties of Nd^{3+} doped Si-SiO_2 layers grown by reactive magnetron sputtering were reported and analyzed through the efficient sensitizing role played by the Si-nc towards Nd ions.

CE8-6-THU 11:45

Epitaxial growth of Yb-doped YAG and YbAG PLD-films monitored in situ by reflection high energy electron diffraction

T. Gün, Y. Kuzminykh, K. Petermann, H. Scheife, G. Huber, University of Hamburg, Germany

We report on the 2-dimensional layer-by-layer growth of Yb-doped YAG- and YbAG-PLD-films on YAG monitored in situ by Reflection High Energy Electron Diffraction.

ROOM 14b

CF7-4-THU (Invited) 11:45

Attosecond real-time observation of electron tunnelling and multi-electron dynamics in atoms

M. Schultze, M. Lezius, H. Schröder, K.L Kompa, A.J. Verhoef, Max-Planck-Institut für Quantenoptik, Garching, Germany; M. Uiberacker, J. Rauschenberger, V. Yakovlev, Ludwig Maximilians University, Garching and Max-Planck-Institut für Quantenoptik, Garching, Germany; F. Krausz, Ludwig Maximilians University, Garching and Max-Planck-Institut für Quantenoptik, Garching, Germany and Vienna University of Technology, Vienna, Austria; M.F Kling, FOM-Instituut voor Atoom- en Molecuulfysica, Amsterdam, Netherlands; T. Uphues, U. Heinzmann, S. Hendel, Universität Bielefeld, Germany; N.M Kabachnik, Institute of Nuclear Physics, Moscow, Russia and Universität Bielefeld, Germany; M.J.J Vrakking, H.G Muller, FOM-Instituut voor Atoom- en Molecuulfysica, Amsterdam, Netherlands; U. Kleineberg, Ludwig Maximilians University, Garching, Germany; M. Drescher, Institut für Experimentalphysik, Hamburg, Germany

We report the first real-time observation of light-induced electron tunnelling. The process is found to deplete atomic bound states in sharp steps lasting several hundred attoseconds, providing a means of probing short-lived, transient states of atoms with potentially attosecond temporal resolution.

ROOM 21

IG6-4-THU 11:30

Transient growth and generalised stability analysis in semiconductor lasers

F. Papoff, G.L Oppo, University of Strathclyde, Glasgow, United Kingdom; G. D'Alessandro, University of Southampton, UK

We show that in models of semiconductor lasers transient growth may induce non-trivial dynamics even when the asymptotic solution is linearly stable.

IG6-5-THU 11:45

Polarization selection mechanisms of spatial patterns in broad-area vertical-cavity surface-emitting lasers

M. Schulz-Ruhtenberg, University of Münster, Münster, Germany; I. Babushkin, Max Born Institute, Berlin, Germany; T. Ackemann, University of Strathclyde, Glasgow, United Kingdom; N. Loiko, Institute of Physics of NASB, Minsk, Belarus; K.F Huang, Department of Electrophysics, National Chiao Tung, Hsinchu, Taiwan

Material anisotropies, the anisotropy of Fresnel reflections and wave coupling by transverse boundaries are shown to determine the polarization of the transverse structures in broad-area vertical-cavity surface-emitting lasers.

ROOM 22

CJ4-4-THU 11:30

Energy storage saturation in large mode area fiber lasers

R. Bello Doua, J. Saby, F. Salin, Eolite, Pessac, France; I.B Manek-Hönninger, J. Boullet, CELIA-PALA, Talence Cedex, France

We study the limitation in energy storage of LMA Yb-doped fibers and show the importance of the gain recovery time for high power nanosecond laser and amplifier design.

CJ4-5-THU 11:45

High efficiency 110W monolithic FBG tuned 2um fiber laser

G. Frith, J. Farroni, A. Carter, B. Samson, K. Tankala Nufern, East Granby, USA

We report a very robust and efficient single-mode fiber laser delivering 110W at 2050nm with 55% slope efficiency. The monolithic design uses an FBG tuned true-LMA Tm-doped silica fiber pumped at 793nm.

ROOM BOR1

CI5-4-THU 11:30

Multi-channel, deterministic, all-order DGD emulator

S.X Wang, A.M. Weiner, Purdue University, West Lafayette, USA

We describe a multi-channel, deterministic DGD emulator based on a high resolution Fourier pulse shaper. Arbitrary user-defined, frequency-dependent DGD profiles have been generated independently on four different wavelength channels and shown excellent agreement with theory.

CI5-5-THU 11:45

Implementation of in line first-order PMD monitoring in high-bit-rate links based on supercontinuum generation in normal dispersion regime

M. Tobia, S. Taccheo, Politecnico di Milano, Italy; K. Ennser, Institute of Advanced Telecommunications, University of Wales Swansea, United Kingdom; F. Curti, D. Forin, G. Tosi-Beleffi, M. Guglielminucci, ISCOM, Rome, Italy; A. Teixeira, Universidade de Aveiro, Portugal

All-optical in-line monitoring of cumulated PMD in high-bit rate transmission link is evaluated. A simple solution based on continuum generation in normal regime is proposed and demonstrated.

ROOM BOR2

IE5-4-THU (Invited) 11:30

Femtosecond imaging of the spin dynamics of $CoPt_3$ nanostructures

A. Laraoui, M. Vomir, E. Beaurepaire, J.Y Bigot, Institute of Physics and Chemistry of Materials of Strasbourg, Strasbourg, France

The ultrafast magnetization dynamics of individual $CoPt_3$ nanostructures and thin films is studied with femtosecond magneto-optical Kerr microscopy. It allows retrieving the spatial evolution of the magnetization when the samples are locally demagnetized or switched.

ROOM B11

CL2-5-THU 11:30

Reproductive death of cancer cells induced by femtosecond laser pulses

J. Thogersen, C.S Knudsen, A. Maetzke, S.J. Knak Jensen, S.R Keiding, Aarhus University, Aarhus, Denmark; J. Alsner, J. Overgaard, Aarhus University Hospital, Aarhus, Denmark

This study shows that ultraviolet, visible and infrared femtosecond laser pulses induce reproductive death of cancer cells. Multi-photon processes improve the efficacy and results in reproductive cell death at wavelengths, where single-photon processes are harmless.

CL2-6-THU 11:45

Laser-induced tissue oxygenation and new technology of elimination of localtissue hypoxia

M.M Asimov, A.N Rubinov, Academy of Sciences of Belarus, Minsk, Belarus; R.M Asimov, Applied Systems Ltd., Minsk, Belarus

New laser-optical technology for elimination of local tissue hypoxia is proposed. Unique possibility of selective and local increase the concentration of free molecular oxygen in tissue that enhances metabolism of cells is demonstrated.

ROOM 1

13:30 – 14:30

PL3 Session: CLEO®/Europe-IQEC 2007 Walther Memorial Plenary

Chair: *Ferenc Krausz, Max-Planck Institute of Quantum Optics, Garching, Germany*

This plenary session is dedicated to the memory of Professor Herbert Walther who died on the 22nd of July 2006 in Garching, Germany.

Renowned scientist and educator, Professor Walther chaired the World of Photonics Congress Steering Committee during 10 years leading it to a successful high scientific level congress. He was a director and Professor Emeritus at the Max-Planck-Institute of Quantum Optics in Garching, Germany.

Professor Herbert Walther

PL3-1-THU 13:30

Moderator and short introduction

F. Krausz, Max-Planck Institute of Quantum Optics, Garching, Germany

Introductory words to the Memorial session dedicated to Professor Herbert Walther.

PL3-2-THU 13:40

Herbert Walther, distinguished scientist and remarkable teacher

A. Schenzle, University of Munich, Germany

PL3-3-THU 14:05

Quantum entanglement: a vanishing resource

J. Eberly, University of Rochester, Rochester, NY, USA

Experts have said: "…it seems fair to say that the study of entanglement is in its infancy, … it is not entirely clear what … can be expected as a result of the study of quantitative measures of entanglement." In an ideal world, entanglement of small and isolated quantum systems would be stable and uncorrupted. But in reality no physical system can be isolated completely. We will discuss the qualitatively and quantitatively surprising effects that weak noise can have on entangled pairs of quantum objects, even when they relax individually very slowly.

NOTES

NOTES

ROOM 1

14:30 – 16:00
IF5 Session: Squeezing
Chair: Agnès Maître, Université Pierre et Marie Curie, Paris, France

IF5-1-THU 14:30
Measuring photon anti-bunching from sideband squeezing with continuous-variable techniques
N.B Grosse, T. Symul, P.K Lam, Australian National Univ., Canberra, Australia; M. Stobinska, Univ. Warszawski, Warsaw, Poland; T.C Ralph, Univ. of Queensland, St Lucia, Australia
We used a continuous-variable measurement scheme to experimentally probe the second-order temporal coherence function of quantum states of light. We prepared an appropriately displaced squeezed state, and were able to confirm strong photon anti-bunching.

IF5-2-THU 14:45
Multimode squeezing of frequency combs
G.J. Valcarcel, Universistat de Valencia, Burjassot, Spain; G. Patera, N. Treps, C. Fabre, Université Pierre et Marie Curie, Paris, France
The full multimode theory of a synchronously pumped type I optical parametric oscillator (SPOPO) is considered. In the degenerate case, significant squeezing is found, approaching threshold from below, for a set of frequency combs.

ROOM 4a

14:30 – 16:00
JSI3 Session: Novel devices and methods for photonic cryptography
Chair: Allan Shore, University of Wales, Bangor, United Kingdom

JSI3-1-THU 14:30
Enhancement of the encryption efficiency of chaotic communications based on all-optical feedback chaos generation by means of subcarrier modulation
A. Bogris, K.E Chlouverakis, A. Argyris, D. Syvridis, University of Athens, Greece
The significant enhancement of the encryption efficiency of a chaos communication system based on all-optical feedback accompanied by successful message decoding at the receiver is numerically demonstrated utilizing subcarrier modulation.

JSI3-2-THU 14:45
Synchronization of chaotic unidirectionally coupled multisection lasers
T. Perez, C.R Mirasso, Univ. of Balearic Islands, Palma de Mallorca, Spain; M. Radziunas, Weierstras Ins. fur Angewandte Analysis und Stochastik, Berlin, Germany; H.J Wünsche, F. Henneberger, Humboldt Univ., Berlin, Germany; I. Fischer, Vrije Univ., Brussels, Belgium
The synchronization properties of two coupled multisection lasers operating in the chaotic regime are investigated. The strong dependence on the pasive sections currents makes these devices ideal candidates for on/off phase shift keying encryption.

ROOM 5

14:30 – 16:00
IE6 Session: Pulse propagation and temporal solitons
Chair: Steven Cundiff, JILA, University of Colorado and NIST, Boulder, CO, USA

IE6-1-THU 14:30
Generalized envelope equation for studying sub-cycle dynamics and multiple-harmonic spectral broadening in highly nonlinear waveguides
G. Genty, Univ. of Technology, Helsinki, Finland; J. Dudley, B. Kibler, Ins. Femto-St Besançon, France; P. Kinsler, Blackett Lab., Imperial College, London, UK
We describe a new generalized envelope equation for modelling sub-cycle propagation in highly nonlinear waveguides. Comparison with Maxwell's equations explicitly demonstrates exact agreement for nonlinear optical shock dynamics on a sub-50 attosecond timescale.

IE6-2-THU 14:45
Self-steepening of ultrashort pulses without self-phase modulation
J. Moses, F.W Wise, Cornell University, Ithaca, USA; B.A Malomed, Tel Aviv University, Tel Aviv, Israel
A first optical manifestation of the Chen-Lee-Liu-type derivative nonlinear Schroedinger equation results in self-steepening of ultrashort pulses and shock formation without simultaneous self-phase modulation. Experiments verify theory.

ROOM 12

14:30 – 16:00
CC3 Session: Adaptive laser cavities and mirrors
Chair: Loïc Mager, Institut de Physique et de Chimie des Matériaux, Strasbourg, France

CC3-1-THU 14:30
Intracavity and extracavity adaptive mirror control
I.V Ilyina, T.Yu Cherezova, A.V Kudryashov, Moscow State University and Moscow State Open University, Moscow, Russia
The performance of laser beam formation by means of bimorph mirror is discussed. The control extracavity and intracavity algorithms are Gerchberg-Saxton extended for multimode beam and combination of genetic and hill-climbing algorithms correspondingly.

CC3-2-THU 14:45
Self-injection locking of a self-adaptive loop resonator
S. Richard, A. Brignon, Thales Research & Technology, Palaiseau, France
We present a Nd:YAG self-adaptive laser resonator with intracavity four-wave mixing delivering up to 350 mJ at 100 Hz with M^2 of 2. Self-injection seeding of this laser is demonstrated to control its optical frequency.

ROOM 13a

14:30 – 16:00
CA9 Session: Mid-infrared laser sources
Chair: Richard Moncorgé, University of Caen, France

CA9-1-THU 14:30
Femtosecond mid-infrared difference-frequency-generation tunable between 3.2 µm and 4.8 µm from a compact fiber source
C. Erny, K. Moutzouris, J. Biegert, U. Keller, ETH Zurich, Switzerland; D. Kühlke, Furtwangen University of Applied Sciences, Furtwangen, Germany; F. Adler, A. Leitenstorfer, University of Konstanz, Germany
We demonstrate a compact mid-infrared laser source tunable between 3.2 µm and 4.8 µm with an average output power of above 1 mW. The spectral bandwidth of up to 325 nm supports sub-60-fs pulses.

CA9-2-THU 14:45
Rapidly and random wavelength tuned mid-infrared laser
M. Yumoto, Y. Maeda, M. Yamashita, Tokyo University of Science, Chiba, Japan; N. Saito, T. Ogawa, S. Wada, RIKEN, Saitama, Japan
We have realized rapidly and random-access wavelength tuned mid-infrared laser from 5 to12 micrometer by difference-frequency generation. Real time absorption measurements with tunable mid-IR lasers have been demonstrated with mixture of water and acetone.

ROOM 13b

14:30 – 16:00
CB13 Session: Short-pulse generation
Chair: Jesper Mørk, Technical University of Denmark, Kgs. Lyngby, Denmark

CB13-1-THU 14:30
MIXSELs - a new class of ultrafast semiconductor lasers
D.J.H.C Maas, A.R Bellancourt, B. Rudin, M. Golling, H.J. Unold, T. Südmeyer, U. Keller, ETH Zurich, Switzerland
We demonstrate a passively modelocked VECSEL with an integrated saturable absorber, referred to as modelocked integrated external-cavity surface emitting laser (MIXSEL). MIXSELs will potentially enable the realization of robust, ultra-compact multi-GHz sources.

CB13-2-THU 14:45
Harmonically mode-locked semiconductor disk lasers with multi-GHz repetition rate
E.J Saarinen, A. Härkönen, R. Herda, S. Suomalainen, O.G Okhotnikov, L. Orsila, M. Guina, T. Hakulinen, Optoelectronics Research Centre, Tampere, Finland
The results present the first systematic study of multiple pulse formation, ordering and chirping in multi-GHz optically-pumped semiconductor disk lasers harmonically mode-locked with a semiconductor saturable absorber mirror.

ROOM 14a

14:30 – 16:00
Session: Rare-earth doped laser materials
Chair: Markus Pollnau, University of Twente, Enschede, Netherlands

CE9-1-THU 14:30
The site selectivity of the E-beam excitation of Eu ion in GaN
S. Tafon Penn, V. Dierolf, Z. Fleischman, Lehigh University, Bethlehem, USA
Using site-selective cathodoluminescence spectroscopy under saturation conditions we identified two different excitation pathways for the excitation of Eu ions in GaN by energetic electrons and explain the low efficiency for the majority of the ions

CE9-2-THU 14:45
A novel bismuth-doped soda-lime-silicate glass as ultra-broadband near-infrared gain media
Y. Arai, T. Suzuki, Y. Ohishi, Toyota Technological Institute, Nagoya, Japan; S. Morimoto, Suranaree University of Technology, Nakhon Ratchasima, Japan
A novel colorless bismuth-doped soda-lime-silicate glass was developed. The fluorescence emission band with full-bandwidth-half-maximum as wide as 600 nm, which is the widest bandwidth from Bi-doped glasses ever reported, was obtained.

ROOM 14b

14:30 – 16:00
CG6 Session: Ultra high power laser systems
Chair: *Jean Paul Chambaret, ENSTA, Paris, France*

CG6-1-THU 14:30
Polaris 200TW phased-array grating compressor
M. Hornung, R. Bödefeld, M. Siebold, M. Schnepp, S. Podleska, M.C Kaluza, J. Hein, Friedrich-Schiller University, Jena, Germany; R. Sauerbrey, Forschungszentrum Rossendorf, Dresden, Germany
We will present our 200TW Treacy-type pulse compressor. 40TW pulses are recompressed. An improved alignment setup for the phased array grating is introduced. Furthermore pulse-length and complex amplitude measurements are shown.

CG6-2-THU 14:45
0.5-PW 45-fs OPCPA laser system
I.V Yakovlev, G.I Freidman, V.N Ginzburg, E.V Katin, E.A Khazanov, A.V Kirsanov, V.V Lozhkarev, G.A Luchinin, A.N Mal'shakov, M.A Martyanov, O.V Palashov, A.K Poteomkin, A.M Sergeev, A.A Shaykin, Institute of Applied Physics of Russian Academy of Science, Nizhny, Novgorod, Russia
0.5 PW peak power laboratory scale OPCPA laser system based on KD*P crystals has been created. 24 J energy of compressed pulses at 43 fs pulse duration has been achieved experimentally.

ROOM 21

14:30 – 16:00
CM1 Session: Macroprocessing
Chair: *Costas Grigoropoulos, University of California, Berkeley, USA*

CM1-1-THU (Invited) 14:30
Modelling of laser surface alloying and dispersing of ceramics
M. Rohde, Forschungszentrum Karlsruhe, Institute for Materials Research I, Eggenstein-Leopoldshafen, Germany
Results of numerical simulations will be presented on the laser-solid interaction during surface modification of ceramics by second phase particles. The heat and mass transport as well as phase changes are considered.

