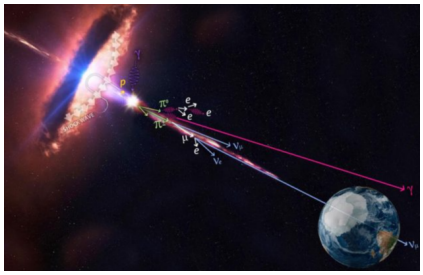

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A Comparative Analysis of High-Energy Hadronic Interaction Models Using TeV-PeV Cosmic Ray Muons at the GRAPES-3 Experiment

Gamma Ray Astronomy at PeV Energies-Phase 3 (GRAPES-3) is a cosmic ray experiment located in Ooty, Tamil Nadu, featuring an array of extensive air shower detectors and a muon telescope. The primary objectives of GRAPES-3 are to precisely measure the cosmic ray energy spectrum, study its nuclear composition, and explore multi-TeV γ-ray astronomy. A key aspect of these studies is understanding muon multiplicity and kinetic energy, which are crucial for accurate cosmic ray composition analysis. In this contribution, we will present a comparative analysis of high-energy hadronic interaction models by examining cosmic ray muons produced in TeV to PeV monoenergetic showers using CORSIKA (Version 7.7550) simulations. We evaluate the performance and differences of three hadronic interaction models: QGSJET II-04, EPOS LHC, and SIBYLL 2.3d. The analysis emphasizes the discrepancies and consistencies among these models, with a focus on the multiplicity and energy distributions of cosmic ray muons with GRAPES-3 conditions with several primaries.

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