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Superconducting TES array for large area cryogenic anti-coincidence detector for the ATHENA space mission

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ATHENA, the large X-Ray mission proposed to the European Space Agency, will operate the largest array of superconducting TES micro-calorimeters at 50 mK with 2 eV FWHM resolution in L2. Cosmics (protons and light nuclei) are expected to produce a high background resulting in a loss of detection of efficiency of faint diffuse or far X-ray source like Worm Hot Intergalactic Medium or weak spectral signature from AGN and GRBs. In order to reach the high sensitivities required for the scientific goal of the missions, it is mandatory to discriminate these fake events.
A GeV protons and light nuclei detector, 1 mm beneath the microcalorimeter array, is proposed as anti coincidence detector. It is made of 6 cm2 silicon micro-machined chip that detects cosmics by means of fast a-thermal and thermal phonons. The signal is produced by hundreds of superconducting and uniformly distributed small TES, that are fabricated on the silicon chip surface. The surface coverage index can be increased by means of superconducting phonon collectors directly connected with the TESs.
Here we present the performance of the samples with and without phonon collector, with the purpose of fine comprehension of the detector physics, together with the design of the next detector generation, which will allow us to reach the technology readiness level 4 (TRL4) for this mission phase A.

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