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An extensive study for correcting the nonlinear particle density measured by GRAPES-3 scintillator detectors

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The GRAPES-3 extensive air shower (EAS) array located at Ooty is equipped with 400 plastic scintillator detectors spread over an area of 25000 m^2 and a muon telescope of area 560 m^2 built with 3,712 proportional counters. One of its principal objectives is to measure the primary cosmic ray energy spectrum in the TeV-PeV energy region. The response of the photo-multiplier tubes (PMTs) used in the plastic scintillator detectors becomes nonlinear at densities >50 particles per m^2 in large EAS. We describe a technique to correct for the nonlinearity of these PMTs, thereby extending the dynamic range of the detector for observed particle densities up to 1000 particles per m^2. The details of the technique will be presented.

Keywords

Primary Cosmic Rays, PMT, Non-Linearity, Particle density, Scintillator detector, Proportional counter

Collaboration

other (fill field below)

other Collaboration

GRAPES-3

Subcategory

Experimental Results

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