Optimization of LEKIDs for NIKA: a Dual Band Kinetic Inductance Detector Camera for the IRAM 30 m Telescope

M. Rösch[1], A. Monfardini[2], A. Benoit[2], A. Bideaud[2], M. Calvo[2], S. Doyle[3], C. Hoffmann[2], S. Leclercq[1], P. Mauskopf[3] and K.-F. Schuster[1].

[1]Institut de Radioastronomie millimétrique (IRAM), Grenoble, France
[2]Institut Néel, CNRS and Université Joseph Fourier, Grenoble, France
[3]Cardiff School of Physics and Astronomy, Cardiff University, Cardiff, UK.

Abstract - One advantage of lumped element kinetic inductance detectors (LEKID) is the highly sensitive direct detection area of the resonator geometry. There are no lenses or antennas necessary to couple photons into the resonator, which makes the fabrication process relatively easy. Measurements at cryogenic temperatures are very time consuming considering the characterization of the optical absorption of a series of samples. Therefore, we present a room temperature reflection measurement setup, which allows measurements that can be compared to the cryogenic case. The results of these measurements are be presented and compared to a transmission line model and simulations.

To increase the responsivity of the detectors, we are testing a LEKID geometry that is sensitive to two polarizations. Properties, such as optical absorption, quality factors and sensitivity are discussed for this type of geometry.

We present the recent results and the future plans of the NIKA collaboration, developing LEKID and antenna-coupled KIDs for ground-based millimeter-wave astronomy. In particular, we describe the results of the last technical run at the IRAM 30-m telescope. NIKA has demonstrated for the first time a KID sensitivity comparable to existing bolometer-based instruments.

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