We invite applications for a PhD student, funded by French Conventions Industrielles de Formation par la Recherche (CIFRE) and Imagine Optic and to work with Dr Ray Barrett at the European Synchrotron Radiation Facility (ESRF) in Grenoble, France. This position is available from the 1st October 2016 for a duration of 3 years.

Surface roughness and figure-errors of X-ray optics lead to reduced reflected intensity and focus degradation. This is particularly true for the optical systems used in synchrotron radiation photon transport systems where the quality of mirrors is often the limiting factor determining the beam quality at the sample. Due to their need to operate in grazing incidence and with short-wavelength (Ångström-range) illumination, such mirrors are rather challenging to manufacture and achieving the necessary quality requires customized measurement methods. Although the optical elements are to be used at X-ray wavelengths, the optical elements must be measured very precisely using visible light techniques prior to their installation in the X-ray beamline. In the most demanding applications, current X-ray source performance demands figure errors in the sub-nm range and slope errors less than 0.1µrad.

The aim of this PhD project is to improve the ex-situ optical metrology for X-ray mirrors used in synchrotrons. Imagine Optic in France and Q-Sys in Netherlands have developed a new metrology platform called SHARPeR for highly accurate slope profiler for long mirrors, with a financial support of Eurostars program. The system prototype will be installed at the Mirror & Metrology Laboratory of the ESRF (www.esrf.eu) at the beginning of 2017. The successful candidate will work on research projects for the X-ray spatial metrology of optics in close collaboration with industrial partners. In particular, he or she will start with learning the wavefront sensing technology and state-of-the art at Imagine Optic in Orsay for a few months, and to use a pilot system* at the Brookhaven National Laboratory in New York for a couple of weeks. The main PhD research will be conducted at the ESRF to

1) enhance the performance of the SHARPeR system,

2) develop algorithms for 2-dimensional stitching,

3) perform multi-angle measurements and data treatments,

4) measure toroidal mirrors, for example.

The successful candidate will be expected to present his research at international conferences and participate in other collaborations related to X-ray optics.

Applicants should have a Masters degree (at the time of taking up the position) in optics or a related discipline.

Please direct inquiries to Imagine Optic: contact@imagine-optic.com

** M. Idir et al., "A 2 D high accuracy slope measuring system based on a Stitching Shack Hartmann Optical Head " Opt. Express 22(3),2770–2781 (2014).*