



Departamento de  
Física



## Project description

**Project title:** Refractive sensitivity to hyperspectral images

**Student:** Candidate from the Master degree in Optometry and Vision Sciences

**Supervisors:** Francisco Miguel Brardo Ferreira / Assistant professor at the Dep of Physics, UBI  
Vasco Miguel Nina de Almeida / Assistant professor at the Dep of Physics, UBI

### Task description and expected results

Clinical refraction results obtained using standard letter charts (LogMAR chart) will be compared with those obtained using hyperspectral images of complex scenarios, for 18 normal observers. First, normal observers will be classified as having simple refractive errors with standard visual acuity of 6/5 in each eye; 6 emmetropes, 6 simple myopes and 6 simple hyperopes (all with  $<0.50D$  astigmatism). Second, hyperspectral images of complex scenarios will be used to test observer's sensitivity to small changes on the prescription with  $\pm 0.12$  and  $\pm 0.25$  diopters spherical and cylindrical trial lenses and to derive the best images (participant subjective impression) for a particular observer, adjusted to their everyday life. Differences between the two types of prescription will be analyzed. Care will be taken to ensure that laboratory measures of refraction are conducted without knowledge of the clinical refraction outcome.

The experiments will be carried out (1) in a calibrated room for the illuminant during clinical refraction and (2) in precisely calibrated Display++ LCD monitor (Cambridge Research Systems, Rochester, UK) using the ViSaGe Stimulus Processor (Cambridge Research System, Rochester, UK) which is a dedicated graphics equipment to display stimuli with precise colour, luminance, spatial and temporal properties. A High-Speed Eye Tracker 250 Hz (Cambridge Research System, Rochester, UK) or an Eye Tracker 220 Hz (Arrington Research) will be used to relate the preferential looking to the statistic properties of the images. The telespectroradiometer (PR650 from PhotoResearch, US) will calibrate both room and monitor. These equipment's are already available at the University of Beira Interior.

The 18 observers will be recruited from the local optometric clinic and/or the university hospital Cova da Beira with full ethics approval in relation to the task to be executed. Clinical refractive assessment will be done at the Centro Clínico e Experimental em Ciências da Visão,

and the refractive sensitivity to hyperspectral images will be measured in the Optical Center. Particular care will be taken in order to control accommodation throughout the evaluation process. Additionally, all participants will be diagnosed using the Heidelberg anomaloscope and the OPD-Scan II wavefront aberrometer (Nidek Co. Ltd).

The experiments will be carried out at the University of Beira Interior by the candidate. The design and data analysis will be assisted by the supervisors.

It is expected that the results will give information about the refractive sensitivity to hyperspectral images.

**Bibliographic references**

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**Student signature**

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**Supervisor's signatures**

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