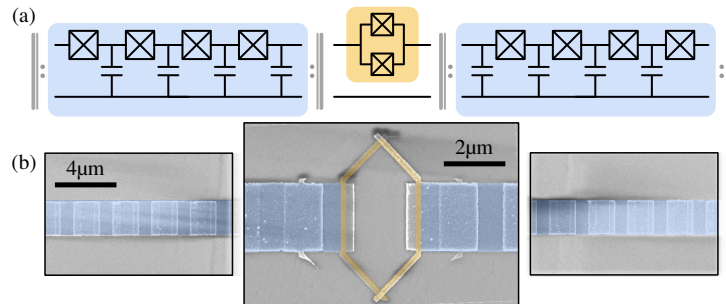


The Superconducting Quantum Circuits (SQC) laboratory at the Néel Institute in Grenoble is currently looking for a post-doctoral researcher. We are particularly interested in individuals who can contribute to research on Bloch oscillations and dual Shapiro steps. These effects, which we recently observed, have significant potential in quantum metrology and quantum technologies. This project offers a remarkable opportunity to participate in cutting-edge research and play a key role in paving the way for future practical applications.



This is an example of a high-impedance superconducting circuit that we use to observe dual Shapiro steps. We use chains of thousands of Josephson junctions (in blue) to create high-impedance environments for ultra-small Josephson junctions (in yellow). As a result, these smaller junctions operate in the charge regime rather than the usual phase regime. This allows them to host Bloch oscillations, which are the dual of the well-established Josephson oscillations.

Project overview

Our laboratory has a successful track record in researching high-impedance superconducting quantum circuits, particularly long Josephson junction chains. With our state-of-the-art clean room, we can consistently fabricate chains with several thousand Josephson junctions. These chains can be seen as high-impedance transmission lines, whereas most superconducting quantum circuits operate in the low-impedance regime (around 50 ohms). This presents exciting opportunities to explore uncharted territories associated with this new regime of superconducting circuits.

Specifically, thanks to these Josephson junction chains, we have observed dual Shapiro steps for the first time. This long-sought demonstration raises interesting questions about the physics of dissipative open quantum systems and opens exciting opportunities for the future of quantum metrology. For further details, you can refer to the [News & Views](#) written by Gianluca Rastelli and Ioan Pop or our [Nature Physics paper](#).

We are currently seeking a postdoctoral researcher to lead the design, simulation, and experimentation for the next generation of high-impedance quantum circuits, with a focus on demonstrating their potential for quantum metrology.

The funding for this position is provided by the European Union through the [AQuanTEC](#) project and by the French National Research Agency through the [TRIANGLE](#) project. Additionally, we benefit from a close collaboration with the research groups of Denis Basko, Serge Florens, and Izak Snymman.

The postdoctoral position will be available in November 2024. We will start reviewing applications upon receipt and will continue the assessment process until the position is filled.

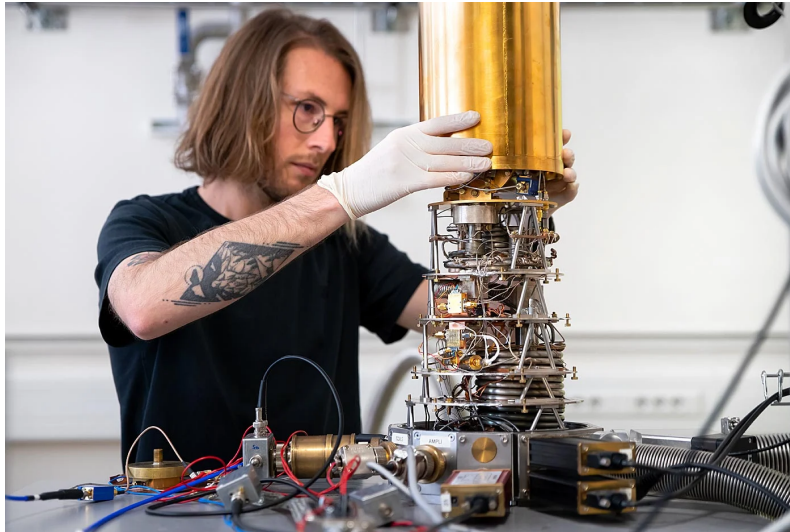
Job description

The chosen candidate will be leading experimental research in the field of quantum devices at Institut Néel, Grenoble. You will work alongside and collaborate with an international and talented team and have access to the extensive infrastructure and unique know-how within

our SQC group. The initial term for the position is two years, with the possibility of extension. Your specific duties will involve:

- Designing and simulating original high-impedance circuits.
- Fabricating novel devices using existing recipes in the clean room at Institut Néel.
- Conducting microwave and DC measurements using the dilution fridge dedicated to this project.
- Participating in meetings with external collaborators.

Profile



We are looking for individuals with a deep passion for physics in general and superconducting quantum circuits and quantum technology in particular. The main requirements include a PhD in Physics, practical experience in nanofabrication techniques, familiarity with microwave circuits, and experience with operating dilution refrigerators. Proficiency in English for scientific communication, teamwork, and exceptional communication skills are all vital.

How to apply?

We are excited to receive your online application along with the following documents in PDF format:

- Comprehensive resume (CV)
- List of published works
- Names of three referees (references to be emailed directly to nicolas.roch@neel.cnrs.fr)

More information about SQC is available on our website (www.sqc.cnrs.fr).

For questions or additional details, please reach out to Dr. Nicolas Roch (nicolas.roch@neel.cnrs.fr).