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The Energy Determination for the High Energy Muon in the Large Volume Detector for High Energy Astrophysics

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Abstract content

The energies of the lepton (muon and electron) which is produced by neutrino interaction and the direction of the incident neutrino are two fundamental parameters for high energy neutrino astrophysics. In the experiment for high energy neutrino astrophysics, all the most of muons from muon neutrino events which occur inside an effective volume of the apparatus escape from it without losing their total energies completely. Such type of the event is classified as Partially Contained Event, following the terminology utilized by Super-Kamiokande. However, it is essentially difficult to determine their energy accurately. In the present paper, we simulate every cascade shower which are produced by the direct pair production, the bremsstrahlung and nuclear interaction due to the parent high energy muon with definite energy and obtain the relation between the total track lengths of the charged particles and primary energy. Taking into account the total track lengths of the charged particles which are another expression for the total Cherenkov light produced by the muon, we examine the relation between the primary energy of the muon and the total track length of the charged particles thus produced, from which we estimate the primary energy of the muon concerned.

If this paper 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. 5 (HE part 2), pages 1487-1490

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