Dual polarization Lumped Element Kinetic Inductance Detectors (LEKID) for 1.25 and 2.05mm

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***Abstract*—The development of Lumped Element kinetic Inductance (LEKID) detectors for the IRAM 30m telescope in the framework of the NIKA collaboration (Neel-IRAM KID array) has recently shown considerable promising direct absorption properties as mm-wavelength detectors for astronomical applications yielding an average optical NEP of ~2 x 10-16 W/Hz^1/2.**

The pixel geometry of these detectors allows absorbing power in only one polarization and limits therefore the optical efficiency of the LEKIDs. To increase the mm-wave absorption and thus the responsivity of the detector, a new dual polarization pixel geometry has been designed and tested for the two frequency bands at 1.25 and 2.05 mm wavelength. We present here the measurement results of the optical absorption done at room temperature using a reflection measurement setup in order to determine the optical efficiency of this pixel design for the two polarizations. We also show cryogenic measurements of 132 pixel arrays including FTS measurements to confirm the increased optical efficiency. First results indicate sensitivities, expressed in noise equivalent temperature, of NET=2mK/Hz^1/2 per beam for the 2.05 mm band, which corresponds to a factor of 2 of improvement compared to the classical single polarization design.