# NOVEL SYSTEM FOR MEASURING THE SCATTERING ASSOCIATED TO THE CORNEA AND THE LENS

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## INTRODUCTION

To test a novel technique based on the contrast of Purkinje images (PI) to separate the contribution of the cornea and the lens to the intraocular scattering.

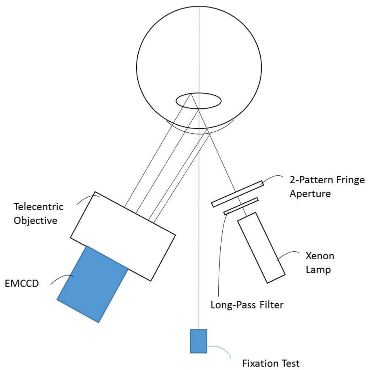
## METHODS

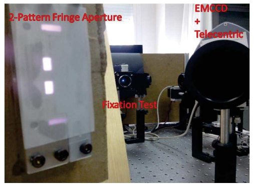
The third (P3) and the fourth (P4) PIs of a 2-fringes pattern aperture illuminated with a xenon lamp attached to a long-pass filter (cut-off 760nm) were recorded using a 14 bits EMCCD camera and a telecentric objective lens

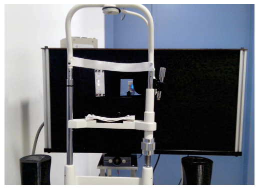
We recorded PIs of a commercial artificial eye (AE1) (OEMI-7, Ocular Instruments) and a customized artificial eye (AE2) (1 meniscus and 2 plano-convex lenses simulating the cornea and lens). Diffusing filters usually used to simulate cataracts (Black Pro Mist 1 (BPM1), 4 (BPM4), single and double Cinegel 3020 (C3020; D-C3020)) were placed in front AE1 to simulate corneal scattering and between the plano-convex lenses in AE2 to resemble cataracts. [1]

We measured PIs and Objective Scatter Index (OSI) (HD Analyzer, Visiometrics SL) of 14 subjects (aged 25 to 72 years old), including healthy eyes (9), and others with corneal disorders (2) and incipient cataracts (3).

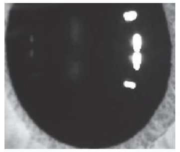
## EXPERIMENTAL SETUP

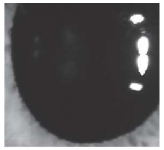


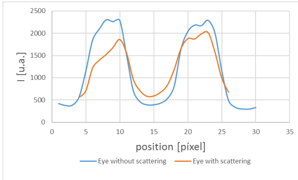



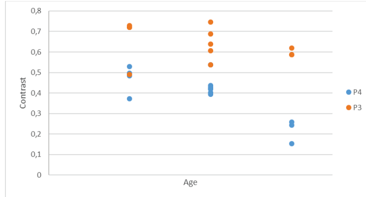
## RESULTS


Eye without scattering


Eye with scattering

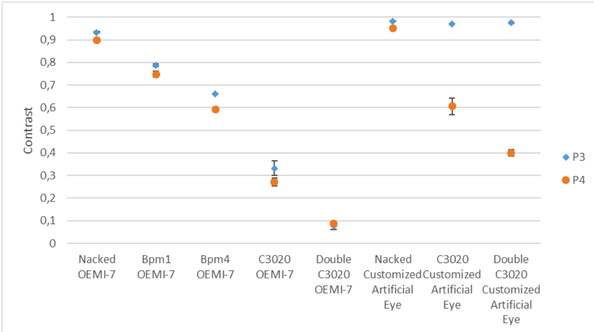


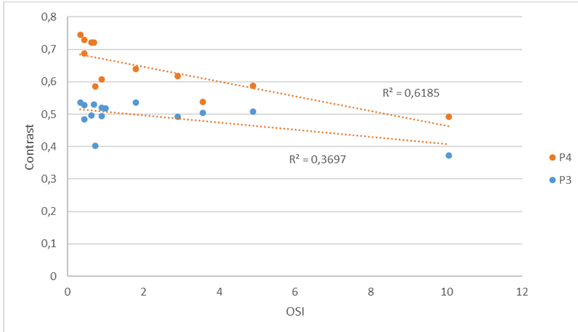

Since P3 showed a strong dependency on age(r=0.74), a factor to compensate for this effect was used (P3+α, where α=0 for age<50, α=0.1 for 50<age<60 and α=0.25 for age>60). [2]




In AE1, mean contrasts (±SD) of P3 and P4 changed with filters (P3: 0.93±0.01 naked eye (NE); 0.79±0.01 BPM1; 0.66±0.01 BPM4; 0.33±0.03 C3020; 0.08±0.02 D-C3020; P4: 0.90±0.01 NE; 0.75±0.01 BPM1; 0.59±0.01 BPM4; 0.27±0.01 C3020; 0.09±0.01 D-C3020). In AE2, P3 remained constant (0.98±0.01 NE; 0.97±0.01 C3020; 0.98±0.01 D-C3020) while P4 decreased (0.95±0.01 NE; 0.61±0.03 C3020; 0.40±0.01 D-C3020).

There were significant differences in P3 between transparent (healthy eyes (0.52±0.02); cataract eyes (0.50±0.01)) and corneas with disorders (0.39±0.02) (t-test p<.001). We also found significant differences in P4 between healthy eyes (0.69±0.05) and those with corneal disorders (0.54±0.07) or lens opacities (0.58±0.04) (t-test p<.005). There was a stronger correlation between OSI and P4 (r2=0.62) than between OSI and P3 (r2=0.37).




## CONCLUSIONS

Preliminary results obtained show the potentiality of the proposed method to separate the contribution of the cornea and lens to the intraocular scattering. Experiments in a large population including eyes with different degree of cataracts and corneal pathologies are being conducted to confirm its clinical usefulness.

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## COMMERCIAL RELATIONSHIPS DISCLOSURE

Pau Santos: Commercial Relationship(s);Visiometrics SL: (Employment) | Meritxell Vilaseca (No Commercial Relationship) | Juan Antonio Martínez-Roda (No Commercial Relationship) | Juan Carlos Ondategui (No Commercial Relationship) | Fernando Díaz-Doutón (No Commercial Relationship) | Jaume Pujol (No Commercial Relationship)

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