



Contribution ID: 580

Type: **Poster contribution**

Primary energy reconstruction from the S(500) observable recorded with the KASCADE-Grande detector

Saturday 1 August 2015 15:30 (1 hour)

The primary energy of cosmic rays is reconstructed at KASCADE-Grande using different approaches based on different sets of recorded observables. We present the results of an approach based on the S(500) observable which is the charged particle density recorded at 500 m distance from the shower axis. Previous investigations based on CORSIKA simulations (with QGSJet-II-2 model embedded for high energy interactions) have shown the S(500) to be primary mass insensitive. We compare the result of this approach with another result from a standard reconstruction based on the correlation between the total shower size and the muon size. When analyzing experimental data we observe a systematic shift between the results. This discrepancy between the two methods does not appear when analyzing simulated events. We conclude that a significant contribution to this discrepancy comes from the inability of simulations to accurately describe the shape of the lateral particle distributions (in particular the muon lateral distributions).

Collaboration

KASCADE-Grande

Registration number following "ICRC2015-I/"

524

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