ROOM 22

14:30 – 16:00
CJ5 Session: Microstructured fibres and visible sources
Chair: *Jens Limpert, Friedrich-Schiller University, Jena, Germany*

CJ5-1-THU 14:30
GaN-diode pumped Pr^{3+}:ZBLAN fiber-lasers for the visible wavelength range
U. Weichmann, J. Baier, J. Bengoechea, H. Moench, Philips Technologie GmbH Forschungslaboratorien, Aachen, Germany
GaN-diode-pumping of Pr:ZBLAN fiber lasers is presented. Laser action was observed at red, cyan and green wavelengths.

CJ5-2-THU 14:45
High-power upconversion fibre lasers for the visible wavelength range
U. Weichmann, J. Baier, G. Heusler, H. Moench, Philips Technologie GmbH Forschungslaboratorien, Aachen, Germany
Diode-pumped upconversion lasers are promising candidates for solid-state lasers at green wavelengths. Using Er-doped ZBLAN-fibers, the limits of conversion efficiency, the temperature sensitivity of the device and ways towards high-power operation are explored.

ROOM BOR1

14:30 – 15:45
CI6 Session: Optical signal generation
Chair: *Liam Barry, Dublin City University, Ireland*

CI6-1-THU 14:30
Moving towards 100 GHz from a passively mode-locked Er:Yb:glass laser at 1.5 micron
A.E.H Oehler, U. Keller S.C Zeller T. Südmeyer ETH Zurich, Switzerland; K.J Weingarten ,Time-Bandwidth Products, Zurich, Switzerland
An ultrafast Er:Yb:glass laser generates a record high repetition rate of 90GHz and initial results at 99GHz. Its compactness and stability are attractive for future high-speed data transmission systems in the 1.5 micrometer telecom window.

CI6-2-THU 14:45
Flat 11 phase-locked channels optical comb generator using low-drive voltage modulators
T. Healy, A.D Ellis, F.C.G Gunning, Tyndall National Ins., UCC, Cork, Ireland; J. Bull, Versawave Technologies Inc., Burnaby, Canada
We present an 11-channel comb generator with channel spacing of 42.6GHz, flatness better than 2dB and side-mode suppression better than 12dB using low-drive voltage electro-optic polarisation modulators, for high information spectral density systems.

ROOM BOR2

14:30 – 16:00
ID1 Session: Optics at the micro- and nano-scale
Chair: *Martial Ducloy, Laboratoire de Physique des Lasers, Paris, France*

ID1-1-THU (Keynote) 14:30
The new high-Q physics: photonic clocks and back-action cooling on a chip
K.V Vahala, Caltech, Pasadena, CA, USA
The union of optical microcavities and micro-mechanical resonators in certain devices has enabled radiation-pressure cooling to Kelvin temperatures and realization of new micromechanical oscillators. These results, their importance and future prospects are reviewed.

ROOM B11

14:30 – 16:00
CL3 Session: Tissue optics
Chair: *Adrian Podoleanu, Univ. of Kent, Canterbury, UK*

CL3-1-THU (Invited) 14:30
Scattering phenomena in biomedical applications
A. Dogariu, CREOL, University of Central Florida, Orlando, USA
We will present a review of optical phenomena associated with light scattering and propagation in heterogeneous media such as tissue and associated approaches for optical sensing and diagnostics.

NOTES

ROOM 1

IF5-3-THU 15:00

Squeezed light at 795 nm using periodically poled KTP

G. Hétet, K. Pilypas B. Buchler O. Glöckl, H-A.. Bachor, ACQAO-ANU, ACT Canberra, Australia; C. Harb, ADFA, Canberra, Australia

Our research aims at storing continuous variable information onto atoms. In this talk we will present our work on the generation of 5 dB of squeezing at Rubidium wavelength using an Optical parametric Amplifier.

IF5-4-THU 15:15

Polarization squeezing with photonic crystal fibers

J. Milanovic, A. Huck, J. Joel, Ch. Marquardt, U.L Andersen, G. Leuchs, University of Erlangen-Nuremberg, Erlangen, Germany

We present Photonic Crystal Fibers as an efficient polarization squeezing source. Using these highly nonlinear fibers polarization squeezing of -3.3 +/- 0.3 dB was measured and an increased state purity was observed.

ROOM 4a

JSI3-3-THU 15:00

Observation of nonlinear dynamics and transition to chaos in photonic integrated circuits

M. Yousefi, S. Beri, Y. Barbarin, M. Smit, E. Bente, COBRA, TU Eindhoven, Netherlands; D. Lenstra, Technical University, Delft, Netherlands

We demonstrate a period doubling route in and out of chaos in a photonic integrated circuit using a novel method of analysis, which relies on statistical information.

JSI3-4-THU 15:15

Cryptographic system by using Fourier holograms

A.S. Suto, CoOptik, Budapest, Hungary

A Fourier holographic system including phase coding is a potential cryptography system. Using Fourier power spectrum distribution in hologram plane, it is possible to design code set taking into account covered energy by code position.

ROOM 5

IE6-3-THU 15:00

Interactions and transformations of dissipative optical bullets

N. Akhmediev, The Australian National University, Canberra, Australia; J.M Soto-Crespo, Instituto de Optica, CSIC, Madrid, Spain; Ph. Grelu, Institut Carnot de Bourgogne, U.M.R. 5209 C.N.R.S, Dijon, France; N. Devine, Optical Sciences Group, Research School of Physical Sciences and Engineering, Canberra, Australia

The interaction of two optical bullets in 3-D dissipative systems can allow the formation of double bullet complexes (DBC). DBCs exist in the form of rotating structures, which can show an oscillating behavior. Transformations between various forms of DBC occur as bifurcations.

IE6-4-THU 15:15

On the possibility of observing bound soliton pairs in a wave-breaking-free mode locked laser

C. Chedot, A. Hideur, G. Martel, UMR6614-CORIA, Saint Etienne du Rouvray, France; Ph. Grelu, UMR 5027-LPUB, Dijon, France

By numerically solving the coupled laser Ginzburg-Landau equations in a normal dispersion regime, we explain the formation of stable bound soliton pairs observed in a self-similar Yb-doped fiber laser.

ROOM 12

CC3-3-THU 15:00

Adaptive interferometer for detection of mechanical vibrations based on dynamic population grating in Er-doped optical fiber

S. Stepanov, E. Hernandez Hernandez, F. Perez Cota, D. Garcia Casillas, CICESE, Ensenada, Mexico; M. Plata Sanchez, P. Rodriguez Montero, INAOE, Puebla, Mexico

Dynamic population gratings in Er-doped optical fibers with saturable absorption/gain recorded by mW-scale cw laser power from spectral range 1480-1570nm are proposed as promising substitute of photorefractive crystals in adaptive interferometry applications.

CC3-4-THU 15:15

A solid-state phase conjugate mirror for space Lidar systems

A. Brignon, S. Richard, Thales Research & Technology, Palaiseau, France; M. Georges, J.Y Plesseria, T. Thibert, P.A Blanche, Centre Spatial de Liège, Angleur-Liège, Belgium; A. Gusarov, F. Berghmans, Studiecentrum voor Kernenergie - Centre d'Etude de l'Energie Nucléaire, Mol, Belgium; Y. Lien, European Space Agency, Noordwijk, Netherlands

We present a reliable solid-state phase conjugate mirror operating at 100Hz repetition rate with 200mJ incident pulse energy. Vacuum/thermal and radiation tests have been conducted showing that the device is compatible with space environment.

ROOM 13a

CA9-3-THU 15:00

Compact source based on a microchip laser and periodically poled lithium niobate

S.M Klimentov, A.V Kir'yanov, General Physics Institute RAS, Moscow, Russia; I.V Mel'nikov, Optolink Ltd., Moscow, Russia; P.E Powers, University of Dayton, USA

We present a sub-nanosecond source capable of generating light ranged from blue- to mid-IR wavelengths. This is based on optical parametric generation that occurs inside a single crystal of PPLN driven by a Nd:YAG microchip laser and offers diffraction-limited output.

CA9-4-THU 15:15

Broadly tunable Cr:ZnSe laser

P. Koranda, H. Jelinkova, J. Sulc, M. Nemec, Czech Technical University, Prague, Czech Republic; M.E Doroshenko, T.T Basiev, General Physics Institute, Moscow, Russia; V.K Komar, M.B Kosmyna, Institute for Single Crystals, Kharkov, Ukraine

Broadly tunable ROOM temperature laser with Cr:ZnSe prism as active medium and tuning element was constructed. The maximal output energy was 20 mJ. The generated radiation was tunable from 200 to 2750 nm.

ROOM 13b

CB13-3-THU 15:00

Optically pumped semiconductor disk laser with graded and step indices for cw and ultrashort pulse generation

F. Saas, V. Talalaev, J.W Tomm, G. Steinmeyer, U. Griebner, Max-Born-Institute, Berlin, Germany; M. Zorn, M. Weyers, Ferdinand-Braun-Institute, Berlin, Germany

Laser performance of step-index and graded-index InGaAs-QW-gain structures for optically-pumped semiconductor disk lasers @ 1040nm was studied. The graded-index structure exhibited better cw laser characteristics, whereas the step-index structure delivered shorter pulses of 590fs.

CB13-4-THU 15:15

Characterisation of a low Jitter 2-ps passively mode-locked semiconductor quantum-dot laser by RF linewidth study

F. Kéfélian, S. O'Donoghue, Tyndall National Institute and University College Cork Lee Maltings, Cork, Ireland; M.T Todaro, J. McInerney, University College Cork Lee Maltings, Cork, Ireland; G. Huyet, Tyndall National Institute, Cork, Ireland

We investigate the timing jitter of a 19.4-GHz quantum-dots passively mode-locked laser using a new method based on RF linewidth. The possibility of obtaining 1.9-ps pulses with a pulse-to-pulse timing jitter of 6.5-fs/cycle is demonstrated.

ROOM 14a

CE9-3-THU 15:00

Upconversion channels in Er:ZBLALiP: a multicolour, microspherical light source for microphotonics

D.G O'Shea, S. Nic Chormaic, University College and Tyndall National Institute, Cork, Ireland; J.M Ward, B.J Shortt, Cork Institute of Technology and Tyndall National Institute, Cork, Ireland

We present results on the upconversion processes in a novel erbium-doped fluoride glass, ZBLALiP. We have identified thirteen upconversion processes ranging from the ultra-violet to the infra-red, in addition to C-band lasing.

CE9-4-THU 15:15

Thermally induced optical bistability in Yb^{3+}-Er^{3+} co-doped phosphate glass microspheres at room temperature

J.M Ward, B.J Shortt, Cork Institute of Technology and Tyndall National Institute, Cork, Ireland; D.G O'Shea, S. Nic Chormaic, University College and Tyndall National Institute, Cork, Ireland

In this work we will present evidence of optical bistability effects for Er-Yb co-doped IOG-2 glass microspheres. Both chromatic and intensity optical bistability has been observed, for the first time, in a single material.

ROOM 14b

CG6-3-THU 15:00

Development of 10 PW OPCPA capability on the Vulcan laser

I.O Musgrave, T. Winstone, O. Checklov, Y. Tang, J. Collier, P. Matousek, C. Hernandez-Gomez, I. Ross, CCLRC, Oxfordshire, UK

We present the progress made in developing 10PW OPCPA capability for the Vulcan laser to produce pulses with focused intensities $>10^{23}$ W/cm^2. This power level will be delivered by generating pulses with >300J in 30fs.

CG6-4-THU 15:15

Experimental results on ultra-broadband OPCPA

L. Cardoso, G. Figueira, J. Wemans, H. Pires, Instituto Superior Tecnico, Lisbon, Portugal

Angular dispersion is experimentally applied to the signal beam in an Optical Parametric Chirped Pulse Amplification setup. The phase matching conditions are then fulfilled over several times the conventional bandwidth.

ROOM 21

CM1-2-THU 15:00

A 3D model of residual stress generation during laser cladding

A. Yanez, M.J Tobar, J.M Amado, A. Suarez-Diaz, J.C Alvarez, Univ. da Coruna, Ferrol, Spain

A significant issue concerning the optimization of laser cladding is the generation of residual stresses which can lead to distortion or cracks. A 3D finite element modelling is presented and compared to experimental results

CM1-3-THU 15:15

Model based optimization criteria for the generation of deep compressive residual stresses in high elastic limit alloys by laser shock processing

M. Morales, J.L. Ocana, C. Molpeceres, R. Pecharroman, J.A Porro, Universidad Politecnica de Madrid, Spain

A model based systematization of optimization criteria for LSP is presented along with practical results on its application to high elastic limit alloys, showing induced residual stresses fields and corresponding results on mechanical properties improvement.

ROOM 22

CJ5-3-THU (Invited) 15:00

Microstructured fibres and applications

P. Roy, L. Lavoute, S. Février, J.L Auguste, J.M Blondy, P. Leproux, D. Gaponov, M. Devautour, A. Roy Xlim, Limoges, France; L. Bigot, G. Bouwmans, V. Pureur, PhLAM, Lille, France

We investigate several new promising optical fibre designs for high power fibre lasers and amplifiers. Single-mode propagation is possible in a large and highly rare-earth-doped fibre core. Resonant cladding advantages are exploited.

ROOM BOR1

CI6-3-THU 15:00

UWB signal generation by incoherent pulse shaping

V. Torres-Company, J. Lancis, University Jaume I, Castello de la Plana, Spain; P. Andrés, Universidad Valencia, Burjasot, Spain

An all-incoherent technique for photonic generation of UWB signals is proposed and numerically demonstrated. Apart from being reconfigurable and tunable, it is strong against environmental fluctuations and overcome the low-bandwidth limit.

CI6-4-THU 15:15

Performance evaluation of a compact 10-GHz pulse compressor based on a highly nonlinear Bismuth-Oxide fibre

S. Asimakis, M.A.F Roelens, T.T Ng, P. Petropoulos, D.J Richardson, University of Southampton, United Kingdom; G. Meloni, A. Bogoni, L. Poti, Integrated Research Centre for Photonics Networks and Technologies, Pisa, Italy

A 2-m long bismuth-oxide fibre is used to facilitate 5-fold compression of 2ps pulses at a repetition rate of 10GHz. The compressed pulses are characterised both in intensity and phase using a linear FROG technique.

ROOM B11

CL3-2-THU 15:00

Influence of scattering anisotropy on reflected diffuse light probed by diffusing-wave spectroscopy

R. Carminati, R. Pierrat, Ecole Centrale Paris, CNRS, Chatenay-Malabry, France; N. Ben Braham, L. Rojas-Ochoa, F. Scheffold, University of Fribourg, Switzerland

We study the diffuse reflection of light on scattering media, probed by diffusing-wave spectroscopy. We show that improved models allow to go beyond the diffusion approximation and compare theoretical results to measurements on model systems

CL3-3-THU 15:15

Automation of cancer diagnosis based on colorimetric transformation of cutaneous reflectance spectra

E. Borisova, L. Avramov, Institute of Electronics, Sofia, Bulgaria; P. Troyanova, National Oncological Diagnostic Center, Sofia, Bulgaria; P. Pavlova, Technical University - Sofia, Plovdiv Branch, Plovdiv and Institute of Electronics, Sofia, Bulgaria

Method for automatic estimation of different skin pathologies, including malignant melanoma, using reflectance spectroscopy is developed. Colour features from the spectra obtained are calculated and applied for benign and malignant lesions differentiation with high diagnostic accuracy.

NOTES

THURSDAY / ORAL

ROOM 1

IF5-5-THU 15:30

Quantum dynamics of polarisation squeezing in optical fibres

J.F. Corney, P.D. Drummond, The University of Queensland, Brisbane, Australia; U.L Andersen, J. Heersink, R. Dong, G. Leuchs, University Erlangen-Nurnberg, Erlangen, Germany

Comparing stochastic simulations and experimental measurements, we study the quantum dynamics of polarisation squeezing in optical fibres. Squeezing of -6.6 dB is measured, with Raman effects limiting squeezing for higher pulse energies and longer fibres.

IF5-6-THU 15:45

Measurement of optical cross-Kerr nonlinearity induced by a few photons in a photonic crystal fiber

N. Matsuda, Y. Mitsumori, H. Kosaka, K. Edamatsu, Tohoku University, Sendai and CREST, Kawaguchi, Japan; R. Shimizu, Tohoku University, Sendai, Japan

Utilization of weak cross-Kerr interaction will be a key to the photonic quantum information processing. We propose a novel technique to measure tiny cross-Kerr phase shifts and demonstrate it using a photonic crystal fiber.

ROOM 4a

JSI3-5-THU 15:30

A quantum key distribution network: integrated design and prototypical implementation

M. Peev, Th. Länger, Austrian Research Centers GmbH – ARC, Vienna, Austria; N. Lütkenhaus, Institute of Quantum Computing, Univ. of Waterloo, Canada; L. Salvail, BRICS, Univ.of Aarhus, Denmark; R. Alleaume, Ecole Nationale Supérieure des Télécommunications, Paris, France

We present the design of a quantum key distribution network developed within the EU project SECOQC. We further outline the current implementation status of the SECOQC prototype, to be built in Vienna and Lower Austria.

JSI3-6-THU 15:45

Secure quantum key distribution over 40 km of fiber with a pulsed heralded single photon source

A. Soujaeff, S. Takeuchi, Research Institute for Electronic Science, Hokkaido Univ. and CREST, Sapporo, Japan; K. Sasaki, Research Institute for Electronic Science, Hokkaido Univ., Sapporo, Japan; M. Matsui, T. Hasegawa, T. Nishioka, T. Tsurumaru, Mitsubishi Electric Corporation, Information Technology R&D Center, Ofuna, Japan

Using a pulsed heralded single photon source emitting at 1550 nm, we performed quantum key distribution over 40 km of fiber with unconditional security. We will also report latest experimental progress over longer distance.

ROOM 5

IE6-5-THU 15:30

Temporal soliton molecules: experimentally determined phase profiles

A. Hause, H. Hartwig, M. Böhm, F. Mitschke, University Rostock, Germany

The binding mechanism of soliton molecules in dispersion managed fibers depends on phase dynamics. Measurement of phase structure with FROG fails for these complex shapes; we demonstrate that VAMPIRE is successful.

IE6-6-THU 15:45

Discrete-continuous spatio-temporal light localization in nonlinear fiber arrays

F. Eilenberger, T. Pertsch, A. Szameit, S. Nolte, F. Lederer, Friedrich Schiller University, Jena, Germany; U. Röpke, J. Kobelke, K. Schuster, H. Bartelt, IPHT Jena, Germany; A. Tünnermann, Fraunhofer Institute, Jena, Germany

We study experimentally and theoretically the formation of spatial and spatio-temporal localization in hexagonal arrays of mutually coupled optical fibers.

