



04/05/2026 – 19/06/2026

Title of the project: Design and Development of a Quantum Control Experimental Platform for Multi-Spin NV Center systems

Supervisor(s): Charles Babin

Laboratory / Department / Team : ICB / ICQ/ DiTeQ

Collaborations:

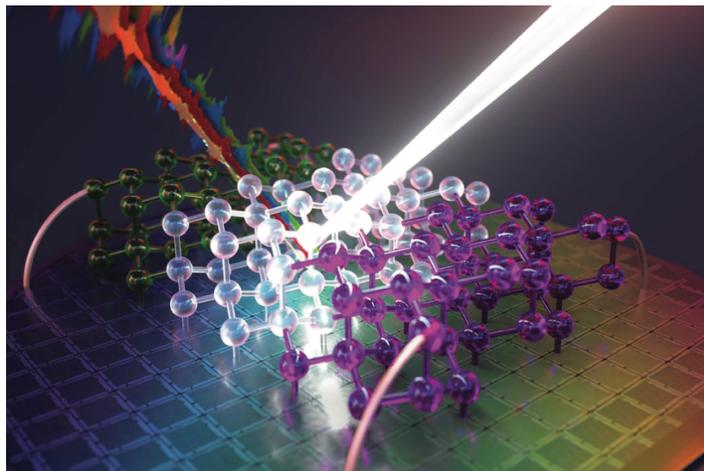
Summary:

Color centers are a leading quantum platform for the development of next-generation quantum technologies: computing, sensing, long-distance entanglement distribution etc., thanks to their strong spin–optical properties and their ability to form multi-spin systems via dipole-dipole coupling between electronic and nuclear spins. Among these systems, nitrogen-vacancy (NV) centers in diamond are particularly attractive. They showcase at room-temperature great optical spin initialization and readout as well as long coherence times, while being controllable. These properties make NV centers an exceptional testbed for the development and implementation of advanced quantum control protocols.

The goal of this internship is to design and develop a new confocal microscopy experimental platform dedicated to the study of NV centers in diamond. The setup will enable optical addressing and detection of NV centers and the implementation of standard spin manipulation pulse sequences for coherent control experiments, including Rabi oscillations, Ramsey interferometry, and Hahn echo measurements. In addition, the platform will support the implementation of advanced optimal control sequences derived from numerical simulations thanks to state-of-the-art electronic devices (AWG), paving the way toward high-fidelity multi-spin quantum operations.

The internship will be carried out within the DiTeQ team, whose research focuses on quantum optimal control, both from theoretical and experimental perspectives, as well as on quantum thermodynamics.

The internship can be extended to a 8 week period.



Type of project (theory/experiment): Experimental

Required skills: None. Having enjoyed the quantum technologies Lab Work.