

DESIGN CONSIDERATIONS FOR MACE AND MYSTIQUE TELESCOPE SYSTEMS

R.Koul for the GRACE team
Bhabha Atomic Research Centre, Nuclear Research Laboratory
Trombay, Mumbai –400 085 India
rkoul@apsara.barc.ernet.in

We have plans to establish the GRACE astronomy facility at Mt. Abu in India for high-sensitivity investigations of the gamma-ray sky over the energy range ~ 10 's keV – 100 's TeV. Four experimental systems, TACTIC, MACE, MYSTIQUE and BEST are being set up for this purpose in a phase-wise manner. While the first 3 experiments would search for single photons over the energy range ~ 10 's GeV – 100 's TeV using the atmospheric Cerenkov detection technique, the fourth experiment (BEST) will attempt to detect short-duration (<1 sec), cosmic gamma-ray bursts through the atmospheric scintillation technique.

As a part of the first phase of this project, the 4-element TACTIC array of imaging gamma-ray telescopes has already been commissioned successfully and it has detected statistically significant signals from the Crab Nebula, Mkn 421 and Mkn 501. Presently, the design and development work is in progress related to the second phase of the project, which aims at setting up the MACE and MYSTIQUE telescopes. The MACE will use 2 x 17m diameter paraboloid light collectors using 2 high-definition imaging Cerenkov cameras (FoV $\sim 4^\circ$, pixel resolution $\sim 0.1^\circ$) operating in a stereoscopic mode for gamma-ray source monitoring at photon energies > 20 GeV. The MYSTIQUE will be an array of 300 large-area, wide-angle Cerenkov detectors (1m x 1m physical area, half angle of viewing cone $\sim 45^\circ$), spread out over an area of ~ 600 m x 600 m. The expected photon threshold energy for this system is ~ 2 -5 TeV. The paper will discuss the design details and implementation schedule of these two high-sensitivity systems.