ROOM 12

CC3-5-THU (Invited) 15:30

Ultra-fast phase conjugate laser system

K. Nawata, J. Hagiwara, T. Omatsu, Chiba University, Chiba, Japan

We present power scalability of a pico-second Nd doped vanadate bounce amplifier with a photorefractive phase conjugate mirror. We also mention design issues of the phase conjugate mirror in ultra-fast regime.

ROOM 13a

CA9-5-THU 15:30

Mid-infrared ZnSe:Cr diodes based on optically enhanced impact ionization process

J. Jaeck, R. Haidar, E. Rosencher, ONERA, Palaiseau, France; J.L Pelouard, S. Colin, N. Bardou, S.A Said Hassani, F. Pardo, CNRS/LPN, Marcoussis, France

We report ROOM-temperature mid-infrared electroluminescence in ZnSe:Cr. The diode runs in an avalanche regime dominated by impact ionization processes. Photoconductivity studies show that optical seeding may enhance the electro-optical conversion efficiency.

CA9-6-THU 15:45

1-W novel Tm:LiLuF laser with wide tunability around 1.93 µm

N. Coluccelli, G. Galzerano, P. Laporta, Politecnico di Milano, Milan, Italy; F. Cornacchia, D. Parisi, M. Tonelli, Università di Pisa, Italy

Continuous wave laser action was demonstrated in a novel Tm:LiLuF active crystal. Maximum output power in excess of 1 W and tunability wavelength range from 1828 nm to 2040 nm were obtained.

ROOM 13b

CB13-5-THU 15:30

Effect of spectrum filtering on the performances of Quantum-Dash mode-locked lasers emitting at 1.55 µm

K. Merghem, C. Gosset, A. Martinez, G. Moreau, G. Aubin, A. Ramdane, C.N.R.S, Marcoussis, France; F. Lelarge, Alcatel-Thales III-V Laboratory, Marcoussis, France

After specific spectrum filtering, 3.5 ps pulses at ~40GHz are demonstrated using one-section self pulsating quantum dash mode locked lasers emitting at 1.55 micrometer. A 17dB extinction ratio is evidenced.

CB13-6-THU 15:45

Passive mode-locking of lasers by crossed-polarization gain modulation

J. Javaloyes, J. Mulet, S. Balle, Institut Mediterrani d'Estudis Avancats, Esporles, Spain; M. Giudici, Institut Non Linéaire de Nice, Valbonne, France

We report on a novel approach exploiting the polarization of light for inducing passive mode-locking of lasers. Stable pulsation with repetition rates in the GHz range and pulsewidths of few tens of picoseconds are demonstrated.

ROOM 14a

CE9-5-THU (Invited) 15:30

Rare-earth-ion-doped sesquioxide laser materials

K. Petermann, Institute of Laser-Physics, University of Hamburg, Germany

Crystal growth, spectroscopy, and laser experiments of rare-earth-doped sesquioxides will be reported. It turns out that $Yb:Sc_2O_3$ and especially $Yb:Lu_2O_3$ are most attractive for high power thin-disc lasers.

ROOM 14b

CG6-5-THU 15:30

Design of pump beam homogenizers for Petawatt class Ti:Sapphire systems using MIRO code

F. Canova, J.P Chambaret, LOA - Ecole Polytechnique, Palaiseau, France

We have studied and designed pump beam homogenizer for PW class Ti:Sapphire systems, using MIRO propagation code. The performances of diffractive systems used to smoothen the spatial and temporal profiles are evaluated through extensive simulation.

CG6-6-THU 15:45

Picosecond to nanosecond pulse shaping via a chirp-transform scaling technique

N. Forget, T. Oksenhendler, D. Kaplan, P. Tournois, Fastlite, Palaiseau, France; C. Le Blanc, LULI, Palaiseau, France

We demonstrate a chirp-transform scaling technique to increase the spectral resolution of a pulse shaper by three orders of magnitude. Using this technique quasi-monochromatic pulses at 532nm are shaped on a picosecond time-scale.

ROOM 21

CM1-4-THU 15:30

Poly-crystallization of hydroxyapatite coatings deposited by PLD method at ROOM temperature

M. Katto, K. Ishibashi, A. Yokotani, S. Kubodera, University of Miyazaki, Miyazaki, Japan; T. Nakayama, H. Katayama Kinki University, Higashi-Osaka, Japan; M. Tsukamoto, N. Abe, JWRI, Osaka University, Ibaraki, Japan; M. Fujita, Institute of Laser Technology, Suita, Japan

Bio-compatible hydroxyapatite coatings were deposited by the pulsed laser deposition method. We experimentally found that the crystallinity of the coatings was affected by the velocities of the ablated species.

CM1-5-THU 15:45

Diagnosis and simulation of high speed drilling

W. Schulz, Fraunhofer Institut Lasertechnik, Aachen, Germany; T.L Trippe, E.U Eppelt, Lehrstuhl für Lasertechnik, Aachen, Germany

Laser drilling is a thermal ablation process being about to be widely applied. However, there are gaps in understanding the dynamics of the process, especially the resulting drilling quality. The interaction of the underlying mechanisms and quality features are discussed.

ROOM 22

CJ5-4-THU 15:30

High power polarization maintaining supercontinuum source

F.D Nielsen, C.L Thomsen, Koheras A/S, Birkeroed, Denmark; M.O Pedersen, T.V Andersen, Y. Qian, L. Leick, C.F Pedersen, NKT Research and Innovation A/S, Birkeroed, Denmark; K.P Hansen, Crystal Fibre A/S, Birkeroed, Denmark

In this paper we present a fiber based turn-key high-power polarization-maintaining supercontinuum source which covers the wavelength range from 460 to above 200 nm with a high power spectral density.

CJ5-5-THU 15:45

Q-switched Nd-doped depressed clad hollow optical fiber laser operating at 927 nm and its frequency doubling to blue light

J.K Sahu, J. Kim, Y. Jeong, J. Nilsson, University of Southampton, United Kingdom

A Q-switched, cladding-pumped, Nd:Al-doped fiber laser producing 1.3 kW of peak power at 927 nm with a diffraction-limited output was frequency-doubled in BiB_3O_6 crystal to generate 50 mW of average power at 463.5 nm.

ROOM BOR1

CI6-5-THU 15:30

Self-adaptive WDM transmitter operating under temporary ASE-injection

N. Dubreuil, G. Roosen, G. Pauliat, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France; P. Boucard, J.L Clavel, F. Verluise, Kylia, Paris, France

We present a transmitter with a memory effect of the operating wavelength set under temporary optical injection using a filtered ASE-fibre source. A 12 nm tuning range is reported with a SMSR of 35 dB.

ROOM BOR2

ID1-2-THU 15:30

Atom-surface van der Waals interaction in the nanometric range

A. Laliotis, I. Hamdi, M. Fichet, I. Maurin, P. Todorov, G. Dutier, M.P Gorza, S.M Saltiel, D. Bloch, M. Ducloy, Université Paris-13, Villetaneuse, France

The van der Waals atom-surface attraction should cover numerous orders of magnitudes in the interaction energy. We explore its spatial dependence down to ~15 nm for excited atoms that provide record energy shifts.

ID1-3-THU 15:45

Sub-doppler spectroscopy of a vapour confined in an extremely thin cell: saturation effects and interplay between coherent resonances and incoherent

C. Andreeva, S. Cartaleva, L. Petrov, Ins. of Electronics, BAS, Sofia, Bulgaria; S.M Saltiel, Sofia Univ., Sofia, Bulgaria; D. Sarkisyan, T. Varzhapetyan, Ins. for Physical Research, NAS of Armenia, Ashatarak-2, Armenia; D. Bloch, M. Ducloy, Univ. Paris-13, Villetaneuse, France

In a vapour nanocell, sub-Doppler spectra are observed because the contribution of slow atoms is relatively enhanced as due to transient processes, and because of a (Dicke-type) transient linear coherent response. These competing effects partly survive under saturation.

ROOM B11

CL3-4-THU 15:30

Two photon microscopy in millimeter scale for investigation of skin damage from laser irradiation

C. Spitz, A. Garz, R. Menzel, University of Potsdam, Germany; A. Krink, H.P Berlien, Elisabeth Klinik, Berlin, Germany

Two photon microscopy of tissue with images of several millimeter sizes allows to connect the signals to locally varying diseases or tissue damage which is generated by erbium laser irradiation in our example.

CL3-3-THU 15:45

Noninvasive monitoring of blood hemoglobin derivatives by spatially localized diffuse scattering spectroscopy

V.A Saetchnikov, E.A Tcherniavskaia, Belarusian State University, Minsk, Belarus; G. Schweiger, Ruhr, University Bochum/LAT, Bochum, Germany

A method of noninvasive monitoring of blood hemoglobin derivatives based on spatially localized optical diffuse scattering spectroscopy has been developed. Several schemes of compact fiber optical sensor for different applications have been realized.

NOTES

ROOM 1

16:30 – 18:00

IF6 Session: Quantum optics with single emitters

***Chair:** Gioavanna Morigi, Univ. Autonoma de Barcelona, Spain*

IF6-1-THU 16:30

Strong light extinction by a single molecule

J. Hwang, G.C Wrigge, I. Gerhardt, V. Sandoghdar, ETH Zurich, Switzerland

We present cryogenic experiments where the direct signature of a single molecule on an incident laser beam is demonstrated. Strong extinction larger than 10% is achieved in near and far-field geometries.

IF6-2-THU 16:45

Spontaneous emission of single colloidal CdSe nanocrystals close to a metallic interface

A. Maître, C. Vion, C. Barthou, P. Benalloul, J.M Frigerio, Ins. des NanoSciences de Paris, France; P. Spinicelli, L. Coolen J.-P. Hermier, Lab. Kastler Brossel, Paris, France

Spontaneous emission of a single CdSe nanocrystal close to a metallic interface is explored demonstrating enhancement and inhibition of emission depending on the emitters surroundings and, very close to the interface, on surfaces plasmons.

ROOM 4a

16:30 – 18:00

IC6 Session: Quantum cryptography

***Chair:** John Rarity, University of Bristol, United Kingdom*

IC6-1-THU 16:30

Experimental demonstration of free-space decoy-state quantum key distribution over 144 km

T. Schmitt-Manderbach, H. Weier, M. Fürst, H. Weinfurter, Ludwig-Maximilians-Univ., Munich, Germany; J. Rarity, Univ. of Bristol, UK; R. Ursin, Uni. of Vienna, Austria; J. Perdigues, Z. Sodnik, ESA, Noordwijk, Netherlands; F. Tiefenbacher, Th. Scheidl, A. Zeilinger, Univ. Wien and Austrian Acad. of Sciences, Wien, Austria; Ch. Kurtsiefer, National Univ. of Singapore, Singapore

We report on successful experimental quantum key distribution over a 144 km free-space link using weak coherent laser pulses and decoy state analysis. This outdoor experiment demonstrates the feasibility of global key distribution via satellites.

IC6-2-THU 16:45

Afterpulsing-free 80MHz single-photon detection at 1550 nm using an InGaAs/InP avalanche photodiode operated with sinusoidal gating

N. Namekata, S. Inoue, Nihon University, Tokyo, Japan

We demonstrated afterpulsing-free 80MHz single-photon detection at 1550 nm using an InGaAs/InP avalanche photodiode operated with sinusoidal gating. Detection efficiency was 11% with dark count probability of 7.3×10^{-6} and afterpulsing probability of 0.5%.

ROOM 4b

16:30 – 18:00

ID2 Session: High precision metrology

***Chair:** Marcis Auzinsh, University of Latvia, Riga, Latvia*

ID2-1-THU 16:30

Absolute frequency measurement of $^{115}In^{+}$ clock transition

Y.H Wang, Y.N Zhao, J. Zhang, Z.H Lu, L.J Wang, A. Stejskal, University of Erlangen-Nuremberg, Erlangen, Germany; R. Dumke, Nanyang Technological University, Singapore, Singapore; Th. Becker, H. Walther, Max Planck Institute of Quantum Optics, Garching, Germany

We report on a new absolute frequency measurement of the clock transition in a single Indium ion. A narrow linewidth spectrum of 43 Hz for the transition is resolved.

ID2-2-THU 16:45

Towards optical frequency metrology of the electron-to-proton mass ratio

F. Bielsa, A. Douillet, T. Valenzuela, J.Ph Karr, L. Hilico, Lab. Kastler-Brossel, Paris, France; V. Korobov, Bogoliubov Lab., Joint Ins. for Nuclear Research, Dubna, Russia

Recent progress in a two-photon vibrational spectroscopy experiment on the hydrogen molecular ion aiming at a new determination of the electron-to-proton mass ratio is reported. Advances in the calculation of theoretical spectra are also presented.

ROOM 5

16:30 – 18:00

IE7 Session: Spatial solitons

***Chair:** Nail Akhmediev, National University, Canberra, Australia*

IE7-1-THU 16:30

Photonic systems acting as magnetic solids

A. Ferrando, Universidad de Valencia, Spain; P. Fernandez de Cordoba, M. Zacarés, Universidad Politecnica de Valencia, Spain; M.A Garcia-March, Universidad de Castilla-La Mancha, Valencia, Spain

We numerically and analytically demonstrate the equivalence between soliton crystals and magnetic systems. We show how to obtain the equivalent of a solid with antiferromagnetic properties by means of light supported by a photonic crystal.

IE7-2-THU 16:45

Nonlocal bi-color vector solitons in liquid crystals

A. Alberucci, G. Assanto, M. Peccianti, University Roma Tre, Rome, Italy; A. Dyadyusha, M. Kaczmarek, University of Southampton, United Kingdom

We investigate experimentally and theoretically dual-frequency spatial solitons in non local birefringent reorientational media and report their first observations, including walk-off and power-dependent breathing, in liquid crystals.

ROOM 12

16:30 – 18:00

CC4 Session: Photorefractives and related materials

***Chair:** Yasuo Tomita, University of Tokyo, Japan*

CC4-1-THU 16:30

Two-photon induced refractive index change in quantum dot doped photorefractive polymer

X. Li, R.A Evans, M. Gu, B. Bullen, J.W.M Chon, Swinburne University of Technology, Hawthorn, Australia

Quantum-dot surfaces were engineered for two-photon induced localized photorefractivity. The use of sulfur rich surfaced QDs not only optimized charge transfer and resultant refractive index change but expanded the optical recording thresholds.

CC4-2-THU 16:45

$Sn_2P_2S_6$ crystals with enhanced sensitivity for photorefractive applications at 1.06µm

T. Bach, M. Jazbinsek, P. Günter, ETH Zürich, Switzerland; A.A Grabar, I.M Stoika, Y.M Vysochanskii, Uzhgorod National Univ., Ushgorod, Ukraine

We developed Te/Sb-doped $Sn_2P_2S_6$ with enhanced photorefractive sensitivity in the near-infrared. Self-pumped optical phase conjugation was demonstrated at 1064nm with a reflectivity of >40% with a fast rise time (<100ms at 20W/cm² intensity).

ROOM 13a

16:30 – 18:00

CA10 Session: New laser architectures

***Chair:** Robert L. Byer, Stanford Univ., Ginzton Lab., Stanford, USA*

CA10-1-THU 16:30

High power laser based on Nd:YAG single-crystal fiber grown by micro-pulling-down technique

J. Didierjean, M. Castaing, F. Balembois, P. Georges, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France; D. Perrodin, J.M Fourmigue, Fibercryst SAS, Lyon, France; K. Lebbou, A. Brenier, O. Tillement, Laboratoire de Physico-Chimie des Matériaux Luminescents, Lyon, France

We present the characterization and laser results of single-crystal Nd:YAG fibers grown by micro-pulling-down technique, producing 10-W CW power and 370-kW peak power in Qswitched regime for 60-W of pump power.

CA10-2-THU 16:45

Toward diffraction-limited high-average-power radially-polarized lasers

I. Moshe, A. Meir, S. Jackel, G.Machavariani, Y. Lumer, Soreq NRC, Yavne, Israel

Wavefront correction by stepped wave-plates was demonstrated in multi-kW rod-based amplifiers. These wave-plates have strongly improved the output wavefront and beam-quality for radially polarized beams, from P.V=3.8 micron to P.V=0.3 micron and from M^2=24 to M^2=3.8.

ROOM 13b

16:30 – 18:00

CB14 Session: High power diode lasers

***Chair:** Ingo Fischer, Vrije Universiteit, VUB, Brussels, Belgium*

CB14-1-THU 16:30

Broad area single emitter (BASE) modules with improved brightness

S. Pawlik, B. Sverdlov, J. Müller, R. Bättig, B. Schmidt, H.U Pfeiffer, S. Arlt, B. Valk, N. Lichtenstein, Bookham Switzerland AG, Zurich, Switzerland

Two approaches to increase the brightness in a multimode fiber with a 105 µm core diameter will be presented. Their combination allows the realization of reliable broad area modules with outstanding brightness

CB14-2-THU 16:45

High-power 980-nm monolithically integrated master-oscillator power-amplifier

H. Wenzel, K. Paschke, O. Brox, F. Bugge, A. Ginolas, A. Knauer, P. Ressel, J. Fricke, G. Erbert Ferdinand-Braun-Ins., Berlin, Germany

A semiconductor-based master-oscillator power-amplifier consisting of a distributed Bragg reflector laser and a flared amplifier is demonstrated to emit more than 10W continuous wave in a nearly diffraction limited beam with a narrow spectral bandwidth.

ROOM 14a

16:30 – 18:00

JSII2 Session: Nano-Photonics

Chair: *Vlad Shalaev, Purdue University, West Lafayette, USA*

JSII2-1-THU (Invited) 16:30

Plasmon-based optical manipulation

R. Quidant, M. Righini, A. Zelenina ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; C. Girard, CEMES, Toulouse, France

We report on the use of surface plasmons fields at homogeneous and patterned metal surfaces for optical manipulation of micro-objects. Our experimental observations are well corroborated by simulations based on the green dyadic method.

ROOM 14b

16:30 – 18:00

CF8 Session: Material processing and structuring

Chair: *Giulio Cerullo, Politecnico di Milano, Italy*

CF8-1-THU 16:30

Femtosecond laser-induced forward transfer: a technique for versatile micro-printing applications

D.P Banks, C. Grivas, R.W Eason, University of Southampton, United Kingdom; I. Zergioti, National Technical University of Athens, Greece

We present the latest results from our investigation of femtosecond Laser-Induced Forward Transfer (LIFT), including the smallest features so far reported (330 nm diameter), the first demonstration of intact material transfer, and novel ring structures.

