Poster

Large Area A-thermal Phonon TES Detector Mediated by the Quasiparticle Diffusion Signal for Space Application

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Low temperature detectors operated at about 0.1 K have achieved excellent performance in the soft-Xray, IR, and Microwave detection, becoming appealing for the new challenging measurements of the space or balloon born mission in Astrophysics and Cosmology. In order to exploit their full higher sensitivity for searching faint signal of distant object, it is necessary to minimize the background signals generated by the cosmic rays,i.e., high energy protons and light nuclei, that leave sizable amount of energy in the same spectral window of the astrophysics signals. GeV proton and nuclei detector operating at few mm from the X-ray or microwave detector at 0.1K can act as anti-coincidence for disentangle the fake signal of cosmic. Fast and large (cm^2) detectors are designed and fabricated. These operate by mixing the fast a-thermal phonon signal with the slow diffusive thermal ones. A grater uniformity in the response has ben obtained using large shaped aluminum films that acts as phonon collectors: the quasiparticles created by high energy phonon diffuse along the the film toward the small (100x100 um^2) Ir TES sensors giving out to a fast rise-time signal. The thermal diffusive signal then follows and mixes with the a-thermal one, allowing to achieve a good proportionality with the full energy released by cosmic ray. Here we present measurement of the qp diffusion properties inside the phonon collectors, the overall efficiency of energy transport mediate by qp in the TES sensor, the full operating performance of the detector for a possible space mission (ATHENA+).