Master in Photonics – "PHOTONICS BCN"
Master ERASMUS+ "EuroPhotonics"

MASTER THESIS PROPOSAL

Dates: April 2020 - September 2021

Laboratory:
Institution: Alcyon Photonics S.L.
City, Country: Madrid (remote working)

Title of the master thesis:

DESING AND SIMULATION OF HIGH PERFORMANCE PICS (PHOTONIC INTEGRATED CIRCUITS)- FROM COMPONENTS TO CIRCUITS

Name of the master thesis supervisor and co-supervisor:
(for external proposals a co-supervisor from the program in needed)

Supervisor at Alcyon Photonics S.L:

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Keywords: Photonic Integrated Circuit (PIC), SOI, silicon, waveguides, simulation

Summary of the subject (maximum 1 page):

ALCYON PHOTONICS S.L. is a startup focused on the design of high-performance Photonic Integrated Circuits (PICs), increasingly demanded for application in many different fields such as optical communications, computing or sensing. The company aims at transferring the innovation and specific know-how developed at the Spanish National Research Council (CSIC), to the growing photonic semiconductor market.

PICs are based on combination of individual basic structures (microscopic structures with nanoscopic features), typically known as building blocks (BBs), which define the functionality and performance of the optical circuits. Figure 1 shows an example of building block, in this case a PBS (polarization beam splitter) . This PBS has one input port (port 1) and two output ports (port 2 and port 3). When the input port is excited with an optical wave with hybrid polarization (TE + TM), both orthogonal polarizations are separated and divided between the two output ports, in such a way that the TE polarization emerges through port 3 and the TM

polarization through port 4. An example of PIC using a PBS among other BBs can be found in https://www.ntt-review.jp/archive/ntttechnical.php?contents=ntr201103fa9.pdf&mode=show_pdf

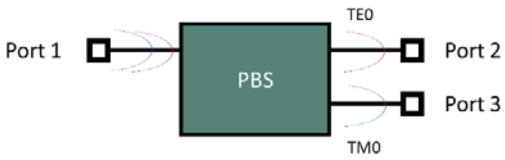

Figure. Schematic representation of a building block.

The aim of the project is to involve the student in all phases of the process flow for the generation of libraries of photonic components and the simulation of PICs. The proposed project has two main objectives. First, generation of the behavioural models of high performance building blocks and their incorporation into libraries of components. Second, design of new PICs based on those building blocks with professional software.

Knowledge of:

➢ Python: Mandatory!!

➢ Experience in simulating photonic devices would be very valuable.

Remote work:

This project will be developed through teleworking. Daily meetings and on demand. Remote access to the necessary software tools will be provided as well as trainings and supporting materials. Technical support for remote access.