# Open PhD position

## Quantum photonics with novel nanomaterials

The *Crystals and Quantum State Dynamics* group seeks motivated and talented PhD students to join our team developing novel nanomaterials for **quantum computing** and **quantum communication** applications. We use nanostructured crystals to realize a solid-state quantum interface between spin and photonic degrees of freedom, a great challenge for future quantum technologies. Rare-earth ion-doped (REI) crystals provide long spin and optical coherence times and are promising for realizing quantum memories, quantum sensors, and single photon sources; however, their nanofabrication is in the early technological stage and needs a significant boost. The project is aimed to develop novel REI materials based on nanoparticles and thin films, preserving the coherent properties of REIs and enabling their further integration with a broader range of nanophotonic platforms.

The project combines low-temperature physics using dilution refrigerators, fabrication of novel nanomaterials, high-resolution optical and spin spectroscopy, and design and fabrication of nanophotonic devices in collaboration with French and international research groups.

**The PhD student's tasks will include the following:**

- Learning about using solid-state spin ensembles for quantum information applications ;
- Acquiring the fabrication skills to develop nanomaterials based on nanoparticles and thin films (atomic layer deposition and chemical vapour deposition, spin coating etc.);
- Studying developed samples using optical spectroscopic techniques at cryogenic temperatures;
- Designing and fabricating novel nanophotonic interfaces using clean-room fabrication/ processing (lithography, reactive ion etching etc.).

**Candidate's profile :**

We are looking for candidates with a background in Nanoscience, Applied Physics, and Optical or Electrical Engineering. Applicants are expected to have:

- Background in optics, solid-state physics, or optoelectronics, including experimental skills;
- Basic knowledge of quantum physics and quantum information;
- Interest in experimental work and nanofabrication (previous experience working in chemical labs/cleanrooms is a plus);
- Ability to work independently and in daily collaboration with the research team.

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**Presentation of the host institution and host laboratory**

Our group (*cqsd.fr*) is developing a new set of nanomaterials based on rare earth dopants to control optical and spin non-classical states. The combination of structural characterization and optical spectroscopy allows us to synthesize nanostructures with low perturbations to the quantum states.

The group is a part of the Material for Photonics and Opto-Electronics (MPOE) team of the Institut de Recherche de Chimie Paris, located in Paris.

We offer creative and stimulating working conditions in a dynamic, international research environment. Our research facilities include modern optical laboratories and fabrication facilities to synthesize nanomaterials.

**Place of work**

11, rue Pierre et Marie Curie
75005 Paris, France

**Contact information**

For further information and to apply, please send an email including your CV and motivation letter to:

Dr. Alexey TIRANOV alexey.tiranov@chimieparistech.psl.eu (Junior Professor)
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