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Geometry reconstruction of fluorescence detectors revisited

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Abstract content

The experimental technique of fluorescence light observation is used in current and planned air shower experiments that aim at understanding the origin of ultra-high energy cosmic rays. In the fluorescence technique, the geometry of the shower is reconstructed based on the correlation between viewing angle and arrival time of the signals detected by the telescope. The signals are compared to those expected for different shower geometries and the best-fit geometry is determined. The calculation of the expected signals is usually based on a relatively simple function which is motivated by basic geometrical considerations. This function is based on certain assumptions on the processes of light emission and propagation through the atmosphere. For instance, the fluorescence light is assumed to propagate with vacuum speed of light. We investigate the validity of these assumptions and provide corrections that can be used in the geometry reconstruction. The impact on reconstruction parameters is studied. The results are also relevant for hybrid observations where the shower is registered simultaneously by fluorescence and surface detectors.

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 503-506

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