



Université
de Paris



Marie Curie
Actions

Laboratory: Center for Nanoscience and Nanotechnology

Group of Solid State Quantum Optics - <http://quantumdot.eu/>

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PhD offer: Quantum light generation and manipulation

This PhD project is funded by the Innovative Training Network ITN QUDOT-TECH (www.qudot-tech.eu) that aims at developing a solid-state platform for on-chip quantum information processing. In this framework, the objective of the present PhD position is to develop **ultra-efficient quantum light sources and use them for on-chip optical quantum computing**.

We study single quantum dots deterministically coupled to a pillar optical microcavity. Combined with an electrical contact, this technology has already allowed developing high-efficiency sources of single indistinguishable photons^{1,2}. The sources show near unity quantum purity for a brightness of typically 15%--defined as the probability to obtain a single photon per pulse. Such efficiency, already ten times higher than heralded single photon sources, has allowed to increase the rate for quantum manipulation of 3 photons in a glass photonic chip³.

The objective of the PhD work is to push further the efficiency of the single photon sources, exploring new excitation schemes and developing new cavity designs. These sources will then be used to implement small scale optical quantum computation on chip, within our collaboration with the groups of Fabio Sciarrino (Rome) and Roberto Osellame (Milan). Finally, to further increase the quantum resources for quantum computing, we will explore the efficient generation of entangled photon pairs making use of the entanglement between the emitted single photons and the spin state of a carrier in the quantum dot.

The PhD salary is **~2200€ net per month** (+ family allowance if applicable). The successful candidate will also benefit from an **additional funding for several visiting trips (typically 1 month each) in the partner teams (incl. Rome and Berlin)**.

Requested profile: **we welcome highly-motivated applicants with excellent background in quantum physics, optics, and/or solid state physics, and with a taste for experimental as well as technological research**.

Applications (CV, transcript of studies, statement of motivation) should be sent by email to Pascale Senellart (pascale.senellart-mardon@c2n.upsaclay.fr)

[1] Somaschi et al., Nature Photonics 10, 340 (2016)

[2] Senellart, Solomon and White et al, Nature Nanotechnology 12, 1026 (2017)

[3] Anton et al., arXiv:1905.00936, Optica 2019 in press

Funding conditions : Candidates must not have resided or carried out their activities - work, studies, etc.- in France for more than 12 months in the 3 years immediately before starting the PhD.

Planned starting date: 06/2020