Post-doc position: spin-photon interfaces for quantum information

Location: Center for Nanoscience & Nanotechnology – Palaiseau (south of Paris Area)

Duration: 24 months, preferentially starting in the Autumn 2024 or January 2025

Gross salary: between 3081.33 € and 4291,70 € per month (depending on experience)

Job offer & application : https://emploi.cnrs.fr/Offres/CDD/UMR9001-LOILAN-006/Default.aspx

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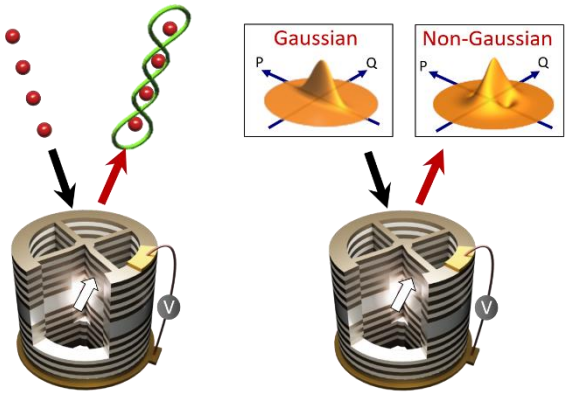
Our group on Solid-State Quantum Optics, at the Center for Nanoscience & Nanotechnology, has developed a strong expertise in harnessing light-matter interaction at the most fundamental level. We develop crucial resources for optical quantum technologies, including high-performance single-photon sources [1]. In parallel, we have developed **efficient interfaces between a single material qubit** (the spin of a single charge in a semiconductor quantum dot (QD)) and **single photonic qubits** (the polarization of a single photon) [2]. We have also developed an important expertise in the understanding of the solid-state physics governing the QD-photon interactions [3].

Such spin-photon interfaces have long been envisioned, for example, to engineer photon-mediated operations between distant spins, as well as spin-mediated operations between single photons. Our main objective is to develop experiments using these devices as **receivers of incoming photons**, as required for the future implementation of **deterministic spin-photon and photon-photon gates**. These same devices will be used also to generate **exotic (non-gaussian) quantum states of light**. A crucial requirement, finally, will be to improve the spin coherence, i.e. **increase the memory time of the spin qubit**, for successfully entangling more and more photons with the same solid-state spin.



In the framework of the consortium OQuLus, gathering leading teams from 15 French laboratories, **we are looking for excellent post-doctoral candidates, with a PhD degree in quantum technologies, quantum optics, or solid state quantum physics**. The successful candidate will be part of our research effort by devising and implementing experiments on our QD-based spin-photon interfaces, and participating to the management of PhD students and interns.

[1] Nature Photonics 10, 340 (2016); Nature Photonics 13, 803 (2019)
[2] Nature Communications 6, 6236 (2015); Nature Photonics 17, 582 (2023); Nature Communications 15, 598 (2024)
[3] Optica 4, 1326 (2017); Quantum Science & Technology 8, 025021 (2023); arXiv:2401.14976 (2024)