

TOWARDS ABSOLUTE GAIN CALIBRATION OF THE TACTIC FOCAL PLANE CAMERAS

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The TACTIC array of Cerenkov telescopes, set up at Mount Abu in Western India, comprises $4 \times 9.5 \text{ m}^2$ area light-collector elements configured in a triangular pattern of 20m side. The Imaging Element (IE), placed at the centre of the array, deploys a photomultiplier tube (PMT) - based, 349-pixel imaging Cerenkov camera, covering a FoV of $\sim 6^\circ \times 6^\circ$ with a uniform pixel granulation of $\sim 0.31^\circ$. Each of the 3 Vertex Elements (VE), disposed at the 3 corners of the TACTIC array, uses a PMT-based duplex detector array with 29 detectors of assorted types and sizes in each array element. (Total number of PMT detectors used in the 3 VE thus adds up to 174). Absolute gain-calibration of the PMT used in all the 4 TACTIC elements is mandatory for quantifying the light flux received by each element in response to an atmospheric Cerenkov pulse and thereby estimating the progenitor-particle energy. In case of the TACTIC, we have arranged to perform the necessary calibration in the following two stages(steps) :

(i) 4 PMT pixels, placed symmetrically at the edges of the 349 pixel imaging camera in the IE and 29 pixel detector array in the 6 VE cameras, have been selected and their single photo-electron equivalent peaks measured at the operating EHT of 1250 V. An ^{241}Am isotope (alpha-emitter) based light - pulser is permanently mounted on these fixed EHT calibration pixels to measure their absolute gains in situ and thus monitor possible variations in it due to changes in ambient temperature and light level during actual observations. The corresponding gains of the other 345 pixels in the IE camera and 123 pixels in the 6 VE cameras are determined by exposing these cameras to a uniform photon field produced by a high intensity LED lamp embedded inside a scintillating/diffusing medium and placed appropriately at a distance of $\sim 1\text{m}$ from the focal plane instrumentation. (For 27 solar blind PMT in the VE, the absolute calibration is done beforehand in the laboratory). Details of this in situ calibration facility alongwith first results obtained with the IE will be discussed in the paper.