CF8-2-THU 16:45

Novel concept for an integrated optical waveguide isolator for picosecond pulse operation

M.J.R Heck, M.K Smit, Y. Barbarin, E.A.J.M Bente, Tecnical University / COBRA, Eindhoven, Netherlands; D. Lenstra, Tecnical University, Delft, Netherlands

By concatenating an array of amplifiers and saturable absorbers, an integrated optical waveguide isolator is created which is transparent for forward propagating picosecond pulses, while absorbing (down to -35dB) backward propagating low-power reflections and noise.

ROOM 21

16:30 – 18:00

CM2 Session: Microprocessing

Chair: *Alexander Kaplan, Lulea Univ. of Technology, Lulea, Sweden*

CM2-1-THU (Invited) 16:30

Nanoscale laser processing using near field optics

C.P Grigoropoulos, D.J Hwang, University of California, Berkeley, USA

Research on the pulsed laser-based processing and structuring of materials at the nanoscale using optical near-field schemes is summarized. The interaction mechanisms, inlcuding the dynamics of laser ablated plasmas are investigated.

ROOM 22

16:30 – 18:00

CJ6 Session: Fibre gratings and waveguide lasers

Chair: *William Wadsworth, University of Bath, United Kingdom*

CJ6-1-THU 16:30

Femtosecond written fiber gratings in PM and LMA fibers

J. Thomas, E. Wikszak, S. Nolte, A. Tünnermann, C. Voigtländer, Friedrich Schiller University, Jena, Germany;

We report on the inscription of Fiber Gratings with IR fs-pulses using a fixed phase-mask scanning technique into different fiber types like Polarization Maintaining (PM) fibers as well as in Large Mode Area (LMA) fibers.

CJ6-2-THU 16:45

Bragg gratings written in ZBLAN fibers and all-fiber laser applications

M. Bernier, S.L Chin, R. Vallée, G. Androz, D. Faucher, Y. Sheng, COPL, Université Laval, Quebec, Canada

We report on the writing of Bragg gratings in ZBLAN fibers and demonstrate emission at 1480 nm in an all-fiber Tm^{3+}-doped ZBLAN laser pumped at 1070 nm based on a FBG as an input coupler

ROOM BOR1

16:30 – 17:45

CI7Session: Transient effects and packet switching

Chair: *Andrew Ellis, University College of Cork, Ireland*

CI7-1-THU 16:30

Surviving channel dependence of fast power transients in a 109 channel Raman-amplified transmission experiment

D.C Kilper, A.R Grant, T. Salamon, T.K Ho, C.A White, Alcatel-Lucent, Bell Laboratories, Holmdel, USA

We measure the time evolution of power transients due to dropped or cut channels in an all-Raman amplified re-circulating loop experiment for different surviving channel configurations with propagation up to 7200 km.

CI7-2-THU 16:45

Performance impairments due to gain transients in a Raman-based bi-directional long-reach PON link

R. Kjaer, I. Tafur Monroy, J. Bevensee Jensen, L.K Oxenlowe, P. Jeppesen COM-DTU, Technical Univ. of Denmark, Kgs. Lyngby, Denmark; B. Palsdottir, OFS Fitel Denmark ApS, Broendby, Denmark

The sensitivity penalty due to gain transients in a Raman-based PON link is characterized for the first time. Low penalty is found when up to eight out of nine corresponding channels are periodically add/dropped.

ROOM BOR2

16:30 – 18:00

IA2 Session: Microfabricated structures for atomic vapour

Chair: *Jakob Reichel, Laboratoire Kastler-Brossel, Paris, France*

IA2-1-THU (Keynote) 16:30

Chip-scale atomic devices based on microfabricated alkali vapor cells

J. Kitching, S. Knappe, J. Moreland, L.A Liew, V. Shah, V. Gerginov, P. Schwindt, L. Hollberg, NIST, Boulder, CO, USA; A. Brannon, B. Lindseth, Z. Popovic, University of Colorado, Boulder, CO, USA

Millimeter-scale instruments based on spectroscopy of ROOM-temperature alkali atoms may allow new capabilities for portable, battery-operated systems. We describe the design, fabrication and performance of atomic frequency references and magnetometers fabricated using micromachining techniques.

ROOM B11

16:30 – 18:00

CL4 Session: Multi photon fluorescence

Chair: *Jan Thogersen, Aarhus University, Denmark*

CL4-1-THU 16:30

Polarization sensitive two-photon microscopy of nanometric $Fe(IO_3)_3$ crystals

J. Extermann, L. Bonacina, J.P Wolf, University of Geneva, Switzerland; F. Courvoisier, Université de Franche Comté, Besançon, France; R. Le Dantec, Y. Mugnier, C. Galez, Université de Savoie, Annecy, France

$Fe(IO_3)_3$ crystals can be efficiently employed as probes for SHG microscopy. Possessing a permanent dipole moment, they bear information about crystal orientation, and may be used as sensors of local electric field in bio-samples.

CL4-2-THU 16:45

In situ, starch-based backwards SHG for MEFISTO pulse characterization in multiphoton microscopy

A. Thayil, P. Loza-Alvarez E.J Gualda M. Mathew I. Amat-Roldan I.G Cormack S. Soria ICFO - Institut de Ciencies Fotoniques, Castelldefels, (Barcelona), Spain; D. Artigas, Universitat Politecnica de Catalunya, Barcelona, Spain

We have demonstrated an ideal approach for in- situ, real time pulse characterization at the sample plane of a multiphoton microscope using Backward SHG from starch and the MEFISTO technique

ROOM 1

IF6-3-THU 17:00

Coherent control of exciton in a single InAs/GaAs quantum dot

S. Kono, J. Fujikata, K. Nishi, Fundamental and Environmental Res. Lab., NEC Corporation, Tsukuba, Japan; H. Saito, System Device Res. Lab., NEC Corporation, Sagamihara, Japan; A. Tomita, Fundamental and Environmental Res. Lab., NEC Corporation and JST-SORST, Tsukuba, Japan

The Rabi oscillation and quantum interference of a single InAs/GaAs quantum dot exciton were observed at 1127 nm, 4.2K by using coherent control technique. The exciton dipole moment was estimated to be about 60 debye.

IF6-4-THU 17:15

Measurement of the time coherence of the single photons emitted by CdSe nanocrystals using photon correlation Fourier spectroscopy (PCFS)

J.-P. Hermier, Laboratoire Kastler Brossel, Paris and Université de Versailles Saint Quentin en Yvelines, France; L. Coolen, X. Brokmann, P. Spinicelli, Laboratoire Kastler Brossel, Paris, France

We present the measurement of the time coherence of the single photons emitted by colloidal CdSe nanocrystals using an original method called photon correlation Fourier spectroscopy. We report measured coherence time longer thant 200 ps.

ROOM 4a

IC6-3-THU 17:00

Counterpropagating twin photons in the telecom range:a narrow-bandwidth semiconductor source

S. Ducci, Univ. Paris 7-CNRS, Paris, France; X. Marcadet, Alcatel-Thales III-V Lab, Palaiseau, France; L. Lanco, J.P Likforman, G. Leo, V. Berger, Lab. Matériaux et Phénomènes Quantiques, Paris, France; H. Zbinden, J.A.W van Houwelingen, GAP-Optique, Univ. de Genève, Switzerland

We experimentally demonstrate a semiconductor waveguide source of counterpropagating twin photons in the telecom range working at ROOM temperature. Entangled state generation and narrow spectral bandwidth are two important advantages of our source.

IC6-4-THU 17:15

Continuous variable polarization entanglement via the Kerr nonlinearity in an optical fiber

R. Dong, J. Heersink, G. Leuchs, University of Erlangen-Nuremberg, Erlangen, Germany; J. Yoshikawa, University of Tokyo, Japan; U.L Andersen, Technical University of Denmark, Kongens Lyngby, Denmark

We report on the generation of continuous variable polarization entanglement using two polarization squeezed input pulses. The sum of these squeezing variances 0.99+- 0.02 < 2 verifies the inseparability criterion.

ROOM 4b

ID2-3-THU 17:00

A narrowband Ti:Sapphire-based pulsed laser system for precise frequency metrology in the deep UV

E.J Salumbides, S. Hannemann, E.J van Duijn, K. Eikema, W. Ubachs, Vrije University, Amsterdam, Netherlands

We present a novel laser system based on an injection-seeded Ti:Sapphire oscillator. Frequency measurements on atomic and molecular resonances are performed with a frequency comb, reaching accuracies at the MHz level for deep UV wavelengths.

ID2-4-THU 17:15

Atomic strontium based inertial sensor with micron spatial resolution

G. Ferrari, A. Alberti, R.E Drullinger, N. Poli, M. Schioppo, G.M Tino F. Sorrentino, LENS - University of Florence - INFM-CNR, Sesto Fiorentino, Italy; M. Prevedelli, University of Bologna and LENS - University of Florence - INFM-CNR, Sesto Fiorentino, Italy

We show that ultra-cold 88Sr in presence of a lattice plus linear potential give rise to Bloch oscillations lasting many seconds. This is used to accurately measure forces at few micron distances from surfaces.

ROOM 5

IE7-3-THU 17:00

Self-transparency mediated by X-waves in Bragg gratings

C. Conti, Research Center Enrico Fermi, Rome, Italy; A. Di Falco, St. Andrews University, St. Andrews, United Kingdom; S. Trillo, University of Ferrara, Italy

We investigate 2+1D self-transparency of Bragg gratings mediated by the excitation of X-shaped gap-solitons with controllable velocity.

IE7-4-THU 17:15

Stabilization of counter-propagating solitons in periodic photonic lattices

S. Koke, C. Denz, Ph. Jander, D. Träger, Westfaelische Wilhelms University, Münster, Germany; D. Neshev, M. Chen, W. Krolikowski, Y. Kivshar, Australian National University, Canberra, Australia

We demonstrate theoretically and experimentally the suppression of instabilities of counterpropagating solitons in one- and two-dimensional periodic photonic lattices created by optical induction in a biased photorefractive crystal.

ROOM 12

CC4-3-THU 17:00

Linear writing of waveguides in bulk photorefractives

E. DelRe, P. Pierangelo, E. Palange, Universita' dell'Aquila, L'Aquila, Italy; A. Ciattoni, Laboratorio Regionale CASTI INFM-CNR, L'Aquila, Italy; Y. Garcia, A.J Agranat, Hebrew University of Jerusalem, Israel

We present a novel technique to optically write waveguides in bulk photorefractive crystals using only linear propagation. The effect is the result of a funnel-like index-pattern with a quasi-degenerate fundamental mode.

CC4-4-THU 17:15

Phase-change memory functionality in gallium nanoparticles

A.I Denisyuk, F. Jonsson, N.I Zheludev, University of Southampton, United Kingdom

We report on a method of structural phase identification of gallium nanoparticles via their cathodoluminescence when excited by a scanning electron beam. This feature can be used for high density phase change memory elements.

ROOM 13a

CA10-3-THU 17:00

Design of laser cavities with high energy extraction and arbitrary output intensity profiles

A.J Caley, J.S Liu, A.J Waddie, M.R Taghizadeh, Heriot-Watt University, Edinburgh, UK; M.J Thomson, Optos Plc, Dunfermline, United Kingdom

A diffractive optical element which performs intracavity mode selection and beam shaping of laser output simultaneously is considered. Combining these operations in one element has benefits in the optical setup size and for simplifying alignment.

CA10-4-THU 17:15

A novel SBS-laser oscillator scheme with active and passive mode locking

M. Ostermeyer, P. Kappe, University of Potsdam, Germany

A phase conjugating Nd:YAG SBS-laser oscillator is presented in an actively and a passively mode locked variant emitting 400ps pulses with 7W average output power in variable pulse train structures with up to 5MW peak power.

ROOM 13b

CB14-3-THU 17:00

Near-field pattern control of broad-area laser diodes

T.A Asatsuma, Y. Takiguchi, A. Furukawa, S. Hirata, Sony Corporation, Kanagawa, Japan

By introducing appropriate waveguide structure, we have succeeded to control the near-field patterns of broad-area laser diodes. For this purpose, the three-region model was proposed and experimentally verified for various waveguide structures.

CB14-4-THU 17:15

5.5 W output power from 100 mikrometer stripe width lasers at 670 nm with a vertical far-field angle of 32 degrees

B. Sumpf, M. Zorn, M. Maiwald, R. Staske, J. Fricke, G. Traenkle, P. Ressel, G. Erbert, M. Weyers, Ferdinand-Braun-Institut für Hoechstfrequenztechnik, Berlin, Germany

670 nm broad area diode lasers with an output power of 5.5 W and a conversion efficiency of 40% will be presented. Reliable operation over 1800 h at more than 1 W will be demonstrated.

ROOM 14a

JSII2-2-THU 17:00

Accurate measurement of the transition dipole moment of self-assembled quantum dots

S. Stobbe, J. Johansen, T. Lund-Hansen, P.T. Kristensen, J.M. Hvam, P. Lodahl, COM-DTU, Technical University of Denmark, Kgs. Lyngby, Denmark; . S. Nikolaev, W.L Vos, FOM Institute for Atomic and Molecular Physics (AMOLF), Amsterdam, Netherlands

We have measured time-resolved spontaneous emission from quantum dot ground state excitons in modified local density of states. Using a theoretical model without free parameters we accurately determine the quantum dot transition dipole moment.

JSII2-3-THU 17:15

Broadband near-field optical spectrometer for the observation of structural phase contrast in organic semiconductors

D. Polli, L. Lüer, G. Cerullo, Politecnico di Milano, Italy; C. Ropers, J. Renard, Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; R. Pomraenke, C. Lienau, Carl von Ossietzky University, Oldenburg and Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

We demonstrate a near-field spectrometer with 100-nm spatial resolution based on an ultra-broadband Ti:sapphire oscillator coupled to an aperture-based NSOM. The system enables structural phase-selective nanoscale imaging of organic materials such as oxotitanyl phthalocyanine.

ROOM 14b

CF8-3-THU 17:00

Efficient versatile-repetition-rate ps source for material processing applications

C. Gerhard, P. Georges, P. Blandin, F. Druon, M. Hanna, F. Balembois, Institut d'Optique, Palaiseau, France; F. Falcoz, Thales Laser, Orsay, France

We present a simple ps source for material processing applications. It combines a stable low repetition rate oscillator and efficient 3D multipass amplifier and produces pulse trains between 1Hz and 1MHz with energy up to 70 µJ.

CF8-4-THU 17:15

Fabrication of photonic devices in heavy metal oxide glass by femtosecond laser direct writing

W. Yang, C. Corbari, P. Kazansky, O.R.C., Southampton, United Kingdom, K. Sakaguchi, Technical Research Laboratory, Nippon Sheet Glass Co., Ltd, Hyogo, Japan

Low loss, 0.2 dB/cm, channel waveguides are written by fs-laser irradiation in highly nonlinear bismuth-borate glass. Directional couplers and y-junctions at 1550nm are presented. Second-order-nonlinearity can be induced by poling in these structures.

ROOM 21

CM2-2-THU 17:00

Nonlinear diffraction in sub-critical femtosecond inscription

S.K Turitsyn, M. Dubov, V.K Mezentsev, Aston Univ., Birmingham, UK; A.M Rubenchik, Lawrence Livermore National Lab., Lawrence, USA; M.P Fedoruk, Ins. of Computational Technologies, Novosibirsk, Russia; E.V Podivilov, Ins. of Automation and Electrometry, Novosibirsk, Russia

We have re-examined nonlinear diffraction theory in context of sub-critical regime of fs laser inscription in dielectric materials. Semi-analytical expression for the pulse power and spatial pre-focusing parameter required to achieve inscription threshold is derived.

CM2-3-THU 17:15

Charged nano-particles generated at ablation in air and their role in pulsed microdrilling

S.M Klimentov, V.I Konov, P.A Pivovarov, General Physics Institute RAS, Moscow, Russia; D. Walter, F. Dausinger, Institut für Strahlwerkzeuge, Pfaffenwaldring, Stuttgart, Germany

Ablation by ultrashort pulses in air form a cloud of electrically charged nano-particles, extended residence of which can introduce screening of incident radiation. Plasma ignition, morphology of particles, their statistics and electric properties are investigated.

ROOM 22

CJ6-3-THU 17:00

High power fibre lasers based on point-by-point inscribed fibre-Bragg gratings

A. Fuerbach, N. Jovanovic, G. Marshall, M. Withford, Macquarie University, Sydney, Australia; S. Jackson, Optical Fibre Technology Centre, Sydney, Australia

We report on a novel approach to realise high power continuous-wave fibre lasers utilising femtosecond laser point-by-point inscription of fibre-Bragg gratings. The lasers feature highly narrow linewidths and polarised outputs, perfectly suited for frequency conversion.

CJ6-4-THU 17:15

1.5 micron high-power robust single-frequency waveguide laser

S. Taccheo, A. Festa, G. Della Valle, P. Laporta, Politecnico di Milano, Milano, Italy; K. Ennser, Institute of Advanced Telecommunications, University of Wales Swansea, United Kingdom; G. Sorbello, DIIT-Universita' di Catania, Italy; C. Cassagnetes, D. Barbier, Teem-photonics, Grenoble, France

We demonstrate laser waveguide with over 20 mW output power in robust single-frequency operation. The highly-doped Er:Yb doped phosphate glass waveguide was only 9-mm long. Power scaling towards 100 mW is discussed.

ROOM BOR1

CI7-3-THU 17:00

All-optical swapping of spectrally efficient, spectral amplitude code-based labels in semiconductor fiber ring lasers using cross-absorption modulation

V. Baby, S. Jamal, C. Habib, L.R Chen, McGill University, Montreal, Canada

We present all-optical swapping of spectrally efficient spectral-amplitude labels for packet switched networks using cross absorption modulation in semiconductor fiber ring lasers with electro-absorption modulators. 19dB switching contrast ratio is obtained with label regeneration capability

CI7-4-THU 17:15

Packet clock recovery at 40 Gb/s and beyond, using a Fabry-Pérot filter and an optical power limiter based on a bismuth oxide fibre

Ch. Kouloumentas, N. Pleros, P. Zakynthinos, D. Petrantonakis, D. Apostolopoulos, O. Zouraraki, H. Avramopoulos, National Technical University of Athens, Greece; A. Tzanakaki, I. Tomkos, Athens Information Technology Center, Athens, Greece

We demonstrate packet clock recovery at 40 Gbps using a Fabry-Perot-Filter and a power limiter based on self-phase modulation inside a bismuth-oxide fibre. Successful application of the technique at ultra-high data rates is predicted.

