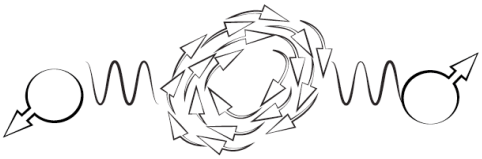
NÉEL INSTITUTE Grenoble

Topic for Master 2 internship – Academic year 2023-2024

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 global aim is to develop a new kind of nano-processor, based on quantum properties. Its building brick is a two-level quantum system (the qubit), in our case the spin of an electron trapped in a quantum dot. In this context, the Grenoble Quantum Silicon Group is actively trying to leverage the decades of development of the Silicon industry in Grenoble to realize a network of inter-connected semiconductor spin qubits.



Research topic and facilities available :
The objective of the internship aims at developing magnetometry 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.
Therefore, 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 Quantum coherence 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

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