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

MASTER THESIS PROPOSAL

Dates: November 2021 - 2022

Laboratory : OPTICAL COMMUNICATIONS

Institution: UPC-ETSETB-TSC-GCO

City, Country : BARCELONA

Title of the master thesis: **Dynamic Tuning of Transmitter Lasers in Fiber Access Networks.**

Name of the master thesis supervisor: Prof. Josep Prat

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Keywords : FIBER, LASER, WDM, PON, TRANSMISSION, NETWORKS.

Summary of the subject (maximum 1 page) :

Modern Fiber-to-the-Home and Fiber-to-the-Antenna networks use Wavelength Division Multiplexing to combine the broadband signals to/from users. This can be extended by ultra-dense WDM with coherent transmission, to implement the Wavelength-to-the User concept in an extended access network in order to greatly increase the current communications capacity, as demonstrated in the COCONUT and ThermalPON projects.

In the access network, every user transceiver generates its own wavelength and all wavelengths are densely combined in the optical distribution network. To avoid crosstalk or collision between them and to increase the bandwidth efficiency, every user laser has to precisely tune to the allocated channel, and a monitor module in the headend manages the spectrum and control the laser sources.

The access network testbed is available in the GCO lab, along with the required instrumentation. The student will analyse it and enhance its operation, collaborating with the GCO team in assembling an efficient user equipment. For this, the following task will be carried out:

1. The tuning characteristics of the lasers will be studied and tested, as a function of the injection currents and temperature.



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2. A dynamic model of the laser tuning and emission will be adjusted and optimized.
3. The optical spectrum will be monitored and managed via the existing interfaces and PC.
4. The high bit-rate data transmission will be checked and optimized.
5. A journal publication will be submitted.

Another Master Thesis is available focussing on the direct modulation of the laser sources, in chip and packaged forms, testing and equalizing for analog and digital data, and comparing with external modulation.

Additional information :

- * Required skills : Matlab or LabView programming.
- * Miscellaneous : A scholarship is available for support of the lab research.