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ICFO
The Institute
of Photonic
Sciences



Erasmus+

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

MASTER THESIS PROPOSAL

Dates: April 2022 – July or September 2023

Laboratory:

Institution: Quside

City, Country: Castelldefels, Spain

Title of the master thesis: Phase diffusion quantum entropy source using integrated DBR lasers

Name of the master thesis supervisor and co-supervisor:

(for external proposals a co-supervisor from the Master program is needed)

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Keywords: Photonic Integrated circuits, Quantum random number generation

Summary of the subject (maximum 1 page):

In this Master Thesis the student will focus on the measurement and analysis of an InP photonic integrated circuit for quantum random number generation. In particular, the first part of the thesis will focus on the measurement/analysis of the individual building blocks of a phase diffusion quantum random number generator (DBR lasers, MMI, Photodetectors) and comparison with theoretical simulations. In the second part of the thesis the student will analyze the performance of the QRNG based on these building blocks, in particular how to set the DBR lasers' to obtain an interference signal and analysis of its probability distribution to certify its quantum origin.

Objectives:

Set-up an optical test bench for measuring an InP PIC, including input and output optical coupling with optical fibers and DC/RF connections.

Measurement/analysis of individual building blocks in the PIC, including different DBR laser designs and photodetectors, and extraction of their parameters (wavelength, bandwidth,...).



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Analysis/Modelling of the phase diffusion QRNG based on 2 DBR lasers and an MMI.

Additional information (if needed):

- * Required skills :
- * Miscellaneous :