

MEGA - A New Medium Energy (0.5 - 50 MeV) Gamma-Ray Telescope

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Previous low-energy gamma-ray astronomy missions (mainly SIGMA, COMPTEL, OSSE) have demonstrated that the sky is rich in low-energy gamma-ray phenomena. To make further progress in this difficult field of astronomy, an instrument is needed, which is at least ten-times more sensitive than the presently existing ones. Such an instrument would bring the sensitivity in the 0.5 to 50 MeV range to a level, which presently is already achieved at lower and higher energies. The prototype version of an advanced Compton telescope (called MEGA) is presently being built in the labs of MPE. MEGA would have the potential to meet the requirements for a next-generation mission. The converter of the telescope consists of silicon strip detectors, in which the track of the Compton scatter electron is recorded. The absorber consists of CsI-bars, which surround the converter at the bottom and at all four sides. It is mandatory that the absorber offers 3-dimensional position resolution in order to trace multiply scattered photons within the absorber. The tracking of the primary recoil electron leads to a significant improvement of the signal to noise ratio. The large solid angle, in which the scattered photon can be detected in the absorber, implies a high detection efficiency. Backscattered gamma-rays and other undesired events should be efficiently identified and rejected by means of pattern recognition programs and consistency checks. Above 10 MeV, the instrument can be operated as a pair-production telescope. The performance parameters of MEGA are summarized.