ROOM B11

CL4-3-THU 17:00

Sensitive single-beam heterodyne CARS microscopy with independently phase controlled local oscillator

B. von Vacano, T. Buckup, M. Motzkus, Philipps-University, Marburg, Germany

For increased sensitivity of CARS microscopy, interferometric detection can be used. In a very simple, intrinsically stable implementation, we use a single beam of shaped ultrashort pulses and add a local oscillator without further complexity.

CL4-4-THU 17:15

Time-correlated two-photon fluorescence imaging with arrays of solid-state single photon detectors

M. Gersbach, D.L Boiko, M. Sergio, C. Niclass, C. Petersen, E. Charbon, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

We report on a two-photon lifetime imaging system for biological applications. The core of the system is an integrated two-dimensional array of single-photon counters operating simultaneously and achieving 120ps time resolution.

NOTES

ROOM 1

IF6-5-THU 17:30

Quantum correlated polaritons modes in a semiconductor triple vertical microcavity

C. Leyder, C. Diederichs, D. Taj, P. Roussignol, J. Tignon, C. Ciuti, C. Delalande, E. Giacobino, A. Bramati, Ecole Normale Supérieure, Paris, France; A. Lemaître, J. Bloch, Laboratoire Photonique et Nanostructures, Marcoussis, France

We study the statistics of twin photons emitted by a vertical triple microcavity by measuring the intensity correlations of the signal and idler. Quantum correlated polaritons are observed for the first time in these systems.

IF6-6-THU 17:45

Experimental realization of wheeler's delayed-choice gedanken experiment

V. Jacques, J.F Roch, E. Wu, F. Grosshans, F. Treussart, ENS Cachan, France; E. Wu, , ENS Cachan, France and Key Lab. of Optical and Magnetic Resonance Spectroscopy, Shangai, China; A. Aspect, P. Grangier, Institut d'optique, Orsay, France

We report a realization of Wheeler's delayed-choice gedanken experiment with a true single-photon source and space-like separation between the photon entering into the interferometer and the random choice of the measurement at the interferometer output.

ROOM 4a

IC6-5-THU 17:30

Continuous variable quantum cryptography: post-selection with thermal noise

S.M Assad, D.J Alton, P.K Lam, T. Symul, Australian National University, Canberra, Australia; T.C Ralph, C. Weedbrook, University of Queensland, Brisbane, Australia

We present a theoretical security analysis and experimental demonstration of post-selection based continuous-variable quantum-key-distribution for channels with nonzero excess noise. We considered both collective and individual attacks and our protocol allows 2-ways reconciliation.

IC6-6-THU 17:45

Noiseless filtering of non-gaussian noise from continuous-variable quantum information

C. Wittmann, D. Elser, G. Leuchs, University Erlangen- Nuremberg, Erlangen, Germany; U.L Andersen, Technical University of Denmark, Lyngby, Denmark; R. Filip, Palacky, P. Marek, Palacky University, Olomouc, Czech Republic

We present a scheme for noiseless filtering of non-Gaussian noise from continuous-variable quantum information. Characteristics of on/off detection and homodyne detection methods will be compared and an optimal device will be discussed.

ROOM 4b

ID2-6-THU (Invited) 17:30

New measurement of the electron magnetic moment and the fine structure constant

G. Gabrielse, Harvard University, Cambridge, USA

For the first time since 1985, the electron magnetic moment and the fine structure constant have been measured with improved accuracy. A one-electron quantum cyclotron is used.

ROOM 5

IE7-5-THU 17:30

Soliton attraction by the edge of chirped optical lattice

Y. Kartashov, L. Torner, ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; V. Vysloukh, Universidad de las Americas, Puebla, Mexico

We address soliton formation at the surface of chirped optical lattice. We find families of power thresholdless surface waves that do not exist at other lattice interfaces. Surfaces of chirped lattices act as soliton attractors.

IE7-6-THU 17:45

Nonlinear Goos-Hänchen shift of nematicons at a bias-controlled dielectric interface

M. Peccianti, G. Assanto, University Roma Tre, Rome, Italy; A. Dyadyusha, M. Kaczmarek University of Southampton, UK

Total internal reflection of spatial solitons occurs at the interface between two differently biased regions of nematic liquid crystal. We demonstrate a power dependent Goos-Hänchen shift with lateral filament displacements as large as 0.5mm.

ROOM 12

CC4-5-THU 17:30

Amorphization dynamics of $Ge_2Sb_2Te_5$ films under nano- and femtosecond laser pulse irradiation

J. Siegel, D. Puerto, J. Solis, C.N Afonso, Instituto de Optica, C.S.I.C., Madrid, Spain; A. Pirovano, R. Bez, STMicroelectronics, Agrate Brianza, Italy; C. Wiemer, MDM laboratory, CNR-INFM, Agrate Brianza, Italy

The amorphization process in $Ge_2Sb_2Te_5$ under pulsed laser irradiation has been studied using reflectivity measurements with high temporal resolution. The role of the pulse duration and laser fluence on the phase change dynamics is discussed.

CC4-6-THU 17:45

Wavelength multiplexed optical storage in plasmonic gold nanorods

P. Zijlstra, J.W.M Chon, M. Gu, Swinburne University of Technology, Hawthorn, Australia

We demonstrate optical recording in plasmonic gold nanorods by size selective reshaping of nanoparticles in the focal volume. By incorporating nanorods of multiple aspect ratios into the recording medium we achieved wavelength multiplexed data storage.

ROOM 13a

CA10-5-THU 17:30

Absolute wavelength locking of microchip lasers using pump-power modulation

M. Brunel, M. Vallet, Université de Rennes 1, Rennes, France

The pump power is shown to be an efficient thermo-optical wavelength controller in Er:Yb:glass microlasers at 1.5 microns. We demonstrate the locking to C_2H_2 lines of either cw or passively Q-switched microlasers with 10^{-8} stability.

CA10-6-THU 17:45

Self-Q-switched adaptive laser with quasi-CW diode-pumping

G. Smith, M.J Damzen, Imperial College London, United Kingdom

We present quasi-cw diode-pumped adaptive lasers, based on induced gain gratings using self-intersecting loops. The systems produce self-Q-switched output pulses with ~5.6mJ energy, <7ns duration and ~1MW peak power with TEM00 and single mode operation.

18:00 – 19:30

CP1 Session: CLEO®/Europe Postdeadlines I

Chair: *Markus Pollnau, University of Twente, The Netherlands*

ROOM 13b

CB14-5-THU 17:30

High temperature operation of 640nm wavelength high power laser diode arrays

D. Imanishi, S. Hirata, K. Naganuma, K. Wakabayashi, Y. Takiguchi, S. Ito, H. Nakajima, Sony corporation, Atsugi, Japan

We have achieved 0.3W operation for a single emitter broad area red laser at 45 degrees centigrde for the first time, and highly reliable 25 emitter arrayoperation of 6.6W at 25 degrees centigrade.

CB14-6-THU 17:45

Closed-loop quantum design of a multi-watt 1178nm VECSEL

J.V Moloney, J. Hader Nonlinear Control Strategies and University of Arizona, Tucson, USA; C. Hessenius, L. Fan, M. Fallahi, University of Arizona, Tucson, USA; W. Stolz, S.W Koch, University of Marburg, Marburg, Germany

Combining a fully microscopic quantum design with full-scale optical/thermal simulation, we design and experimentally demonstrate a high-power optically-pumped VECSEL cavity capable of generating multi-Watt yellow light at 589 nm via second harmonic generation.

18:00 – 19:30

IP1 Session: IQEC Postdealines I

Chair: *Fedor Mitschke, University of Rostock, Germany*

THURSDAY / ORAL

ROOM 14a

JSII2-4-THU 17:30

Nanomechanical control of an optical antenna

M. Kahl, J. Merlein, A. Zuschlag, A. Sell, A. Halm, A. Leitenstorfer, J. Boneberg, R. Bratschitsch, P. Leiderer, University Konstanz, Germany

We mechanically tune the feedgap of a single gold bowtie antenna by precise nanomanipulation with the tip of an atomic force microscope. At the same time, its optical response is determined via dark-field scattering spectroscopy.

JSII2-5-THU 17:45

Colloidal quantum dots in high-Q pillar microcavities

T. Thomay, R. Bratschitsch, A. Halm, M. Kahl, K. Beha, V. Kohnle, J. Merlein, A. Leitenstorfer, M. Hagner, Univ. of Konstanz, Germany; U. Woggon, M. Artemyev, Y. Yurij, Univ. of Dortmund, Germany; J. Ziegler, T. Nann, University of East Anglia, Norwich, UK; F. Perez-Willard, Univ. of Karlsruhe, Germany

We have fabricated high-Q pillar resonators with colloidal CdSe/ZnS quantum dots or rods as light emitters via FIB milling. Cavities with elliptical cross section show higher Q-values along the short axis compared to circular resonators.

18:00–19:30

JSP1 Session: Joint CLEO®/ Europe-IQEC Postdeadlines

Chair: *Nikolay Zheludev, Southampton University, UK*

ROOM 14b

CF8-5-THU 17:30

Mechanisms of waveguiding in femtosecond laser-structured $LiNbO_3$

J. Burghoff, S. Nolte, Friedrich-Schiller-University, Jena, Germany; A.Tünnermann, Friedrich-Schiller-University and Fraunhofer-Institut für Angewandte Optik und Feinmechanik, Jena, Germany

We discuss the mechanisms of optical waveguiding in femtosecond laser-structured LiNbO3 and present experimental and theoretical results of waveguide fabrication techniques. As an application, efficient second harmonic generation is demonstrated in these structures.

CF8-6-THU 17:45

Fabricating high-strength Bragg-grating-waveguide devices in glass with ultrashort laser pulses

H. Zhang, S.M Eaton, S. Ho, J. Li, P.R Herman, University of Toronto, Canada

A 1-kHz femtosecond laser was optimized for writing strong (35 dB transmission dip) Bragg grating waveguides in borosilicate glasses. Thermal stability of gratings and 2-D distributed sensing demonstrations will be presented.

18:00 - 19:30

CP2 Session: CLEO®/ Europe Postdeadlines II

Chair: *Philip Russell, University of Erlangen-Nürnberg, Germany*

ROOM 21

CM2-4-THU 17:30

Micro-/nano-structuring of tungsten by ultrashort laser pulses

Q.Z Zhao, S. Malzer, L.J Wang, Max-Planck Research Group and University Erlangen-Nuremberg, Erlangen, Germany

Subwavelength ripple-like periodic structures and mushroom-like nanoneedles have been formed after single beam femtosecond laser pulses irradiation of tungsten. The period of ripple can be controlled by pulse energy, pulse numbers, and incident angle.

CM2-5-THU 17:45

Efficient generation of titanium oxide nanomaterials using a continuous wave high-power fibre laser

A. Abdolvand, Z. Liu, S. Khan, M. Schmidt, P. Crouse, Y. Yuan, L. Li, University of Manchester, United Kingdom; K. Watkins, M. Sharp, University of Liverpool, United Kingdom

High-power Yb-doped continues wave fibre laser ablation of titanium in liquid resulted in efficient generation of titanium oxide nanoparticles, ranging mainly between 5 nm to 30 nm in diameter.

ROOM 22

CJ6-5-THU 17:30

Advanced waveguide lasers at 1.5 micron fabricated by femtosecond laser pulses

G. Della Valle, G. Cerullo, S. Taccheo, R. Osellame, N. Chiodo, P. Laporta, O. Svelto, Politecnico di Milano, Italy; A. Rohzin, A.C Ferrari, Cambridge University, United Kingdom; U. Morgner, Leibniz University, Hannover, Germany

Mode-locked and single-longitudinal-mode waveguide lasers, manufactured by femtosecond laser writing in Er-Yb-doped phosphate glasses, are presented. Transform-limited 1.6-ps pulses and a cw output power exceeding 50 mW have been obtained in the two regimes.

CJ6-6-THU 17:45

Realizing optical amplifiers with micro-sphere: A 15 dB gain, 2 dB noise-figure, tiny amplifier

A. Mihaescu, P. Féron, P. Besnard, FOTON/ENSSAT, Lannion, France; O. Bouchet, France Télécom R&D, Rennes, France; N. Traynor, A. Monteville, PERFOS, Lannion, France

600 ppm Er^{3+} Al-doped silica micro-spheres are fabricated in order to realize optical amplifiers. We demonstrate that it is possible to obtain component showing 15 dB gain with 2 dB noise figure.

ROOM BOR1

CI7-5-THU 17:30

Temporal-talbot effect based all-optical clock recovery using Bragg gratings

D. Pudo, L.R Chen, M. Depa, McGill University, Montreal, Canada; M. Ibsen, D.J Richardson, University of Southampton, United Kingdom

We use linearly chirped fiber Bragg gratings to implement the temporal Talbot effect to achieve all-optical clock recovery at 10 Gbps. We recover a periodic pulse train by reflecting a PRBS from the chirped grating.

ROOM BOR2

IA2-2-THU 17:30

Optical nanofibers for manipulating and probing single atom fluorescence

K.P Nayak, F.L Kien, K. Hakuta, M. Morinaga, Univ. of Electro-Communications, Tokyo, Japan; P.N Melentiev, V.I Balykin, Ins. of Spectroscopy, Moscow Region, Russia and Univ. of Electro-Communications, Tokyo, Japan

We show that fluorescence of a very small number of atoms around the optical nanofiber can be measured efficiently by detecting the photons coupled to the guided mode of the nanofiber. We show also that atoms around the nanofiber behave like molecules due to formation of atom-surface bound states.

IA2-3-THU 17:45

Atom nanolithography with atom pinhole camera

V.I Balykin, P.N Melentiev, S.N Rudnev, A.P Cherkun, P.A Borisov, V.S Letokhov, ISAN, Troitsk, Russia; P.Y Apel, A.P Akimenko, V.A Skuratov, Joint Institute for Nuclear Research, Dubna, Russia

An atom pinhole camera with nanometer resolution has been experimentally implemented for the first time. By use of this camera an array of identical atomic nanostructures with a features less than 50nm has been built.

ROOM B11

CL4-5-THU 17:30

Low lying carotenoid dark singlet states in light-harvesting complexes revealed by multi-photon fluorescence excitation spectroscopy

A. Betke, D. Leupold, B. Voigt, R. Menzel, H. Lokstein, University of Potsdam, Germany; M. Krikunova, University of Hamburg, Germany

TPA fluorescence excitation spectra of antenna complexes were measured in the dark state region of bound carotenoids. Contributions to the signal due to a further dark state S* and excited state absorption are discussed.

CL4-6-THU 17:45

Assessing the binding mode of ligands to DNA by time resolved fluorescence

A. Andreoni, L. Nardo, Universita' dell'Insubria, Como, Italy; M. Bondani, Natl.Lab. Ultrafast and Ultraintense Opt. Science, C.N.R.-C.N.I.S.M., Como, Italy

By analyzing time-resolved donor-fluorescence decays at different ligand concentrations, we can detect and quantify tiny conformational changes induced by ligand binding to DNA fragments labeled with fluorescence donor-acceptor pairs and distinguish minor-groove binders from intercalators.

ROOM 5

08:30 – 10:00

IF7 Session: Joint Session IA, IC & IF - QED with quantum dots

Chair: Alexander Sergienko, Boston University, USA

IF7-1-FRI 08:30

Photon antibunching from a single quantum dot-microcavity system in the strong coupling regime

C. Hofmann, S. Reitzenstein, A. Forchel, A. Löffler, M. Kamp, University Würzburg, Germany; S. Götzinger, Y. Yamamoto, D. Press, Stanford University,CA, USA

We present photon antibunching in the strong coupling regime between a single quantum dot and the photonic mode of a high-Q micropillar cavity. Our data proves that a single quantum emitter dominates the photon emission.

IF7-2-FRI 08:45

Quantum nature of a strongly coupled quantum dot-cavity system

M. Winger, A. Badolato, K. Hennessy, D. Gerace, ETH Zurich, Switzerland

We investigate a single quantum dot actively positioned in a photonic crystal nanocavity in the strong coupling regime. We show the quantum nature of the system by measuring sub-poissonian light statistics in photoluminescence.

ROOM 11

08:30 – 10:00

CC5 Session: Holographic devices

Chair: Kazuo Kuroda, University of Tokyo, Japan

CC5-1-FRI 08:30

High-sensitive and fast-adaptive fiber-optic interferometer based on photorefractive diffusion holograms multiplexed in CdTe:V crystal

R.V. Romashko, Yu.N. Kulchin, Institute of Automation & Control Processes, FEB RAS, Vladivostok, Russia; S. Di Girolamo, A.A. Kamshilin, University of Kuopio, Finland; J.-C. Launay, C.N.R.S. Bordeaux, France

Adaptive interferometer based on reflection hologram recorded in fast photorefractive crystal without external electric field using low-power light source is presented. Possibility of holograms multiplexing inside single crystal is investigated.

CC5-2-FRI 08:45

A super-sensitive linear adaptive interferometer based on photorefractive $BaTiO_3$:Co crystal

V.M. Petrov, J. Petter, T. Tschudi, Darmstadt University of Technology, Darmstadt, Germany and A.F. Ioffe Physical Technical Institute, St. Petersburg, Russia; A.V. Khomenko, Centro de Investigación Científica y de Educación Superior de Ensenada, Mexico

We report a nowel technique of an artificial linearization of the interferometer based on photorefractive materials with the diffusion mechanism of grating formation. The proposed interferometer was enough sensitive to measure the light pressure and the Casimir force.

ROOM 12

08:30 – 10:00

CJ7 Session: Fibre Raman lasers

Chair: Sergei Turitsyn, Aston University, UK

CJ7-1-FRI 08:30

All-fiber pulsed Raman source pumped by Yb:Bi fiber laser

A.S. Kurkov, V.V. Dvoyrin, V.M. Paramonov, E.M. Dianov, O.I. Medvedkov, Russian Academy of Sciences, Moscow, Russia

We have realized all-fiber pulsed Raman source emitting at 1254 nm. The source was pumped by Yb:Bi fiber pulsed laser. P-doped fiber was used as an active medium of the converter. The conversion slope efficiency was of 70%.

