Development of metrology procedures for quantum sensors

Record number : OPR-1263

Overview

RESEARCH DIRECTION

Mathieu Massicotte, Professeur - Department of Electrical and Computer Engineering

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de génie informatique
Département de génie mécanique
Institut interdisciplinaire d'innovation technologique (3IT)

LEVEL(S)

3e cycle

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique

Project Description

Context: The goal of this project is the realization of integrated nanophotonic circuits enabling the addressing of qubits for industrial quantum sensors. Such systems are to be employed as room temperature ultra-sensitive magnetometers in the fields of geological exploration, defense, navigation, medical imaging and for the development of quantum computers. This embodies a pioneering quantum technology to be brought early to the market and adopted on a large scale.
This funded graduate project is part of the Canadian National Quantum Strategy and the Quebec Quantum Innovation Zone. Our team at the Interdisciplinary Institute for Technological Innovation (3IT) is developing impactful and practical solutions in close collaboration with SB Quantum, the National Research Council of Canada, the Quantum Institute and the MiQro Innovation Collaborative Centre.

Research project: This PhD's project aims to develop metrological procedures to characterize spin defects (NV centers) in single-crystal diamond nanostructures. It mainly consists of determining the impact of structuring and structural defects on coherence time, a key metric quantum detection performance. A special focus will be on measurement and monitor the impact of the various etching processes on the NV centers in diamond, in terms of emission intensity and coherence times. Successful candidate will have the opportunity to thrive in the 3IT environment & the Quantum Institute and will have responsibility to develop the setup for coherence time measurements using a simple power broadening method. More precise quantification of spin coherence times will require a pulsed measurement method. At the NRC-QN, the candidate will work in collaboration with a PhD student to better understand more precisely the influence of nanofabrication on the physics of NV centers.

Supervision & work environment: The project will be carried out under the direction of Professor Mathieu Massicotte. The successful candidate will interact regularly with all collaborators, but will carry out the vast majority of the work at IQ and 3IT, as well as occasionally at CNRC-QN. The individual will benefit from an exceptional research environment where students, professionals, teachers, and industry collaborate closely to develop the technologies of the future.

Desired Profile:
The desired profile must have a master's degree in physics or electrical engineering, knowledge of solid-state physics, quantum mechanics and photonics. hands-on laboratory experience is also required. Good knowledge of optoelectrical measurements is an asset. Strong ability to adapt and an interest in research and development in optics/photonics/quantum sciences. Fluency in French is an asset.

Contacts: inpaqt@usherbrooke.ca
Documents to provide: CV, transcripts of the past two years and references

Funding : Funded by the NSERC Alliance Quantum grants, NRC and PROMPT-Québec

Discipline(s) by sector

Sciences naturelles et génie

Génie électrique et génie électronique,
Génie mécanique

Funding offered

To be discussed

Partner(s)

SBQuantum, Centre de Collaboration MiQro Innovation (C2MI)

The last update was on 22 June 2026. The University reserves the right to modify its projects without notice.