

Recent Measurements of Galactic Cosmic Rays with the GRAPES-3 Experiment

The GRAPES-3 experiment setup at an altitude of 2200 m in Ooty, India, employs a dense array of plastic scintillator detectors complemented with a large-area tracking muon detector. It is designed to observe shower particles which mostly include gamma rays, electrons and muons produced by interactions of primary cosmic rays and gamma rays in Earth's atmosphere. Recently, GRAPES-3 successfully measured the cosmic ray proton spectrum in the energy range of 50 TeV to 1.3 PeV, overlapping with space-based detectors and bridging the gap between space and ground-based observations. The experiment discovered a spectral hardening beyond 166 TeV, challenging the single power-law model that applies below the knee energy (at ~ 3 PeV). Furthermore, GRAPES-3 identified two significant small-scale anisotropic structures in cosmic ray arrival distributions at a median energy of 16 TeV, confirming the observations from the HAWC and ARGO-YBJ experiments. This presentation will highlight these results and discuss the future outlook.

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