30th International Cosmic Ray Conference

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Energy reconstruction of extremely high energy events in IceCube

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Abstract content

Extremely high energy (EHE) cosmic rays are expected to interact with cosmic microwave photons and generate EHE neutrinos (>10PeV).
The IceCube telescope can detect the EHE neutrinos due to its large effective volume, although the expected flux is much lower than the huge flux of atmospheric background muons at lower energies. Therefore, reconstruction of the track geometry and especially the energy are essential for the EHE neutrino detection.
An EHE neutrino may interact with the ice in or near IceCube and induce a muon/tau track with secondaries. The subsequent energy loss is roughly proportional to the energy of the muon/tau, so from the measured energy loss one may infer a lower limit on the energy of the parent neutrino.
We are developing an event reconstruction algorithm for the track geometry and the deposited energy by using all information about the emitted Cherenkov light as detected and recorded by the IceCube digital optical modules, using waveforms. The detector response such as electronic noise, signal spreading and saturation, and also detailed information about the propagation of Cherenkov light in ice are taken into account.
We will present the resolution of the event geometry and the energy obtained with this method.

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

IceCube

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 1457-1460

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