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Neutrino Physics with the High Resolution Fly's Eye

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Abstract

The High Resolution Fly's eye detector, known as HiRes, is designed to detect the highest energy cosmic rays through their interaction with the earth's atmosphere. When a typical cosmic ray (proton, nucleus or gamma ray) enters the earth's atmosphere it initiates an air shower via nuclear or electromagnetic interactions. Protons of 10^{20} eV will typically penetrate less than about 100 g/cm^2 into the atmosphere before initiating an air shower. Nuclei and gamma rays are even less penetrating. By looking at the deeply penetrating showers we can search for ultra-high neutrino initiated interactions in the atmosphere. The neutrino aperture calculation for the HiRes detector is presented. A preliminary search for neutrino candidates is reported on.