# NÉEL INSTITUTE Grenoble

## Two year post-doc – 2025-2027

### Spectrometer based on Kinetic Inductance Detectors (KID)

**General Scope :**
Millimeter and sub-millimeter astrophysics is nowadays among the most important pillars supporting our common cosmological model. In particular, the Cosmic Microwave Background, the most primordial electro-magnetic radiation that is observable, is peaking at millimeter wavelengths.

Kinetic Inductance Detectors are state-of-the-art detectors for millimeter wave observations in astrophysics. They are LC resonators made out of superconducting materials. The detection principle is based on the monitoring of the resonator frequency variation $f_0 = 1/(2\pi\sqrt{LC})$. Incident photons break down Cooper pairs, modifying the inductance $L$ and thus the resonance frequency. The superconducting gap $\Delta$ sets in the photon detector cutoff frequency to $\nu > \Delta/h$.

**Research topic and facilities available:**
In this project, we aim to develop a new technology for on-chip spectroscopy using Kinetic Inductance Detectors and a magnetic field (the H-KID projet) [1]. The spectral response of the Kinetic Inductance Detectors will be modified by reducing the superconducting gap using the magnetic field. The aim of the project is to design, build and test at low temperature a spectrometer based on Kinetic Inductance Detectors.

The post-doc will focus mainly on low-temperature tests in a 100 mK optical dilution refrigerator. She/he may also be involved in the design and nano-lithography of detectors and/or in the programming of new readout electronics.

**Possible collaboration and networking :**
The project is part of the Institut Néel's collaboration with Alessandro Monfardini, Martino Calvo and Usasi Chowdhury.

**Required skills:**
Experience of low-temperature RF measurements is a must. Specific experience with kinetic inductance detectors is an asset. Expertise in RF simulation and nano-lithography is also an asset. Programming skills are welcome.

**Starting date** : April-December 2025

**Salary :** commensurate with experience, indicative probable minimum: ~3000€/month gross, corresponding to ~2000€/month net (after all taxes).

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[8] F. Levy-Bertrand, M. Calvo, U. Chowdhury, A. Gomez, J. Goupy, and A. Monfardini, Magnetic field tunable spectral response of kinetic inductance detectors, Applied Physics Letters 126, 042602 (2025).[arXiv link]