MASTER IN PHOTONICS – "PHOTONICS BCN"
ERASMUS+ "EUROPHOTONICS"

MASTER THESIS PROPOSAL

Dates: April - September 2019

Laboratory : NANOPTO - ICMAB
Institution: Institute of Materials Science of Barcelona ICMAB- CSIC
City, Country : Barcelona, Spain

Title of the master thesis: Design and fabrication of photonic crystals for improved particle detection

Name of the master thesis supervisor: Juan Luis García Pomar and Agustín Mihi. Co-supervisor UPC: to be determined
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Keywords : Light Trapping, thin film deposition, Bragg stacks, Matlab

Summary of the subject (maximum 1 page) :

We search Master student for a master thesis in the design and fabrication of photonic crystal Institute of Materials Science of Barcelona ICMAB – CSIC.

This project is oriented to the improvement of a silicon photomultiplier by the design and fabrication of a photonic crystal, based on strong interference effects.

Particle detectors often rely on the detection of UV to IR light generated by particles as they travel and interact through a medium. Silicon photomultiplier is the technology of choice for sensitive detection of visible light but is currently limited by its small area of collection.
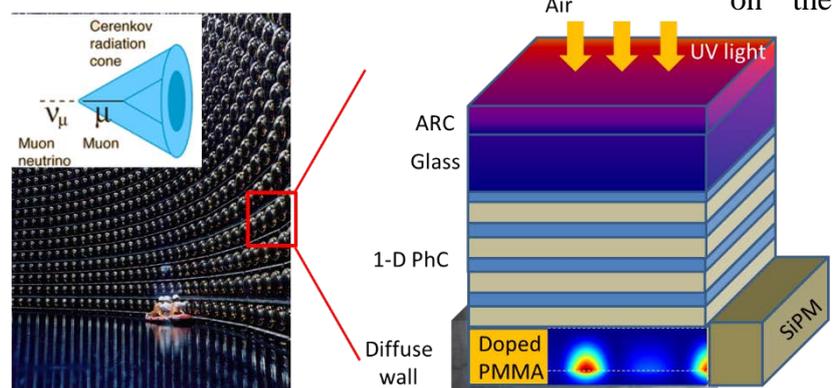
This project aims at improving the efficiency of these photodetectors by developing a "light trap". In this light trap, a small Silicon photodetector is coupled to a much larger disk of PMMA doped with a wavelength-shifting fluorophore and covered by a photonic crystal. This scheme will help collect all the UV radiation, convert it into visible radiation trapped in the PMMA disk and eventually detected by the silicon photodetector.

The project involves:
1 Modeling and design of the photonic crystal to maximize the light trapped inside the disk.
2 Fabrication of the photonic architectures using physical deposition techniques.
3 Optical characterization of the final trap and implementation in real photodetectors.

Additional information :

- Candidates must possess a background in physics or engineering with studies in photonics, materials, optics…
- Specific Knowledge in numerical simulation and programming (MATLAB) will be appreciated.
- Only excellent candidates will be considered.

- **The position involves a contract up to 1 year**. (The position should start in January or February)