



Longitudinal Shower Development Studies Near 8 TeV.

Saturday, July 7, 2012 3:15 PM (15 minutes)

(KASCADE-Grande Collaboration).

Muons have never been used up to now to reconstruct the hadron longitudinal development of Extensive-Air-Showers (EAS) induced by Cosmic Rays (CR) with sufficient accuracy, due to the difficulty of building large area ground-based muon telescopes. The Muon Tracking Detector (MTD) in the KASCADE-Grande experiment (128 m^2 , $E_\mu > 0.8 \text{ GeV}$) allows to study the angular correlation between muon tracks and the shower axis with high precision and for 'protons' in a CM-energy range from 1.4-8.0 TeV or higher. The muon production height allows an almost model independent investigation of the mass composition of the CR flux.

Extensive CR composition studies in KASCADE-Grande based on extensive MC simulations (CORSIKA+Interaction Models) are available for comparison.

A deficit of muons in the data for only the highest CM-energy in the region of the first interactions above 15 km, compared to MC-simulations for proton primaries (CORSIKA, QGSjet-II + FLUKA 2002.4), is observed. Muon pseudorapidity distributions at all energies are compared to MC simulations. An experimental pseudo-rapidity gap for muons may support a heavy mass production at 8 TeV.

The deviation from 'standard' high energy MC is strongest for the 'light' CR primaries at 8 TeV. 'Heavy' primaries show little deviation from the MC prediction, which points to a possible threshold effect for the 'light' CR primaries. In EAS studies we deal with the pions in the fragmentation region which deliver muons conserving the rapidity of the parent mesons. With respect to the effect of missing muons at the highest energy, the comparison with other type of high energy interaction models is of interest.

Primary author: Dr DOLL, Paul (KIT (DE))

Presenter: Dr DOLL, Paul (KIT (DE))

Session Classification: Room 216 - Particle Astrophysics and Cosmology -TR11

Track Classification: Track 11. Particle Astrophysics and Cosmology