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MeVCube: a CubeSat for MeV astronomy

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Despite the impressive progresses achieved both by X-ray and gamma-ray observatories in the last decades, the energy range between $\sim 200\,\mathrm{keV}$ and $\sim 50\,\mathrm{MeV}$ remains poorly explored. COMPTEL, on-board CGRO (1991-2000), was the last telescope to accomplish a complete survey of the MeV-sky with a relatively modest sensitivity. Missions like AMEGO have been proposed for the future, in order to fill this gap in observation; however, the time-scale for development and launch is about 10 years. On a shorter time-scale, a different approach may be profitable: MeV observations can be performed by a Compton telescope flying on a CubeSat. MeVCube is a 6U CubeSat concept currently under investigation at DESY, that could cover the enery range between hundreds of keV up to few MeVs with a sensitivity comparable to that of missions like COMPTEL and INTEGRAL. The Compton camera is based on pixelated Cadmium-Zinc-Telluride (CdZnTe) semiconductor detectors, coupled with low-power read-out electronics (ASIC, VATA450.3), ensuring a high detection efficiency and excellent energy resolution. In this work I will show measurements of the performance of a custom design CdZnTe detector and extrapolations of the expected telescope performance based on these measurements as well as simulations.

Keywords

Gamma-rays astrophysics, Compton telescope, CubeSat, CdZnTe detectors

Collaboration

other Collaboration

Subcategory

Future projects

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