

GRAPES-3 Detector System

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The Gamma Ray Astronomy at Pev Energies phase-3 (GRAPES-3), experiment located in beautiful slopes of Nilgiris hills, Ooty, India, consist of world class indigenously developed detector system. The core elements of the experiment are plastic scintillator (Sc) detector and proportional counter (PRC). A large array of 400 Sc detectors each having sensitive area of 1m² are spread in field with inter-detector separation of 8m covering an effective area of 25000m² [1]. The design of these detectors are unique for a high energy cosmic ray experiment with extended dynamic range and wavelength shifting (WLS) fiber readout. The 3712 sealed PRC's each made of 600 1010cm hollow mild steel square tube are used as muon detector. These PRC's are arranged in a grid of 4-layers with each layer having 58 PRC's covering a total area of 560m² making it as the most sensitive tracking muon telescope[2]. The near maintenance free detector system is very rugged with failure rate of less than 2%. The signal processing for both Sc and PRC's are done with indigenously developed front end and back end electronics modules. The recent discovery of Transient Weakening of Earth's Magnetic Shield Probed by a Cosmic Ray Burst[3] using GRAPES-3 tracking muon telescope at Ooty has demonstrated that a unique instrument can make a major discovery.

[1] S K Gupta et al Nucl Phys A 540 (2005) 311–323

[2] Y Hayashi et al Nucl Phys A 545 (2005) 643–657

[3] P K Mohanty et al Phys Rev Lett 117, 171101 (2016)

Author: Mr JAIN, Atul (GRAPES-3)

Presenter: Mr JAIN, Atul (GRAPES-3)

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