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TREATMENT OF INCLINED EAS DATA FROM SURFACE ARRAYS AND GZK PREDICTION

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Abstract content

An algorithm has been derived from simulations above 1019 eV to amend the conversion of the densities measured at a given zenith angle to the energy estimators (for instance, densities at 600m for AGASA for the corresponding vertical shower). Above 5.1019 eV, as the shower vertical maximum depth is close to the experimental plane, a complex situation happens for the "absorption"; for a given primary energy, the inclined density at 600m or 1000m exceeds the vertical density, sometimes by 10%, between 10-30 degrees in spite of the decrease of the total size. This is a simple consequence of 3D cascade theory (larger densities at large distance for older profiles of lateral distributions). Both CORSIKA and AIRES confirm this tendency and we present an analytical treatment (description by distorted gaussian function) to restore the correct primary energy and amend the previous intensity overestimated for 60-70% of the solid angle inside 45 deg. The behaviour of muons and converted photons have an additive contribution to this synopsis. A convergence from the amended AGASA data to HIRES measurements appears, confirming the GZK prediction. The correction of AGASA UHE primary spectrum could be less important, only in the case of a pure heavy component. In parallel, we examine the model dependence of the amendments proposed and some particular circumstances (i.e. combination of LPM effect and single diffraction in very inclined showers) as possible sources of energy overestimation in individual events.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 249-252

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