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Master in Photonics – “PHOTONICS BCN” ERASMUS+ “EUROPHOTONICS”

MASTER THESIS PROPOSAL

Dates: April - September 2020

Laboratory : R&D lab

Institution: ASE Optics Europe

City, Country : El Prat de Llobregat, Spain

Title of the master thesis:

White light interferometry for surface characterisation: a study of mechanical tolerances to surface reconstruction accuracy

Name of the master thesis supervisor: Thomas Siegel

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Keywords : White light interferometry, phase shift detection, mechanical tolerances, error propagation

Summary of the subject (maximum 1 page) :

White light interferometry is a powerful technique enabling the non-contact measurement of multi-layered three-dimensional surfaces with sub-micron accuracy. It is widely used in the medical sector for the acquisition of retinal images for the detection of glaucoma or in dermatology. It is starting to be applied to the micro-manufacturing sector and ASE Optics holds a patent regarding this technology. ASE is currently investigating the application of this technology to a particular type of surfaces (the specific development is under non-disclosure agreement).

The mounting and actuation of the surfaces is key to the reconstruction of the surfaces, and the selection of the sample actuators a key cost driver for the final instrument. The successful applicant shall start by studying the problem analytically, then verify the findings in the laboratory, using ASE Optics' white light interferometer.

The Master thesis shall include:

- A review of the principles of white-light interferometry and its application to the type of surfaces of interest
- A review of surface reconstruction algorithms from white light interferograms
- The definition of the actuation requirements to enable the measurement



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- The propagation of error from the actuation to the surface reconstruction
- Laboratory implementation of the sample actuation in the white-light interferometer
- Reconstruction of the surfaces and verification of the accuracy of the reconstruction of reference surfaces

Additional information :

* Required skills :

The candidate shall:

- Present a good understanding of interferometry
- Understand the principles of error propagation within optical systems
- Be skilled in the handling of a mathematical software language (eg. Matlab, Python...)
- Have demonstrable experience in mounting optics in the laboratory and performing measurements
- Be proficient in English and / or Spanish
- Good teamworking skills

* Miscellaneous :

ASE Optics Europe is a company focussed on the development and assembly of custom optical system. The successful candidate will be incorporated in a multi-disciplinary team of optical, mechanical and software engineers. The candidate will be expected to sign a non-disclosure agreement with ASE Optics regarding the work they will be performing.