CJ7-2-FRI 08:45

All-fiber widely tunable Raman fiber laser with controlled output spectrum

S.A. Babin, D.V. Churkin, A.E. Ismagulov, S.I. Kablukov, E.V. Podivilov, A.A. Vlasov, Russian Academy of Sciences, Novosibirsk, Russia; M.A. Rybakov, Inversion Fiber Co. Ltd., Novosibirsk, Russia

All-fiber widely tunable high-efficient RFL (3W@1.3um) has been developed. The measured output spectrum is described well by the analytical theory. It is shown that the spectral width can be controlled by FBGs detuning.

ROOM 13a

08:30 – 10:00

CA11 Session: Solid-state laser applications

Chair: Irina Sorokina, Technical University Vienna, Austria

CA11-1-FRI 08:30

Recent progress of the prototype laser for Shenguang-III

F. Jing, X. Zhang, W. Zheng, X. Wei, Z. Sui, M. Li, Z. Peng, D. Hu, B. Feng, F. Li, S. He, J. Su, Q. Zhu, H. Yu, B. Chen, X. Jiang, Research Center of Laser Fusion, Mianyang, China

We demonstrate the characteristics and recent progress of the prototype facility of Shenguang III laser fusion driver. It has operated target-shooting and will provide crucial data for the design and construction of Shenguang III.

CA11-2-FRI 08:45

Narrow line-width, high-energy, 2-micron laser for coherent wind lidar

U.N. Singh, J. Yu, NASA Langley Research Center, Hampton, USA

A diode-pumped, narrow linewidth 2-micron laser comprising a seed laser, an oscillator, and a double pass amplifier delivering in excess of 300mJ, Q-switched pulse at 10 Hz for wind and carbon dioxide measurement is described.

ROOM 13b

08:30 – 10:00

CB15 Session: THz lasers

Chair: Wolfgang Elsässer, Darmstadt University of Technology, Darmstadt, Germany

CB15-1-FRI (Invited) 08:30

Terahertz quantum cascade laser source based on intra-cavity difference-frequency generation

M.A. Belkin, F. Capasso, Harvard University, Cambridge, USA; A. Belyanin, Texas A&M University, College Station, USA; D.L. Sivco, Bell Laboratories, Lucent Technologies, Murray Hill, USA

We demonstrate intra-cavity terahertz difference-frequency generation in quantum cascade lasers. A two-wavelength quantum cascade laser with monolithically integrated optical nonlinearity emitting at 7.6 and 8.7 micrometers was used to generate difference frequency at 62 micrometers.

ROOM 14a

08:30 – 10:00

CD9 Session: Slow and fast light

Chair: Christophe Finot, Université de Bourgogne, Dijon, France

CD9-1-FRI (Invited) 08:30

Slow light in semiconductor waveguides: theory and experiment

J. Mørk, F. Öhman, M. van der Poel, P. Lunnemann Hansen, T. Roland Nielsen, P. Kaer Nielsen, H. Thyrrestrup Nielsen, K. Yvind, Technical University of Denmark, Kgs. Lyngby, Denmark

We present experimental and theoretical results on slow light in semiconductor waveguides. Multi-section waveguides for achieving a large and controllable phase shift at gigahertz frequencies as well as quantum dot structures are discussed

ROOM 14b

08:30 – 10:00

CF9 Session: Dispersion compensation and applications of femtosecond pulses

Chair: Pablo Loza-Alvarez, Institut de Ciències Fotóniques, Castelldefels (Barcelona), Spain

CF9-1-FRI 08:30

68-fs passively mode-locked diode-pumped Yb^{3+}:$CaGdAlO_4$ laser with an average power of 520 mW

J. Boudeile, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France; P. Goldner, J. Petit, B. Viana, LCAES-ENSCP, Paris, France; F. Druon, M. Hanna, P. Georges, Laboratoire Charles Fabry de l'Institut d'Optique; Palaiseau, France; Y. Zouter, Amplitudes Systèmes, Pessac, France

We demonstrate the generation of 68-fs pulses with an average power of 520mW from a diode-pumped Yb^{3+}:$CaGdAlO_4$ modelocked laser. This represents the highest average power ever obtained for a sub-70 fs diode-pumped Yb-bulk laser.

CF9-2-FRI 08:45

Resonant saturable absorbers for dispersion compensation in compact femtosecond lasers

G. Steinmeyer, U. Griebner, F. Saas, M. Moenster, Max-Born-Institute, Berlin, Germany; W. Richter, BATOP GmbH, Weimar, Germany

We discuss resonant saturable absorber mirrors as a novel concept, simultaneously enforcing mode-locking with their deep modulation depth and providing substantial amounts of dispersion. This concept may pave the way towards fully integrated femtosecond lasers.

ROOM 14c

08:30 – 10:00

JSII3 Session: Metamaterials – I

Chair: Jørn M. Hvam, Technical University, Lyngby, Denmark

JSII3-1-FRI (Invited) 08:30

Optical metamaterials and plasmonic devices

Z. Xiang, University of California, Berkeley, USA

I will review recent development of far field optical superlens, and hyperlens. In addition, plasmonic devices will be also presented for various applications.

ROOM 21

08:30 – 10:00

CH3 Session: Photonic crystal fibres for sensor applications

Chair: Hanne Ludvigsen, University of Technology, Helsinki, Finland

CH3-1-FRI 08:30

Two-mode photonic crystal fiber interferometer for sensing applications

J. Villatoro, V. Finazzi, G. Badenes, ICFO -Institut de Ciencies Fotoniques, Castelldefels, Spain; V. Pruneri, ICFO -Institut de Ciencies Fotoniques, Castelldefels and Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

A photonic crystal fiber interferometer built with fusion splices is reported. It exhibits stable interference pattern in the 800-1600 nm range with fringe visibility reaching 90%. The interferometer is suitable for sensing and metrological applications

CH3-2-FRI 08:45

Mid-infrared Methane sensing using a Silica photonic bandgap fiber

N. Gayraud, L.W. Kornaszewski, D.T. Reid, W.N. MacPherson, D.P. Hand, Heriot-Watt University, Edinburgh, UK; J.M. Stone, A.K. George, J.C. Knight, University of Bath, UK

We report gas sensing using a low-loss silica photonic bandgap fiber operating in the mid infrared (above 3um) and present results from Fourier transform infrared spectroscopy of methane using femtosecond optical parametric oscillator illumination.

ROOM BOR2

08:30 – 10:00

ID3 Session: From spectroscopy to relativity

Chair: Wojciech Gawlik, Jagiellonian University, Krakow, Poland

ID3-1-FRI 08:30

Selective reflection spectroscopy at a vapour calcium fluoride interface

T. Passerat de Silans, I. Maurin, D. Bloch, A. Laliotis, M. Romanelli, P. Chaves de Souza Segundo, M. Ducloy, Université Paris-13, Villetaneuse, France; D. Sarkisyan, Armenian Academy of Sciences, Ashatarak-2, Armenia

Calcium fluoride exhibits surface resonances in the thermal infrared range. It is a good candidate to demonstrate a vacuum temperature dependence in atom-surface interaction. We report on preliminary experiments with a dedicated vapour cell.

ID3-2-FRI 08:45

Broad spectral bandwidth frequency-modulation spectroscopy

J. Mandon, G. Guelachvili, N. Picqué, C.N.R.S. - Laboratoire de Photophysique Moléculaire, Orsay, France

A new spectroscopic method offering sensitivity, resolution, and broad spectral bandwidth based on high frequency modulation is presented. Both the absorption and the dispersion associated with the spectral feature can be measured simultaneously.

FRIDAY / ORAL

ROOM 5

IF7-3-FRI 09:00

Vertically emitting AlAs/GaAs microcavities with quality factors exceeding 110.000

M. Strauß, A. Löffler, S. Reitzenstein, C. Hofmann, M. Kamp, S. Höfling, A. Forchel, University of Würzburg, Germany

Record high quality factors exceeding 100.000 and 25.000 for quantum dot micropillar cavities with diameters of 4 µm and 2 µm were achieved for experiments in the field of cavity quantum electrodynamics.

IF7-4-FRI 09:15

CQED-enhanced single photon sources from InGaAs quantum dots

C.Y. Hu, R. Gibson, J.G. Rarity, University of Bristol, United Kingdom; M.S. Skolnick, J.A. Timpson, A.M. Fox, M. Hopkinson, A. Tahraoui, S. Lam, University of Sheffield, United Kingdom

We discuss cavity QED in semiconductor micro-cavities containing quantum dots in the weak and strong coupling regime. We link this to single photon emission efficiency and conditional phase shifts for quantum logic.

IF7-5-FRI 09:30

Normal mode splitting induced by a local Rayleigh scatterer in a microsphere resonator: transition from weak to strong coupling

L. de S. Menezes, Universidade Federal de Pernambuco, Recife-PE, Brazil; A. Mazzei, O. Benson, Humboldt University, Berlin, Germany; S. Götzinger, V. Sandoghdar, ETH Zurich, Switzerland

Similarly to a coupled system composed of an atom and a microcavity mode, a transition from weak to strong coupling is observed when controllably inducing the coupling between two counterpropagating modes in a microsphere resonator.

ROOM 11

CC5-3-FRI 09:00

Holographic 3D intensity shaping of evanescent waves

L.C. Thomson, J. Courtial, University of Glasgow, United Kingdom; G. Whyte, University of Cambridge, United Kingdom; M. Mazilu, University of St Andrews, United Kingdom

Bright structures can be smaller in evanescent waves than in travelling waves. This is important in fields like optical trapping. We investigate here the use of holographic algorithms to create more complex evanescent-wave fields.

CC5-4-FRI 09:15

Multicolor image generation by stacked, computer generated holograms

T. Kämpfe, E.B. Kley, A. Tünnermann, Friedrich-Schiller-University, Jena, Germany

We present design, fabrication and measurement of a stacked diffractive optical element, composed of two phase-only binary computer generated holograms, for creating multicolor images from an RGB - laser beam.

CC5-5-FRI 09:30

Holographic optical manipulation of aerosols

D. McGloin, D.R. Burnham, University of St. Andrews, United Kingdom

We demonstrate the use of holographic optical tweezers to trap and controllably manipulate liquid aerosols. We measure the trapping efficiencies of such airborne tweezers and show that aerosols can easily be coagulated.

ROOM 12

CJ7-3-FRI 09:00

Tunable Raman soliton source using mode-locked Tm/Ho fiber system

S. Kivistö, T. Hakulinen, M. Guina, O.G. Okhotnikov, Tampere University of Technology, Tampere, Finland

We report a femtosecond pulse source based on Tm:Ho-doped silica fiber tunable from 1972 nm to 2150 nm with average power up to 230 mW. Long-wavelength pulse operation was initiated by antimonide saturable absorber mirror.

CJ7-4-FRI 09:15

Spectrum broadening in Raman fiber laser induced by cross-phase modulation

G. Ravet, P. Mégret, Faculté Polytechnique de Mons, Belgium, A.A. Fotiadi, Faculté Polytechnique de Mons, Belgium and Ioffe Physico-Technical Institute of RAS, St. Petersburg, Russia

Cross phase modulation induced by the pump on the stokes waves can cause modulation instability and spectral broadening in Raman fiber lasers. The experimental observation and explanation of this phenomenon are reported.

CJ7-5-FRI 09:30

Single mode single Raman order generator with a liquid filled photonic band-gap fiber

S. Lebrun, P. Delaye, R. Frey, G. Roosen, Laboratoire Charles Fabry de l'Institut d'Optique, Palaiseau, France

Single spatial mode monochromatic Raman generation is reported in an ethanol filled photonic band-gap fiber. The on-purpose limited transmission band enables a high conversion efficiency towards a single Stokes component even at high pump intensities.

ROOM 13a

CA11-3-FRI 09:00

Conduction cooled compact laser for Chemcam instrument

B. Faure, M. Saccoccio, S. Maurice, CNES, Toulouse, France; E. Durand, C. Derycke, J.L. Willeman, S. Raby, Thales Laser, Orsay, France; S. Maurice; CESR, Toulouse, France

A new conduction cooled compact laser for Laser Induced Breakdown Spectroscopy on Mars is presented. The laser emits 30 millijoules pulses on a large range of temperature, with a good spatial quality.

CA11-4-FRI 09:15

Laser ignition of combustion engines: development of an ignition laser

J. Tauer, H. Kofler, G. Tartar, E. Wintner, Photonics Institute, Vienna, Austria

We developed a compact end-pumped solid-state laser for engine ignition. The 15mm long laser delivers ~12mJ pulse energy at pulse durations <1.5ns corresponding to an optical-efficiency of 10% which we consider to be best values.

CA11-5-FRI 09:30

Stabilization of the beatnote of a 1.5 µm dual-frequency laser using a fiber-optic delay line

G. Pillet, L. Morvan, D. Dolfi, J.-P. Huignard, Thales Research and Technology, Palaiseau, France

We report on the stabilization of a dual-frequency laser with an optical fiber delay line. A narrow linewidth (1 Hz) and low phase noise (-105 dBc/Hz at 10 kHz) beatnote at 2 GHz is demonstrated.

ROOM 13b

CB15-2-FRI 09:00

Gain and losses in Terahertz quantum cascade laser

J. Kröll, J. Darmo, K. Unterrainer, Vienna University of Technology, Vienna, Austria; S.S. Dhillon, C. Sirtori, Université Paris 7, Paris, France; X. Marcadet, M. Calligaro, Thales Research & Technology, Orsay, France

We used show broadband terahertz pulses transmitted through terahertz quantum cascade laser to study gain, the losses and the real device temperature

CB15-3-FRI 09:15

Design of mid-IR and THz quantum cascade laser cavities with complete TM photonic bandgap

M. Bahriz, V. Moreau, R. Colombelli, Université Paris-Sud, Orsay, France; O. Crisafulli, O. Painter, California Institute of Technology, Pasadena, USA

We present the design of mid-infrared and THz quantum cascade laser cavities formed from planar photonic crystals with a complete in-plane photonic bandgap. A novel effect in metal-metal waveguides is introduced.

CB15-4-FRI 09:30

THz microcavity lasers with sub-wavelength mode volumes and thresholds in the milli-Ampere range

Y. Chassagneux, R. Colombelli, J. Palomo, Université Paris Sud, Orsay, France; C. Sirtori, S. Barbieri, S. Dhillon, Université Paris 7, Paris, France; H. Beere, J. Alton, D. Ritchie, Cavendish Laboratory, Cambridge, United Kingdom

We demonstrate terahertz microcavity lasers at an emission wavelength of 112micron with ultra-low current thresholds (4 mA) and with sub-wavelength mode volumes. The properties of surface plasmons are exploited to confine the optical mode.

ROOM 14a

CD9-2-FRI 09:00

Slowlight in semi-conductor amplifiers: application to programmable time delays for the control of microwave signals

S. Tonda-Goldstein, P. Berger, D. Dolfi, J.P. Huignard, Thales Research & Technology, Palaiseau, France; J. Chazelas, Thales Airborne Systems, Elancourt, France

The control of time delays of large bandwidth microwave signals for radar applications is demonstrated through slowlight in SOA. Time delays ranging from 5 to 50 ps were measured within 15 GHz bandwidth.

CD9-3-FRI 09:15

All-optical switching of slow light in nonlinear Bragg greating coupler

S. Ha, A.A. Sukhorukov, Yu.S. Kivshar, Australian National University, Canberra, Australia

We reveal novel opportunities for power-controlled switching and slowing down of optical pulses in waveguide couplers with phase-shifted Bragg gratings, combined with suppression of dispersion-induced pulse broadening through enhanced nonlinear self-action in the slow-light regime.

CD9-4-FRI 09:30

Simple scheme for realizing fast light with low distorsion in optical fibers

S. Chin, L. Thévenaz, École Polytechnique Fédéral de Lausanne, Switzerland; M. Gonzalez-Herraez, University of Alcala de Henares, Madrid, Spain

We demonstrate a new and convenient scheme for producing fast light with low distortion based on stimulated Brillouin scattering in optical fibers. This scheme will be helpful for further studies on fast light phenomena.

ROOM 14b

CF9-3-FRI 09:00

Extremely simple, compact, distortion-free, single-prism ultrashort-pulse compressor

S. Akturk, R. Trebino, X. Gu, M. Kimmel, Swamp Optics, Atlanta, USA

A very simple, compact, easily tuned pulse compressor uses only a single prism and a corner-cube. When tuned in wavelength or group-delay dispersion, all distortions automatically cancel out.

CF9-4-FRI 09:15

Advanced femtosecond optics for the UV-VIS-IR range

V. Pervak, Max Plank Institute of Quantum Optics, Garching, Germany; A. Apolonski, Ludwig-Maximilians University, Garching, Germany and Russian Academy of Science, Novosibirsk, Russia; F. Krausz, Max Plank Institute of Quantum Optics, Garching and Ludwig-Maximilians University, Garching, Germany

The chirped mirrors with controlled reflectivity and dispersion of up to 1.5 octaves are reported. The mirror pair allows one to compensate a chirp of the corresponding spectrum, resulting in 2.2-fs pulses.

CF9-5-FRI 09:30

Two-photon induced fluorescence for archaeological applications

D. Artigas, Universitat Politecnica de Catalunya, Barcelona, Spain; I.G. Cormack, University of St Andrews, United Kingdom; P. Loza-Alvarez, L. Sarrado, ICFO-Institut de Ciències Fotòniques, Castelldefels, Spain

Two-photon absorption fluorescence is used for the first time in archaeology. The objective was to detect the presence of paint upon an amphora to recover writing that due to the passage of time was unreadable.

ROOM 14c

JSII3-2-FRI 09:00

Metamaterials with giant optical activity

V.A. Fedotov, E. Plum, A.S. Schwanecke, N.I. Zheludev, University of Southampton, UK; Y. Chen, Rutherford Appleton Laboratory, Didcot, UK

We demonstrate a novel type of chiral photonic metamaterial based on pairs of physically separated mutually twisted planar metal patterns. It exhibits very strong gyrotropy (2500°/mm) in the visible, near-infrared and microwave spectral ranges.

