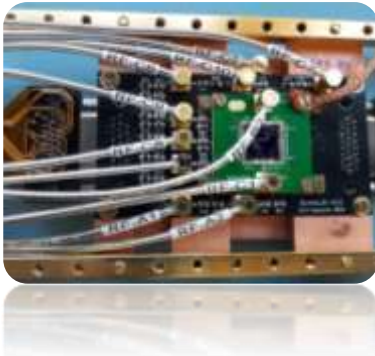




Master /PhD thesis Project Hole spin and Circuit Quantum Electrodynamics

Bonded and mounted sample before cryogenic cooling.



Quantum computing is currently pushing further the frontier of information technology. Among other fields, solid-state hole-spin qubits are a promising research area. Recently, we reached the strong-coupling regime between the spin of a single hole trapped inside the channel of a silicon transistor and a single microwave photon enclosed in a superconducting resonator [1]. This milestone paves the way to Circuit Quantum Electrodynamics (cQED) type experiments where we leverage such large spin-photon couplings to perform advance quantum information experiments.

The aim of this project is to advance the field of spin cQED. First, we will probe the quantum state of the spin via the microwave photon through a quantum non-destructive protocol [2]. In parallel, we will study the spin coherence in such environment where its quantum properties may be strongly correlated to electro-magnetic noise.

Our research team is part of the French national “Plan Quantique” and is a founder member of the “Grenoble Quantum Silicon” group. We also strongly collaborate with the L-SIM group for theoretical support.

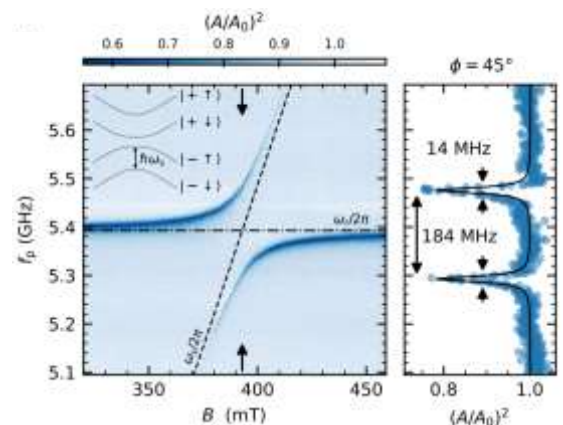
During the master project, you will collaborate on a daily basis with a lively team of two permanent researchers with one PostDoc and two PhDs and take part in an exciting adventure to bring spin qubits to a new level. You will participate to the development of new samples that includes design, theory and nano-fabrication performed in our cleanroom facility. You will also learn to cool down samples to reach cryogenic temperatures and you will perform measurements using state-of-the-art DC and RF techniques. This master project may continue as a PhD thesis.

[1] Nat. Nano 18, 741, 2023

[2] Phys. Rev. A 75, 032329, 2007

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To apply for this position, send your application (including CV) by e-mail to: simon.zihlmann@cea.fr & romain.maurand@cea.fr



Avoided crossing between a hole spin and a microwave photon showing the strong coupling between them.