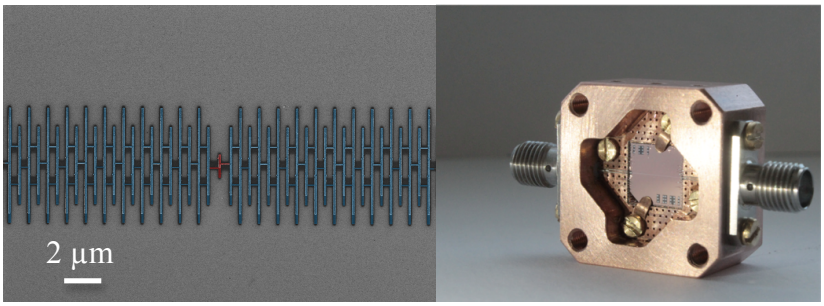
INSTITUT NEEL Grenoble

PhD position : novel superconducting devices

The superconducting circuits group at Néel Institute in Grenoble offers a PhD position. Over the recent years, our team has specialized in large kinetic inductance superconducting quantum circuits working at milliKelvin temperatures [1] with applications ranging from novel superconducting qubits to state-of-the-art quantum limited amplifiers [2]. Your main task will be to build much-anticipated devices such as broadband single photon detectors or quantum limited amplifiers, leveraging our Traveling Wave Parametric Amplifiers (TWPA) expertise.



Left: Example of a Josephson meta-material we engineer in our lab. It is made of thousands of Josephson junctions and behaves as a "superinductance", which is several orders of magnitude larger than what is usually found in standard electronic circuits. Right: we are one of the few teams in the world able to design, fabricate and measure Josephson Traveling Wave Parametric Amplifiers (J-TWPA), which are revolutionizing the way superconducting quantum circuits are measured.

[1] Observation of quantum many-body effects due to zero point fluctuations in superconducting circuits, S. Leger, et al. Nature Communications 10, 5259 (2019). [2] A photonic crystal Josephson traveling wave parametric amplifier, L. Planat, et al. *Phys. Rev. X* **10**, 021021 (2020).

Context: This position is funded within the project AVaQus (Annealing-Based Variational Quantum Processors, http://www.avaqus.eu). This project aims at building a small-scale, fully coherent quantum annealer that is entirely programmable. You will benefit strongly from interactions with the AVaQus consortium.

Means available: Our team specializes in the coherent control and manipulation of superconducting quantum circuits. You will benefit from a dedicated, state-of-the-art setup combining very low temperatures (around 10 mK), fast electronics and quantum-limited microwave detection chains. The devices are fabricated in the clean room of the Neel Institute (Nanofab), offering state-of-the-art equipment (100 keV e-beam writer, dedicated Plassys evaporator, ALD and PE-CVD machines…).

Required profile: Master degree or equivalent with a solid background in quantum physics. Experience in one of the following areas would be appreciated: nano-fabrication, microwave and digital electronics, advanced cryogenic equipment (dilution refrigerators), theory of quantum circuits.

Foreseen start for the position: Fall 2021

Duration: 3 years

Application and Contact: Your application should include a CV, a publication list and a brief cover letter explaining your motivation. To be sent to Nicolas Roch (nicolas.roch@neel.cnrs.fr)

More information: http://perso.neel.cnrs.fr/nicolas.roch and http://neel.cnrs.fr

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