JSII3-3-FRI 09:15

Chiral coupling in T-shaped gold nanodimers

B.K. Canfield, H. Husu, M. Kauranen, Tampere University of Technology, Tampere, Finland; J. Laukkanen, B. Bai, M. Kuittinen, J. Turunen, University of Joensuu, Finland

We observe nanogap-dependent chiral coupling between the dimer bars in arrays of T-shaped gold nanodimers through second-harmonic generation circular-difference measurements. The lineshapes obtained indicate unique chiral symmetry breaking in each array.

JSII3-4-FRI 09:30

Focusing of light by disordered metamaterials

A.P. Mosk, I.M. Vellekoop, University of Twente, Enschede, Netherlands

Disordered photonic materials strongly scatter light. Using CW light with a matched wavefront, we experimentally show that a disordered material can also focus light as sharply as a lens.

ROOM 21

CH3-3-FRI (Invited) 09:00

Photochemical long-period grating fabrication in pure-fused-silica photonic crystal fiber

D.N. Nikogosyan, S.A. Slattery, University College Cork, Ireland; G. Brambilla, University of Southampton, United Kingdom; A.A. Fotiadi, Faculté Polytechnique de Mons, Belgium

We report the fabrication of a long-period grating in a pure-fused-silica photonic crystal fiber. The characteristic fluence value for the inscription is an order of magnitude less than that for a standard telecom fiber.

CH3-4-FRI 09:30

Robust multiplex CARS microscope based on photonic crystal fibre supercontinuum

B. von Vacano, L. Meyer, M. Motzkus, Philipps-Universität Marburg, Germany

Multiplex CARS microscopy allows rapid 3D-chemical imaging. We present an affordable and robust setup, implemented with a single laser, photonic crystal fibre and selected interference filters for beam management. Applications in material characterization are shown.

CH3-5-FRI 09:45

Fiber Bragg-grating (FBG) resonators for high-sensitivity multi-parameter sensing

G. Gagliardi, P. De Natale, P. Ferraro, M. Salza, CNR-Istituto Nazionale di Ottica Applicata (INOA) and European Laboratory for NonLinear Spectroscopy, Pozzuoli, Italy

Recently-developed methods for dynamic interrogation of high-finesse FBG resonators, based on active laser-frequency locking, are described and tested. Their application as high-sensitivity strain and temperature sensors as well as chemical analyzers for liquids is discussed.

ROOM BOR2

ID3-3-FRI 09:00

Compensation of ac Stark and Zeeman shifts in Doppler-free nonlinear Faraday rotation in rubidium vapour

R.Kh. Drampyan, Armenian National Academy of Sciences, Ashtarak, Armenia; A.D. Greentree, Univ. of Melbourne, Victoria, Australia; A.V. Durrant, The Open Univ., Milton Keynes, UK

The role of ac Stark shift in nonlinear Faraday rotation with counter-propagating light beams is considered by observations of Doppler-free rotation signals across all hyperfine and crossover resonances of the D2 line of 87Rb atoms.

ID3-4-FRI 09:15

Nonlinear controlling the angular momentum of a solitary wave cluster

A. Fratalocchi, G. Assanto, A. Piccardi, M. Peccianti, University 'Roma Tre', Rome, Italy

We demonstrate an original method to nonlinearly control the angular momentum of a soliton cluster. Theoretical predictions are experimentally verified in liquid crystals by observing power-dependent rotation of a two-soliton cluster.

ID3-5-FRI (Invited) 09:30

Modern optical tests of special relativity

A. Peters, S. Herrmann, K. Möhle, A. Senger, Humboldt University Berlin, Germany

This talk will present a modern Michelson-Morley experiment testing the isotropy of the speed of light using rotating optical cavities. The current status of this and other tests of Lorentz-invariance in electrodynamics will be discussed.

FRIDAY / ORAL

ROOM 5

IF7-6-FRI 09:45

Entanglement-assisted delayed-choice experiment

X. Ma, A. Qarry, N. Tetik, T. Jennewein, A. Zeilinger, Institute for Quantum Optics and Quantum Information, Vienna, Austria

The wave and particle duality of light is illustrated in counterintuitive way by Wheelers delayed-choice GedankenExperiment. Here we report a experimental realization of that assisted by polarization entanglement of photon pairs.

10:30 – 12:00

IF8 Session: Quantum optics in matter

Chair: Thomas Puppe, Max-Planck-Institut für Quantenoptik, Garching, Germany

IF8-1-FRI 10:30

Deflection of slow light in a Stern-Gerlach magnetic field

L. Karpa, M. Weitz, Bonn University, Germany

Associated with light propagation under EIT conditions are dark polaritons, which are hybrid atom-light quasiparticles. With a Stern-Gerlach-like beam deflection experiment we demonstrate that these excitations have an effective magnetic moment.

ROOM 11

CC5-6-FRI 09:45

Simultaneous recording of digital holograms using a two-wavelength femtosecond laser source

T. Hansel, U. Griebner, G. Steinmeyer, R. Grunwald, Max-Born-Institute, Berlin, Germany; C. Falldorf, C. von Kopylow, W. Jüptner, BIAS, Bremen, Germany

The simultaneous generation of two femtosecond pulses spectrally separated by 14 nm for 2-lambda contouring is reported. Digital holograms were simultaneously recorded at 776 nm and 790 nm.

ROOM 12

CJ7-6-FRI 09:45

Generation of subnanosecond pulses in a cascaded Raman laser

N.Y. Joly, S. Randoux, P. Suret, Université des Sciences et Technologies de Lille, Villeneuve d'Ascq, France

We present a ring-cavity cascaded Raman fibre laser for which the dynamics of the fourth Stokes component exhibits subnanosecond pulses. The repetition rate of these pulses corresponds to the FSR of the laser itself.

10:30 – 12:00

CJ8: Fibre based sources

Chair: Philippe Roy, Faculté des Sciences et Techniques, Limoges, France

CJ8-1-FRI 10:30

Low cost 60 ps, 1.33 MW peak power, 50 kHz repetition rate, pulsed microchip laser fiber amplifier system

D. Nodop, O. Schmidt, J. Limpert, A. Tünnermann, Friedrich-Schiller University, Jena, Germany; M. Guina, Tampere University of Technology and RefleKron Ltd., Tampere, Finland; R. Hohmuth, W. Richter, BATOP GmbH, Semiconductor optoelectronic devices, Weimar, Germany

We present an inexpensive and compact picosecond laser source. A passively q-switched microchip laser is amplified by an ytterbium doped PCF fiber in double-pass configuration to 60ps pulses, 50kHz repetition-rate and 1.33 MW peak power.

ROOM 13a

CA11-6-FRI 09:45

Tunable operation of a high spectral purity continuous singly resonant optical parametric oscillator between 606 and 640nm

T.H. My, F. Bretenaker, C. Drag, Laboratoire Aimé Cotton, Orsay, France; J.-M. Melkonian, Office National d'Etudes et de Recherches Aérospatiales, Palaiseau, France

A continuous wave 532-pumped singly resonant optical parametric oscillator using a MgO-doped periodically poled stoichiometric lithium tantalite crystal is developed. The signal frequency is tunable from 606 to 640nm and stabilized on an external reference.

ROOM 13b

CB15-5-FRI 09:45

Efficient THz source using GaAs and InGaAs nipnip photomixers

S. Preu, F. Renner, S. Malzer, G.H. Döhler, L.J. Wang, University Erlangen-Nuremberg, Erlangen, Germany; M. Hanson, T.L.J. Wilkinson, A.C. Gossard, E.R. Brown, University of California, Santa Barbara, USA

We report on efficient ballistic-transport enhanced GaAs and InGaAs nipnip superlattice CW-THz sources with a transit-time 3dB-frequency up to 1 THz and independently designable RC-roll-off. 1 microwatt output power at 400 GHz has been achieved.

10:30 – 12:00

CI8 Session: Novel transmission techniques

Chair: Dan Kilper, Bell Laboratories, Lucent Technologies, Holmdel, NJ, USA

CI8-1-FRI 10:30

Flat-top pulse enabling 640 Gb/s OTDM demultiplexing

L.K. Oxenløwe, M. Galili, H.C.H. Mulvad, P. Jeppesen, Technical University of Denmark, Lyngby, Denmark; J. Azaña, Y. Park, Institut National de la Recherche Scientifique, Montréal, Canada; R. Slavík, Institute of Photonics and Electronics, AS CR, Prague, Czech Republic

We present the first ever use of flat-top pulses for 640 Gb/s switching, and we demonstrate a significant improvement of the tolerance to timing jitter, enabling error free 640 to 10 Gb/s demultiplexing

ROOM 14a

CD9-5-FRI 09:45

Slow light and all-optical delay lines using cavity solitons in semiconductor lasers

F. Pedaci, S. Barland, P. Genevet, E. Caboche, M. Giudici, J.R. Tredicce, Institut Non Linéaire de Nice, Valbonne, France; G. Tissoni, Università dell' Insubria, Como, Italy; W.J. Firth, A.J. Scroggie, T. Ackemann, G.-L. Oppo, University of Strathclyde, Glasgow, United Kingdom

Cavity solitons, besides their bistability and mutual independence, have unique plasticity properties. We take advantage of these to demonstrate an all-optical delay line based on cavity solitons in a semiconductor laser with optical injection.

10:30 – 12:00

CD10 Session: Engineered supercontinua

Chair: Neil Broderick, University of Southampton, United Kingdom

CD10-1-FRI 10:30

Supercontinuum generation of femtosecond filaments at different laser wavelengths in air

L. Bergé, S. Skupin, CEA/DAM Ile de France, Bruyères-le-Châtel, France

Supercontinuum generation by femtosecond filaments in air is investigated numerically for different laser wavelengths ranging from ultraviolet to infrared. Maximal broadening is observed for large wavelengths and long filamentation ranges.

ROOM 14b

CF9-6-FRI 09:45

Ultra-short pulse lasers in geological fluid inclusion analysis

P. Stoller, J. Ricka, M. Frenz, University of Bern, Switzerland; Y. Krüger, LFA - Labor für Fluideinschluss-Analytik, Bern, Switzerland

Metastable fluid inclusion phase states which prevent microthermometric measurements were overcome using amplified ultrashort laser pulses. We three-dimensionally imaged quartz inclusions using second harmonic generation microscopy, enabling determination of volumetric properties of the fluid.

10:30 – 12:00

CF10 Session: Semiconductor devices and Terahertz technology

Chair: Stefan Lochbrunner, Ludwig-Maximilians University, Munich, Germany

CF10-1-FRI 10:30

Time resolved spectroscopy of dynamics in mid infrared quantum cascade lasers below and above threshold

W. Parz, T. Müller, M. Austerer, G. Strasser, K. Unterrainer, Vienna University of Technology, Austria; L.R. Wilson, J.W. Cockburn, J.S. Roberts, A.B. Krysa, University of Sheffield, United Kingdom

We present data of the dynamics of quantum cascade lasers measured by means of midinfrared timedomain spectroscopy. We observe gain clamping, time resolved spectral narrowing and we derive gain and loss coefficients.

ROOM 14c

JSII3-5-FRI 09:45

Second order nonlinear response of gold nanostructures on lithium niobate

C. Helgert, E.-B. Kley, T. Pertsch, C. Rockstuhl, A. Tünnermann, Friedrich Schiller University, Jena, Germany

Absorption in metal nanostructures can potentially be compensated by a nonlinear gain-mechanism. We report on linear and nonlinear studies of gold nanodiscs on a lithium niobate (LiNbO3) substrate fabricated by e-beam lithography.

10:30 – 12:00

JSII4 Session: Metamaterials – II

Chair: Zhang Xiang, University of California, Berkeley, CA, USA

JSII4-1-FRI (Invited) 10:30

Single negative, double negative, low loss negative metamaterials-II

V.M. Shalaev, U.K. Chettiar, H.-K. Yuan, W. Cai, V.P. Drachev, A.V. Kildishev, Birck Nanotechnology Center, Purdue University, West Lafayette, IN, USA; T.A. Klar, Ludwig-Maximilians-University Munich, Germany and Purdue University, West Lafayette, IN, USA; A. Boltasseva, DTU, Research Center COM and Nanophotonics, Lyngby, Denmark and Purdue University, West Lafayette, IN, USA

We deliberately control one or several parameters out of the quadruple of imaginary and real parts of permittivity and permeability. Optical magnetism throughout the visible range and dual band negative index metamaterials will be discussed.

ROOM 21

10:30 – 12:00

CH4 Session: Optical spectroscopy and precision metrology

Chair: Hanne Ludvigsen, University of Technology, Helsinki, Finland

CH4-1-FRI 10:30

Optical Vernier spectrometer broad band, high resolution, high sensitivity

C. Gohle, A. Schliesser, T. Udem, T.W. Hänsch, Max-Planck-Institut für Quantenoptik, Garching, Germany; B. Stein, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

A device is presented that uses the coherence of a absolutely calibrated frequency comb to record absorbtion and dispersion spectra of a sample with cavity enhanced sensitivity and cw laser resolution over THz of bandwidth.

ROOM BOR2

10:30 – 12:00

IB6 Session: Novel interactions in ultracold gases

Chair: Martin Zwierlein, Massachusetts Institute of Technology, Cambridge, MA, USA

IB6-1-FRI 10:30

Collisional properties of ultracold Chromium: towards a purely dipolar quantum gas

T. Koch, B. Fröhlich, T. Lahaye, M. Fattori, A. Griesmaier, T. Pfau, 5. Physikalisches Institut, Stuttgart, Germany

Besides the usual contact interaction, Chromium BECs show magnetic dipole-dipole interactions. We report on experiments towards a purely dipolar quantum gas using a Feshbach resonance to tune the scattering length to zero.

ROOM 5

IF8-2-FRI 10:45

A novel type of matter wave interferometer for molecules

S. Gerlich, L. Hackermueller, F. Goldfarb, A. Stibor, H. Ulbricht, M. Arndt, University of Vienna, Austria; K. Hornberger, Ludwig-Maximilians-University, Munich, Germany; T. Savas, Massachusetts Institute of Technology, Cambridge, USA

We have realized a new type of matter-wave interferometer which is especially promising for applications with highly polarizable molecules in the mass range of up to several thousand atomic mass units.

IF8-3-FRI 11:00

Two-mode entangled radiation from single atoms

G. Morigi, Universitat Autonoma de Barcelona, Bellaterra, Spain; D. Vitali, S. Mancini, University of Camerino, Italy; J. Eschner, ICFO-Institute of Photonic Sciences, Castelldefels (Barcelona), Spain; L. Davidovich, Universidade Federal do Rio deJaneiro, Rio de Janeiro, Brazil; S. Pielawa, Universitat Autonoma de Barcelona, Bellaterra and ICFO-Institute of Photonic Sciences, Castelldefels (Barcelona), Spain; P. Cañizares, Universitat Autonoma de Barcelona, Bellaterra, Spain and University of Camerino, Italy

We present and analyse several schemes to quantum-coherently generate two-mode squeezed (EPR-entangled) radiation in the pulsed or continuous regime, based on single atoms excited by an external field, which pump coherently a high-finesse resonator.

ROOM 12

CJ8-2-FRI 10:45

Optimization of a passively Q-switched double clad Yb^{3+}:Cr^{4+} all fibre laser

B. Dussardier, L. Labonté, A. Saïssy, Université de Nice Sophia Antipolis, Nice, France

We report on the optimization through modeling of a passively Q-switched (PQS) all-fiber laser built around spliced Yb-doped amplifier and Cr-doped saturable-absorber (SA) fibers. The PQS stability versus pump power and SA concentration is investigated.

CJ8-3-FRI 11:00

Distributed gain in a Tm-doped silica fiber - experiment and modelling

S.R. Lüthi, M.L. Sundheimer, A.S.L. Gomes, Universidade Federal de Pernambuco, Recife, Brazil; B. Dussardier, W. Blanc, Université de Nice-Sophia Antipolis, Nice, France; P. Peterka, Academy of Sciences of the Czech Republic, Prague, Czech Republic

Gain spectra and distributed gain at 1490 nm in a thulium-doped aluminosilicate fiber are measured and numerically modeled for several pump schemes. The model predicts that 20-dB gain is possible for an optimized fiber design.

ROOM 13b

CI8-2-FRI 10:45

New transmitter-side dispersion compensation technique using analog predistorsion for 10 Gbit/s signals

L.M. Ranzani, B. Boffi, M. Martinelli, Politecnico di Milano, Italy

We propose a simple optical chromatic dispersion compensation technique, operating in the microwave domain at the transmitter by using a linear nested modulator. Preliminary performance results on 10 Gbit/s NRZ signals are described.

CI8-3-FRI (Invited) 11:00

Ultrafast optical transmission technologies

R. Ludwig, C. Schmidt-Langhorst, C. Schubert, B. Hüttl, H.G. Weber, FhG Heinrich-Hertz-Institute, Berlin, Germany

The paper reviews ultrahigh-speed data transmission in optical fibers based on optical time division multiplexing. Optical signal processing in the transmitter and receiver as well as the requirements on ultrahigh-speed data transmission are discussed.

ROOM 14a

CD10-2-FRI 10:45

Numerical simulation of continuum generation in a multimode nonlinear waveguide

T. Chaipiboonwong, W.S. Brocklesby, P. Horak, J.D. Mills, University of Southampton, United Kingdom

Numerical simulations are utilised to study pulse propagation in a nonlinear multimode waveguide. Spatial and spectral interferences leading to unique features in the nonlinear spectral broadening are discussed.

CD10-3-FRI 11:00

Light reflection from a Bragg grating during continuum generation

P.S. Westbrook, J.W. Nicholson, K.S. Feder, OFS Labs, Somerset, USA

We measure the light reflected from a fiber Bragg grating when a highly nonlinear pulse generates a continuum in the fiber. Significant reflected light is observed both inside and outside of the grating bandgap.

ROOM 14b

CF10-2-FRI 10:45

Cascadability and efficiency of a saturable absorber device inserted into a SMF transmission line for future 160Gbit/s all-optical reshaping applications

J. Fatome, S. Pitois, G. Millot, Université de Bourgogne, Dijon, France; D. Massoubre, J.-L. Oudar, Laboratory for Photonic and Nanostructures, CNRS, Marcoussis, France

A saturable absorber has been successfully cascaded into a SMF transmission line to annihilate the ghost-pulse phenomenon in the "...01010101..." 160Gbit/s 2-bit pattern at 1555nm. Recirculating-loop experiments show a 6dB extinction ratio enhancement over 800km.

