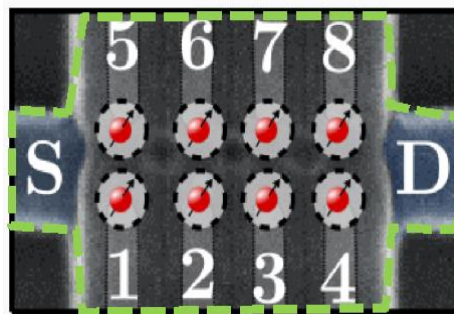


NÉEL INSTITUTE Grenoble

Topic for Master 2 internship – Academic year 2023-2024

Control of spin qubits in foundry-fabricated quantum dot arrays

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.



An array of CMOS spin qubits

Research topic and facilities available :

The objective of the internship is to develop experiments using spin qubits in arrays of silicon MOS quantum dots. We have recently demonstrated the control of a 2x2 array and are willing to extend the size of this array as well as performing quantum operation within. The long-term objective (PhD) is to enforce quantum algorithm or simulation using a small array of CMOS spin qubits.

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 and exploit them for Quantum applications. The candidate will join the existing collaboration between the CEA, the newly established startup Quobly and the CNRS which aims at developing quantum simulator and processor based on foundry-fabricated devices.

Possible extension as a PhD : Yes

Funding: yes (PEPR)

Required skills:

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

Starting date : flexible

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