



MASTER IN PHOTONICS – “PHOTONICS BCN” ERASMUS+ “EUROPHOTONICS-POESII”

MASTER THESIS PROPOSAL

Dates: April - September 2018

Laboratory: Group of Applied Optics and Image Processing (GOAPI), Faculty of Optics and Optometry (FOOT, Building TR8-UPC), Terrassa

Institution: UPC

City, Country: Terrassa, SPAIN

Title of the master thesis:

Measuring light with images in intraocular lens testing on optical bench

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Keywords: imaging photometer, 2D array CCD sensor, V-lambda spectral sensitivity, luminance, illuminance, luminous intensity, intraocular lens, optical bench testing

Summary of the subject (maximum 1 page):

A monochrome camera consisting of a 2D array CCD sensor assembled with an objective lens is a very useful tool for image acquisition in many circumstances and applications. However, when the acquired image has to represent the human eye response to light intensity, matched standard CIE V-lambda filter need to be used to provide the camera sensor with human spectral sensitivity (photopic regime) and ensure accurate measurements of photometric magnitudes. This modified camera can be configured with a microscope objective lens for image acquisition with magnification.

Preferred application: The compound system of microscope objective, filters and camera is aimed to serve as the image acquisition unit placed in an optical setup for intraocular lens (IOL)

testing (see figure). More specifically, it would acquire the aerial image of a target formed by a model eye where an intraocular lens is placed. Many studies have been carried out using the IOL design wavelength illumination and/or other wavelengths in the visible and near infrared spectral regions. However, few studies on IOL characterization include white light illumination and photometric measurements from acquired images. The latter are undoubtedly interesting though, because they represent closer conditions to human vision in daily activity.

The project involves the stages of device initialization and alignment on optical bench, use of extensive options for measurement acquisition, logging and analysis via own software application.

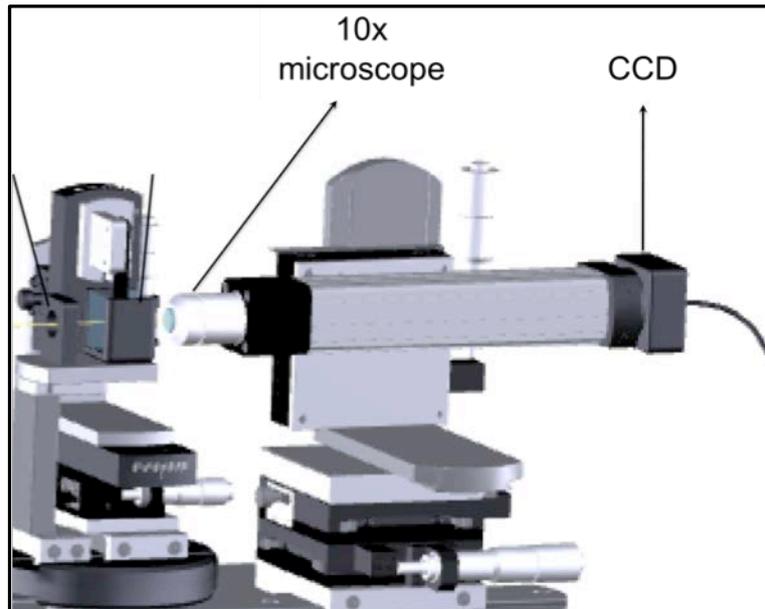


Figure. Scheme of the experimental setup (partial) for IOL testing on optical bench. A model eye unit (left), with an intraocular lens is placed in a wet cell, forms an aerial image (retinal plane) that is captured by an image acquisition unit (center) consisting of a microscope objective assembled to a CCD sensor camera.

Additional information:

- Required skills: Experimental experience in optical laboratory. Most part of the project is experimental, but some theoretical background on imaging systems, photometry and vision is necessary. Team working and autonomous self-working.
- Miscellaneous: All the optical components, opto-mechanic elements, opto-electronic devices and other resources will be provided by the laboratory on the premises of the Faculty of Optics and Optometry (TR8-UPC).