EUROPHOTONICS-POESII MASTER COURSE

PROPOSAL FOR A MASTER THESIS

Dates: April 1st, 2016 – September 30th, 2016

Laboratory : Quantum Photonics group, ICFO
City, Country :Castelldefels

Title of the master thesis : Efficient photon pair source compatible with solid state quantum memories

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Summary of the subject (maximum 1 page) :
Entangled photon pair sources and quantum memories are important building blocks of quantum information networks. High compatibility between the quantum light source and the quantum memories is required, which imposes strong requirement on the spectral properties of the entangled photons. The goal of this master thesis is to design, build and characterize a new generation of photon pair source compatible with solid state quantum memories. The work is part of a project aiming at demonstrating entanglement between two crystals located in different laboratories. For that purpose, it is required that the source emits one photon compatible with the solid state quantum memory and the other photon at telecommunication wavelength in order to minimize loss in optical fibers.

Entangled photons will be generated by spontaneous down conversion in a non-linear crystal. This techniques generates photons with a bandwidth of around hundred GHz, 5 orders of magnitude larger than required to interact efficiency with the quantum memory (bandwidth of a few MHz). To overcome the mismatch, the crystal will be placed in an optical cavity. Depending on the advancement of the project, the coupling of the source to the quantum memory can be envisaged.

Keywords : Cavity enhanced SPDC, Quantum Memory, entanglement, quantum light

Additional information :
* Required skills : Interest for experimental physics
* Miscellaneous :