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An upper limit on the upward-going electron-neutrino flux from the HiRes instrument

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Abstract content

Air-fluorescence detectors such as the High Resolution Fly's Eye (HiRes) instrument are very sensitive to upward-going, Earth-skimming ultrahigh energy electron-neutrino-induced showers. This is due to the relatively large interaction cross sections of these high-energy neutrinos and the Landau-Pomeranchuk-Migdal (LPM) effect, which is responsible for a significant decrease in the cross sections for bremsstrahlung and pair production, rendering charged-current electron-neutrino-induced showers occurring deep in the Earth's crust detectable as they exit the Earth into the atmosphere. The search for upward-going neutrino-induced showers in the entire HiRes-II monocular dataset has yielded a null result. From a full LPM calculation of the energy spectrum of charged particles as a function of primary energy and depth for electron-induced showers in rock, we calculate the resulting profile of these showers in air. A full detector Monte Carlo simulation to determine the detector response to upward-going electron-neutrino-induced cascades is described and an upper limit on the flux of electron-neutrinos is given.

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

HiRes 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 1377-1380

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