CF10-3-FRI 11:00

Ultrafast gain recovery in quantum dot based semiconductor optical amplifiers

J. Gomis, Universitat de Valencia, Spain and University of Dortmund, Germany; S. Dommers, V.V. Temnov, U. Woggon, University of Dortmund, Germany; J. Martinez-Pastor, Universitat de Valencia, Spain; M. Laemmlin, D. Bimberg, Tecnical University, Berlin, Germany

We study the gain dynamics in QD-based SOAs after excitation with fs-pulse trains of THz repetition rates. Direct capture from the wetting layer is identified as the dominant capture mechanism in the high current regime.

ROOM 14c

JSII4-2-FRI 11:00

A double cell metamaterial for independent tuning of the magnetic and electric response

E. Pshenay-Severin, T. Pertsch, F. Garwe, J. Petschulat, C. Rockstuhl, F. Lederer, E.-B. Kley, C. Helgert, Friedrich Schiller University, Jena, Germany; U. Hübner, Institute for Physical High Technology, Jena, Germany; A. Tünnermann, Fraunhofer Institute Jena, Germany

We present an effective approach to tune the resonances in double-wire metamaterials. The influence of additional metal stripes is investigated to modify independently the electric and the magnetic response.

ROOM 21

CH4-2-FRI 10:45

Infrared mapping of material and doping contrasts in microelectronic devices at nanoscale spatial resolution

A. Huber, F. Keilmann, R. Hillenbrand, Max-Planck-Institute of Biochemistry, Martinsried, Germany; J. Wittborn, Infineon Technologies AG, Munich, Germany

We demonstrate that infrared scattering-type scanning near-field optical microscopy (s-SNOM) allows mapping of different materials and electron concentrations in cross-sectional samples of industrial integrated circuit device structures at nanoscale spatial resolution.

CH4-3-FRI 11:00

Femto-Newton sensitivity opto-mechanical force measurement

F. Mueller, S. Heugel, L.J. Wang, University Erlangen-Nuremberg, Erlangen, Germany

We use a high-Q macroscopic torsional oscillator for measuring radiation pressure with a sensitivity at the femto-Newton force level. We discuss opto-mechanical coupling, its effects and thermal limit.

ROOM BOR2

IB6-2-FRI 10:45

Ultracold heteronuclear molecules created from quantum gases

C. Ospelkaus, S. Ospelkaus, K. Bongs, L. Humbert, P. Ernst, K. Sengstock, F. Deuretzbacher, K. Plassmeier, D. Pfannkuche, University of Hamburg, Germany

We present the first realization of ultracold heteronuclear molecules in an optical lattice and discuss novel theoretical results on the binding energies and lifetimes of the molecules in comparison to experimental data.

IB6-3-FRI 11:00

Transport properties in a Mott-like state of molecules

N. Syassen, D.M. Bauer, T. Volz, M. Lettner, D. Dietze, S. Dürr, G. Rempe, Max-Planck-Institut für Quantenoptik, Garching, Germany

We study the transport properties in a Mott-like state of molecules with a single Feshbach molecule on each site of an optical lattice. A loss-induced suppression of tunneling is indicated by the experiment.

NOTES

FRIDAY / ORAL

ROOM 5

IF8-4-FRI 11:15

Bell states generation within the bandwidth of spontaneous parametric down-conversion

M.V. Chekhova, Moscow State University, Moscow, Russia; G. Brida, M. Genovese, L.A. Krivitsky, Istituto Nazionale di Ricerca Metrologica, Turin, Italy

We demonstrate various Bell states generation within the bandwidth of spontaneous parametric down-conversion. For collinear frequency-degenerate type-II case, one of the triplet states is generated at the center and the singlet state, on the slopes.

IF8-5-FRI 11:30

Experimental mesoscopic coherence by parametric amplification of a single photo

F. Sciarrino, Res. Center "Enrico Fermi" and Sapienza Univ. di Roma, Italy; T. De Angelis, F. De Martini, E. Nagali, Sapienza Univ. di Roma, Italy

We investigate multiphoton states generated by high-gain optical parametric amplification of a single photon, polarization encoded as a qubit. The interference patterns showing the coherence of the mesoscopic amplified field involving 4000 photons are reported.

IF8-6-FRI 11:45

Measurement of the phonon decoherence in diamond using spectral interference of stokes emission

F.C. Waldermann, J. Nunn, K. Surmacz, Z. Wang, D. Jaksch, I.A. Walmsley, University of Oxford, United Kingdom; P. Olivero, S. Prawer, University of Melbourne, Australia

Spectral interference is a powerful tool to characterise ultrafast phenomena with phase precision. In this work, we exploit spectral interference fringes to probe the coherent generation of phonons in diamond and to measure their lifetime.

ROOM 12

CJ8-4-FRI 11:15

High power broadband Tm-doped superfluorescent fibre source at 2 μm

D.Y. Shen, L. Pearson, J.K. Sahu, W.A. Clarkson, University of Southampton, United Kingdom

High power and highly efficient operation of double-ended broadband Tm-doped superfluorescent fibre source is described. Over 15W of combined output was obtained with an overall slope efficiency with respect to launched pump power of 42%.

CJ8-5-FRI 11:30

Theory of monochromatic light amplification in multicore fiber lasers

A.P. Napartovich, N.N. Elkin, V.N. Troshchieva, D.V. Vysotsky, Troitsk Institute for Innovation and Fusion Research, Troitsk, Russia

Predominant amplification of an optical mode with lower modal gain in 7-core fiber amplifer is numerically revealed and explained theoretically. Mode beating and gain cross saturation are a key factors responsible for this effect.

CJ8-6-FRI 11:45

Spectral combining of fiber amplified pulsed diode lasers

S. Klingebiel, B. Ortac, F. Röser, O. Schmidt, J. Limpert, Friedrich-Schiller-University, Jena, Germany; A. Tünnermann, Friedrich-Schiller-University, Jena and Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

Spectral combining of pulsed nanosecond lasers is demonstrated. Two fiber amplified directly modulated wavelength tunable external cavity diode lasers serve as independent seed source. Spatial and temporal overlap is realized.

ROOM 13b

CI8-4-FRI 11:30

Transmission impairments for 298.2Gbit/s coherent WDM over 600km of standard single mode fibre

B. Cuenot, A.D. Ellis, F.C.G. Gunning, M. McCarthy, T. Healy, Photonic Systems Group and Tyndall National Institute, UCC, Cork, Ireland

298.2Gbit/s NRZ Coherent WDM transmission over a multiply amplified SSMF link is investigated for the first time. The overall performance is approximately equivalent to a standard WDM system with 42.6Gbit/s channels, but with higher ISD.

CI8-5-FRI 11:45

0.6Tbit/s capacity and 2bit/s/Hz spectral efficiency at 42.6Gsymbol/s using a single DFB laser with NRZ coherent WDM and polarisation multiplexing

F.C.G. Gunning, A.D. Ellis, T. Healy, X. Yang, Photonic Systems Group and Tyndall National Institute, UCC, Cork, Ireland

In this paper we report the achievement of ~0.6Tbit/s of capacity using a single DFB laser combined with NRZ Coherent WDM and Polarisation Multiplexing. A spectral efficiency of almost 2 bit/s/Hz is obtained, with error-free performance.

ROOM 14a

CD10-4-FRI 11:15

Long period fibre gratings for tunable spectral enhancement of a supercontinuum

J.A. Bolger, D.R. Austin, D.-I. Yeom, B.T. Kuhlmey, C.M. de Sterke, B.J. Eggleton, University of Sydney, Australia

We demonstrate tunable spectral enhancement of an ultrafast broadband supercontinuum using a UV-written long-period fibre grating, in a compact all-fibre geometry.

CD10-5-FRI 11:30

Simultaneous observation of multiple four-wave mixing processes in the phase-matched and non-phase-matched regimes

J. Schroeder, S. Coen, F. Vanholsbeeck, Univ. of Auckland, New Zealand; A. Boucon, T. Sylvestre, Univ. de Franche-Comté, Besançon, France

Three four-wave mixing processes are simultaneously observed in a fiber. Two are phase-matched, through higher-order dispersion and Kerr nonlinearity respectively, while the third one is Raman-assisted and involves an incoherent pump.

CD10-6-FRI 11:45

Theory of the radiation trapping at the blue edge of supercontinuum and two-frequency quasi-solitons existing across the zero dispersion point

D.V. Skryabin, A.V. Gorbach, University of Bath, United Kingdom

We present theory explaining the long-standing problem of formation, temporal localization and frequency shift of the radiation associated with spectral peaks at the blue edge of supercontinua generated in silica core photonic crystal fibers

ROOM 14b

CF10-4-FRI 11:15

Tunable Terahertz emission from an electron bunch interacting with modulated laser pulses

M. Hosaka, Y. Takashima, Nagoya Univ. Graduate School of Engineering, Nagoya, Japan; M. Shimada, A. Mochihashi, S. Kimura, M. Katoh, UVSOR, IMS, Okazaki, Japan; T. Hara, SPRING-8/IMS, Hyogo, Japan; C. Evain, S. Bielawski, C. Szwaj, Lab. PhLAM/CERLA, Villeneuve d'Asq, France; T. Takahashi, KURRI, Kyoto Univ., Osaka, Japan

We excite experimentally the electron bunch of a storage ring accelerator, with specially shaped laser pulses. When the pulses possess a longitudinal sinusoidal modulation, coherent terahertz radiation with adjustable bandwidth and wavelength is emitted.

CF10-5-FRI 11:30

Wire pair negative-index material at Terahertz frequencies

M. Awad, H. Kurz, M. Nagel, RWTH Aachen - Ins. of Semiconductor Electronics, Aachen, Germany

We present measurements on a free-standing wire pair (H-pair) negative index material in the THz frequency range and compare the results with finite element simulations.

CF10-6-FRI 11:45

High repetition-rate sub-picosecond source of fibre-amplified vertical-external cavity surface-emitting semiconductor laser pulses

S.P. Elsmere, Z. Mihoubi, A. Quarterman, A.C. Tropper, Univ. of Southampton, UK; P. Dupriez, J. Nilsson, Optoelectronics Res. Centre, Southampton, United Kingdom; J.S. Roberts, Univ. of Sheffield, UK

We report a 6-GHz fundamental repetition-rate source of 900-fs pulses with 1.1-W average power at 1044 nm, based on ytterbium-doped fibre amplification of a Stark mode-locked vertical-external-cavity surface-emitting semiconductor laser.

ROOM 14c

JSII4-3-FRI 11:15

Long pulse delays in thin metamaterial slabs

N. Papasimakis, V.A. Fedotov, N.I. Zheludev, University of Southampton, United Kingdom; S.L. Prosvirnin, National Academy of Sciences of Ukraine, Kharkov, Ukraine

We demonstrate a novel way of achieving long pulse delays with minimal loss by exciting dark modes that are weakly coupled to free space radiation in structured metal-dielectric films of vanishing thickness.

JSII4-4-FRI 11:30

Far-field investigation of slow-light propagating below the light cone in planar photonic structures

N. Le Thomas, R. Houdré, École Polytechnique Fédérale de Lausanne, Switzerland; L.H. Frandsen, J. Fage-Pedersen, A.V. Lavrinenko, P.I. Borel, Com Dtu, Technical Univ., Lyngby, Denmark

A far-field technique is used to investigate the properties of optical waves propagating below the light cone in nanophotonic structures. As an example, dispersion curves for slow-light in photonic crystal waveguides are retrieved.

JSII4-5-FRI 11:45

Achieving sharp resonances in metamaterials through symmetry breaking

V.A. Fedotov, N. Papasimakis, N.I. Zheludev, M. Rose, University of Southampton, United Kingdom; S.L. Prosvirnin, National Academy of Science of Ukraine, Kharkov, Ukraine

We report on the new way of achieving sharp transmission and reflection resonances in sub-wavelength structured artificial materials.

ROOM 21

CH4-4-FRI 11:15

Presision measurements of weak forces and small mechanical deformations with the adaptive holographic interferometer

V.M. Petrov, Darmstadt Univ. of Technology, Darmstadt, Germany and A.F. Ioffe Physical Technical Ins., St. Petersburg, Russia; M.P. Petrov, V.V. Bryksin, A.F. Ioffe Physical Technical Ins., St. Petersburg, Russia; J. Petter, T. Tschudi, Darmstadt Univ. of Technology, Darmstadt, Germany

We report on the theoretical and experimental investigations of the small periodical deformations of the macro-objects caused by the light pressure and by the Casimir force. The measurements were performed with an original super-sensitive holographic interferometer.

CH4-5-FRI 11:30

Development of a ground prototype of a quantum cascade laser heterodyne radiometer operating in the mid infrared

D. Weidmann, W.J. Reburn, K.M. Smith, Ruther-ford Appleton Laboratory, Oxfordshire, UK

A frequency-tunable quantum cascade laser heterodyne radiometer operating in the mid-infrared has been developed and deployed in laboratory and field measurements. Instrument performance is assessed through analysis of retrieved atmospheric ozone profiles.

CH4-6-FRI 11:45

Heterodyne interferometer with sub-nm sensitivity in translation measurement and sub-µrad sensitivity in tilt measurement for the LISA inertial sensor

T. Schuldt, EADS-Astrium GmbH, Friedrichshafen, Humboldt Universität zu Berlin and Hochschule für Technik, Wirtschaft und Gestaltung, Konstanz, Germany; D. Weise, U. Johann, EADS-Astrium GmbH, Friedrichshafen, Germany; M. Gohlke, EADS-Astrium GmbH, Friedrichshafen and Humboldt Universität zu Berlin, Germany; A. Peters, Humboldt-Universität zu Berlin, Germany; C. Braxmaier, Hochschule für Technik, Wirtschaft und Gestaltung, Konstanz and EADS-Astrium GmbH, Friedrichshafen, Germany

We present and discuss translation and tilt measurements of our high-sensitivity heterodyne interferometer, which serves as a demonstrator for an optical readout of the free flying proof masses aboard the LISA satellites.

ROOM BOR2

IB6-4-FRI (Invited) 11:15

Excitation of Rydberg atoms in a Bose-Einstein condensate

R. Löw, U. Raitzsch, R. Heidemann, V. Bendkowsky, B. Butscher, T. Pfau, Stuttgart University, Germany

We present our experimental results on the excitation of Rydberg atoms in a Bose-Einstein condensate in the strong blockade regime and the underlying coherent quantum dynamics of mesoscopic systems.

IB6-5-FRI 11:45

Quantus - degenerate quantum gases in microgravity

W. Lewoczko-Adamczyk, M. Schiemangk, A. Peters, T. van Zoest, Humboldt Univ. Berlin, Germany; E. Rasel, W. Ertmer, Univ. Hannover, Germany; A. Vogel, K. Bongs, K. Sengstock, S. Wildfang, Univ. of Hamburg, Germany; T. Könemann, W. Brinkmann, C. Lämmerzahl, H. Dittus, ZARM Univ. Bremen, Germany; T. Steinmetz, J. Reichel, Lab. Kastler-Brossel, Paris, France; G. Nandi, W.P. Schleich, R. Walser, Ulm Univ., Germany

We present a compact, based on atom chip, setup for experiments with BEC under microgravity condition at the drop tower. Currently, evaporation in magnetic trap, the last stage on the way to BEC, is implemented.

NOTES

CLEO®/Europe-IQEC 2007 Authors' Index

AUTHORS' INDEX

AUTHORS' INDEX

AUTHORS' INDEX

AUTHORS' INDEX

AUTHORS' INDEX

AUTHORS' INDEX

Conference Registration Form

CLEO®/Europe—IQEC 2007, 17–22 June 2007, ICM Munich, Germany

Please return form to:

EPS Conferences
6, rue des Frères Lumière • BP 2136
F-68060 Mulhouse cedex FRANCE

Payment Information: Please register only one person per form. This form can be copied for additional registrants. **Payment is to be made in euros. Registration forms received without payment, or information as to how payment will be made, will not be accepted.**

SECTION A Badge Information

Last (family) Name: ______ Prof / Dr / Mr / Mrs / Ms / Miss (circle relevant title)

First (given) Name: ______ Middle Initial(s): ______

Company/Institute: ______

Department: ______

Address: ______

City: ______ Postcode (ZIP NO): ______

Country: ______

Phone: *(with country code)* ______ Fax: *(with country code)* ______

Email: ______

SECTION B: Society Membership (Tick all that apply)

- ❑ European Physical Society (Individual Member)
- ❑ IEEE/LEOS
- ❑ Optical Society of America
- ❑ National Physical Society that is a member of the European Physical Society *
  * Name of Society ______

SECTION C: Registration Fees

The registration fee includes admission to all CLEO®/Europe-IQEC 2007 technical sessions as well as all conferences collocated with Laser 2007. It includes admission to the technical exhibition.It includes coffee breaks (Monday through Friday morning) and a free conference reception which will take place downtown on Wednesday evening 20 June 2007 provided registration is done. One copy of the technical digest in CD-format is included for the full paying fee. The one-day registration does not include the digest.

(*) Applications for the student rates must include a photocopy of an official student identity card, which must also be presented on-site when collecting registration materials.

		Full fee €	One day fee €
EPS/OSA/IEEE/LEOS Members	Regular	❑ 510	❑ 240
	Student	❑ 135	—
Non-Members	Regular	❑ 630	❑ 240
	Student	❑ 165	—

Payment

All forms must be accompanied by payment, purchase order or bank transfer details. (See page 20 for banking details.)

Method of Payment:

- ❑ Cheque in euros
- ❑ Bank transfer (euros only) Please note that the bank fees are payable by the applicant.
- ❑ Visa/Mastercard

NB. American Express and Diners Club cannot be accepted

Card No: ______

Expiration Date: (mm/yy): .... / ....

Signature:

SECTION D: Short Courses

CLEO®/Europe-IQEC 2007 will present two short courses held in parallel on Sunday 17 June 2007 at the LMU Univ. of Munich. These courses require registration in order to have the short course material and will be charged at extra cost.

- ❑ I register for SH1 "Practical OPOs"
- ❑ I register for SH2 "Micro- and Nano-Machined Optics"

Regular	❑ 270
Student	❑ 150

TOTAL: Section C + D € ______

Please return form to:

EPS Conferences
6, rue des Frères Lumière
BP 2136
F-68060 Mulhouse cedex
FRANCE
Fax: +33 389 329 449

European Physical Society

6,rue des Frères Lumière • BP 2136 • 68060 Mulhouse Cedex • France
tel: +33 389 32 94 42 • **fax:** +33 389 32 94 49
website: www.eps.org