

# Quantum Optomechanics with Superconducting Circuits

Record number : OPR-1409

## Overview

### RESEARCH DIRECTION

Marco Scigliuzzo, 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  
Institut quantique

### LEVEL(S)

3e cycle

### LOCATION(S)

Institut Quantique Sherbrooke

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## Project Description

This is a founding role in a brand-new lab. You will not slot into a running machine, you will help build the experiments, the fabrication recipes, and the group itself from the ground up, with the autonomy of being one of the first people in the door and direct, daily mentorship from a PI whose optomechanics work has opened genuinely new regimes ( Science 2024). The trade is real, and so is the upside: the work you do here will help define the lab's direction.

We are looking for a PhD student to build superconducting devices in which mechanical motion behaves quantum mechanically. The platform is built on high-stress superconducting films: tensile strain dilutes mechanical dissipation to yield ultra-high-coherence resonators, while the superconductor itself forms the low-loss microwave circuit. The goal is to push the single-photon optomechanical coupling toward the strong coupling regime, where one microwave photon moves the resonator by more than the circuit linewidth, a frontier no platform has yet reached. The role spans the full chain on a single platform: material growth, nanofabrication of vacuum-gap devices, microwave design, and millikelvin measurement.

What set this project apart from others

- Fabrication that is hard to find anywhere else! You will build vacuum-gap mechanical oscillators with a sacrificial-layer process that has reached mechanical quality factors up to tens of million roughly 100x the previous state of the art (see the full process published in PR Applied).
- An open frontier, not incremental physics. Single-photon strong optomechanical coupling has never been demonstrated on any platform, and the best microwave devices sit orders of magnitude short. This project builds a superconducting platform aimed squarely at closing that gap — you will push toward it, not reproduce known results

### Research Environment

The student will work at the Institut Quantique (IQ) at the Université de Sherbrooke, a world-class research institute bringing together leading experts in quantum science and engineering, and equipped with state-of-the-art cryogenic, outstanding nanofabrication facility at 3IT, and microwave measurement infrastructure. The lab sits inside DistriQ, Québec's Quantum Innovation Zone: Espace Quantique 1 next door hosts an IBM Quantum System One and quantum companies including Nord Quantique, PASQAL, Multiverse, 1QBit, and Exaion. Université de Sherbrooke welcomes 3,600+ international students from 100 countries and is consistently rated the most appreciated

university in Canada by its students.

The research is supported by an NSERC Discovery Grant.

#### Candidate Profile

- Master's degree in physics, engineering physics, electrical engineering, or a related field
- Experience or strong interest in experimental laboratory work
- Background in one or more of: nanofabrication, superconducting circuits, microwave measurements, condensed matter physics, or quantum optics
- Strong autonomy, curiosity, and problem-solving skills

Assets: cleanroom experience, cryogenic measurement, circuit simulation

This position is a strong fit for someone who enjoys hands-on experimental work, cleanroom fabrication, quantum measurements, and the challenge of making delicate devices behave quantum mechanically.

#### How to apply

Send your CV, transcripts, two reference letters, and a short motivation letter to [marco.scigliuzzo@usherbrooke.ca](mailto:marco.scigliuzzo@usherbrooke.ca)

## Discipline(s) by

### sector

## Funding offered

Yes

### Sciences naturelles et génie

Annual \$32 000

Génie électrique et génie électronique

The last update was on 9 June 2026. The University reserves the right to modify its projects without notice.