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Investigation of the Electromagnetic and Muonic Air-Shower Components in Hadronic Interaction Models using IceTop

The IceCube Neutrino Observatory studies cosmic-ray initiated extensive air showers (EASs) using the IceTop surface array, which is sensitive to the electromagnetic and low-energy muonic components of EASs. The two components are reconstructed on an event-by-event basis by simultaneously fitting separate lateral distribution functions (LDFs) for the electromagnetic and muonic components of each shower. However, the reconstructed muon LDF and other reconstructed parameters can vary significantly based on the choice of the hadronic interaction model. In this work, we demonstrate the ability of the two-component LDF to accurately reconstruct the muon distribution in IceTop. The dependence of the reconstructed muon LDF and other parameters on the hadronic interaction models is investigated. The muon LDF as measured by IceTop is compared to predictions from the same models.

Collaboration(s)

IceCube

Authors: VARSI, Fahim (Karlsruhe Institute of Technology); DRAPER, Lincoln (University of Utah); SOLDIN, Dennis (University of Utah)

Presenter: VARSI, Fahim (Karlsruhe Institute of Technology)

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