

Estimations of the muon content of cosmic ray air showers between 10 PeV and 1 EeV from KASCADE-Grande data

Wednesday, July 14, 2021 7:18 PM (12 minutes)

Measurements of KASCADE-Grande on the muon size in high energy extensive air showers (EAS) have provided evidence that the actual attenuation length of shower muons in the atmosphere is larger than the expectations from the hadronic interaction models QGSJET-II-04, EPOS-LHC and SIBYLL 2.3. This discrepancy is related to a deficient description of the shower muon content with atmospheric depth by MC models. To further explore the origin of the above anomaly, we have investigated the muon size as a function of the primary energy at different zenith angles using data from the KASCADE-Grande experiment. The procedure consisted in comparing the measured muon number flux against the predictions of a reference cosmic ray energy spectrum and from the observed difference to estimate the data/MC muon ratio that best describe the measurements. The ratio is then applied to the MC simulations and from here, we estimate the muon content versus the primary energy. As a reference model, we employed the energy spectrum measured from the Pierre Auger observatory, while, for the different cosmic ray abundances, the GSF model. Results are presented using the QGSJET-II-04, EPOS-LHC, SIBYLL 2.3 and SIBYLL 2.3c models in the analysis procedure.

Keywords

Extensive air showers; muons; KASCADE-Grande; hadronic interaction models

Collaboration

KASCADE-Grande

other Collaboration

Subcategory

Experimental Results

Primary author: ARTEAGA VELAZQUEZ, Juan Carlos (Universidad Michoacana de San Nicolas de Hidalgo)

Co-authors: HAUNGS, Andreas (Karlsruhe Institute of Technology - KIT); FOR THE KASCADE-GRANDE COLLABORATION

Presenter: ARTEAGA VELAZQUEZ, Juan Carlos (Universidad Michoacana de San Nicolas de Hidalgo)

Session Classification: Discussion

Track Classification: Scientific Field: CRI | Cosmic Ray Indirect