



# MEGA: A next generation telescope for medium energy gamma-ray astronomy

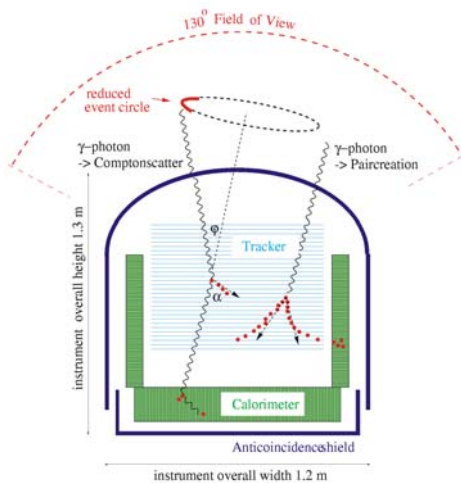


A new telescope for Medium Energy Gamma-Ray Astronomy (MEGA) in the energy range 0.4-50 MeV is being developed. As a successor to the instruments COMPTEL and EGRET on *CGRO* (1991-2000), MEGA is designed to improve the sensitivity for astronomical sources by at least an order of magnitude and to fill a severe 'sensitivity' gap between planned hard-X-ray / low  $\gamma$ -ray (INTEGRAL) and high-energy  $\gamma$ -ray (GLAST) missions. MEGA was ranked second in the last German small satellite competition (2000) and is currently studied in an international consortium (D, E, I, F, USA). It should be submitted again at an appropriate opportunity for a mission in the second half of this decade.

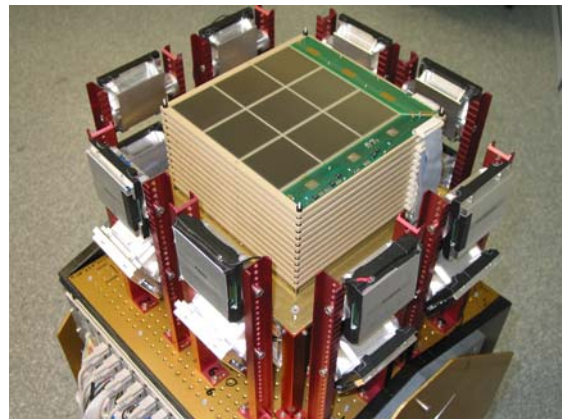
Key science targets for the continuous all-sky survey of MEGA are:

- discovery and investigation of cosmic accelerators (spectra, temporal profiles, and polarization)
- sites of stellar and explosive nucleo-synthesis ( $\gamma$ -ray lines from radioactive isotopes)
- large-scale structure of the galactic and extragalactic diffuse radiation

MEGA is based on new, highly integrated solid state detectors and multichannel read-out electronics. Complete records of Compton scattering and pair-creation interactions (figure 1) enable direct imaging of sources and efficient suppression of systematic background.



*Figure 1: Schematic of the MEGA space telescope. The wide angle field of view and the high sensitivity will enable a continuous scanning all sky survey with unprecedented sensitivity for variable and large scale high-energy sources.*



*Figure 2: Prototype of the MEGA  $\gamma$ -ray telescope with 25% of the area and  $\sim 30\%$  of the depth of a satellite telescope. The tracker contains 10 layers of  $3 \times 3$  double-sided Si strip detectors. The calorimeter has 20 units of pixellated CsI detectors.*

The MEGA prototype (figure 2) will be calibrated in July 2002 at Duke University's high-intensity  $\gamma$ -ray beam facility between 5 and 50 MeV. For the summer of 2003 a stratospheric trans-mediterranean balloon flight is scheduled by the MEGABALL collaboration (GACE, INTA, Spain, IASF, Italy, CESR, France, and MPE, Germany).

## References:

Kanbach, G., et al., 2001, AIP-CP587, 887

Schopper, F., 2002, PhD thesis, TUM