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Composition-sensitive parameters measured with the surface detector of the Pierre Auger Observatory

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Abstract content

A key step towards the understanding of the origin of ultra-high energy cosmic rays is their mass composition. Primary photons and neutrinos produce markedly different showers from nuclei, while showers of nuclear species are not easy to distinguish. To maximise the discrimination with the Pierre Auger Observatory ideally all mass-sensitive observables should be combined, but the 10% duty cycle of the fluorescence telescopes largely prevents the use of hybrid data, and therefore of the depth of shower maximum, for the very highest energies. Therefore, we investigate mass-sensitive observables accessible with the surface detectors alone. These include the signal risetime in the Cherenkov tanks, the curvature of the shower front, the asymmetry of the signal in azimuth, and various methods to assess the muon-to-electromagnetic ratio. The mass sensitivity of these variables is demonstrated and their application for composition studies is discussed.

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

The Pierre Auger 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 377-380

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