

# NÉEL INSTITUTE Grenoble

## Topic for Master 2 internship – Academic year 2024-2025

### Low temperature magnetometry using a CMOS spin qubit

**General Scope :** Quantum computing is a field of growing interest, especially in Grenoble with an exceptional concentration of both research and industrial groups active in this field. The building brick of quantum information is a two-level quantum system (the qubit), in our case the spin of an electron trapped in a quantum dot. In this context, our group is actively investigating the physics of such object and how it can be used for quantum sensing.



#### **Research topic and facilities available :**

The objective of the internship is to develop quantum sensing experiments using CMOS spin qubits. In particular, we aim at investigating the coupling between a magnon mode and a spin qubit and explore the different regimes of coupling. Based on this interaction, we aim at developing magnetometry protocols and characterize exotic magnetic structure at very low temperature.

The research involves participation in the design of quantum devices with our collaborators at CEA-LETI, development of control of the spin qubit array using state of the art DC and microwave electronic, data acquisition and analysis followed by publications and communication in conferences.

#### **Possible collaboration and networking :**

Institut Néel, is a large laboratory covering many different fields of condensed matter physics. The Quanteca team aims at exploring quantum phenomena in nanoelectronics devices. The candidate will join the strong collaboration between the CEA and the CNRS which aims at developing silicon quantum devices for quantum applications.

#### **Possible extension as a PhD : Yes**

**Funding: yes (PEPR)**

#### **Required skills:**

We look for highly motivated students with a good background in quantum physics and with a taste for experimental development.

**Starting date :** flexible

#### **Contact :**

Name : Matias Urdampilleta

Institut Néel - CNRS

Phone : 04 76 88 79 34

e-mail : [matias.urdampilleta@neel.cnrs.fr](mailto:matias.urdampilleta@neel.cnrs.fr)