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Lateral distribution and the energy determination of showers along the ankle

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Abstract content

The normalization constant of the lateral distribution function (LDF) of an extensive air shower is a monotonous (almost linear) increasing function of the energy of the primary, as well as a monotonous decreasing function of the distance from the shower core. Therefore, the interpolated signal at some fixed distance from the core can be calibrated to estimate the energy of the shower. There is, somehow surprisingly, a reconstructed optimal distance, r_opt, at which the effects on the inferred signal, S(r_opt), of the uncertainties on true core location, LDF functional form and shower-to-shower fluctuations are minimized. We calculate the value of r_opt and study the robustness of the method as a function of surface detector separation (400 m to 1500 m), energy (0.1 EeV to 10 EeV) and zenith angle (0 to 60 deg) for a realistic distribution of core determination errors along the space parameter used. We also investigate the effects of silent and saturated stations and give a rough estimate of the systematic errors introduced by varying cosmic ray composition inside the considered energy range.

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 243-246

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