M2 Internship offer:

An unconventional usage of anti-reflection coatings: design of robust coupling structures for photonic integration

Research team: i-Lum, light engineering and conversion

Main location: Ecole Centrale de Lyon

Keywords: Photonic integrated circuits, Optical modelling and design, Laser sources

Profile: Physics, Optics

Duration: 4-6 month.

Project description:
Photonic integrated circuits (PICs) enable the miniaturization of devices for numerous critical applications, many of which require a light source. While future advancements may simplify the fabrication and manipulation of directly integrated sources, the photonics industry at large currently relies heavily on external laser sources. Unfortunately, a well collimated and aligned laser source is often an expensive and rare luxury in many application settings. Furthermore, when the in-coupling technique mainly relies on geometrical structures and/or arrangement (eg. lenses, gratings, butt coupling), the coupling efficiency becomes extremely sensitive to positional and angular misalignment / spread, which often translates to low fabrication yields. Instead of relying mainly on geometry, we wish to more exploit matter. More specifically, we aim to exploit how light propagates within a simple descending index multilayer stack / graded index layer in order to obtain a high efficiency waveguide in-coupling structure that is robust to misalignment errors and also suitable for sources with a large beam spread.
During the internship, the student will design robust coupling structures using available software based on FDTD or finite elements based methods while taking into account the constraints of the planned technological platform.

Candidate profile:
The student should have a solid background in physics and/or optics, with a taste for numerical modelling.

Scientific supervisors:
This is a joint master thesis topic done in collaboration between INL and ams-OSRAM which will offer co-supervision on the topic
For INL: Xavier Letartre: xavier.letartre@ec-lyon.fr and Christian Seassal
For ams-OSRAM: Dr. Aimi Abass and Dr. Rasoul Alaee