

Title: Single pixel characterization of x-ray TES microcalorimeter under ac bias at MHz frequencies

L. Gottardi, S.R.Bandler, F.S.Porter, J.E. Sadleir, C.A. Kilbourne, C.N. Bailey, F.M. Finkbeiner, J.A. Chervenak, J.S. Adams, M.E. Eckart, R.L. Kelley, S.J. Smith, J. Beyer, T. v.d. Linden, H. Hoevers, J.v.d. Kuur, M. Lindeman, M. Bruijn, R.d. Hartog, M. Kiviranta

Abstract: In this paper we present the progress made at SRON in the read-out of GSFC x-ray TES micro-calorimeters in the frequency domain. The experiments reported so far, whose aim was to demonstrate an energy resolution of 2eV at 6 keV with a TES acting as a modulator, were carried out at frequencies below 700 kHz using a standard flux locked loop (FLL) SQUID read-out scheme. The TES read-out suffered from the use of sub-optimal circuit components, large parasitic inductances, low quality factor resonators and poor magnetic field shielding. We have developed a novel experimental set-up, which allows us to test several read-out schemes in a single cryogenic run. In this set-up, the TES pixels are coupled via superconducting transformers to 18 high-Q lithographic LC filters with resonant frequencies ranging between 2 and 5 MHz. The signal is amplified by a two-stage SQUID current sensor and baseband feedback is used to overcome the limited SQUID dynamic range. We study the single pixel performance as a function of TES bias frequency, voltage and perpendicular magnetic field.