NEW LIMITS ON THE FLUX OF DEEPLY PENETRATING PARTICLES AT THE FLY'S EYE

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Abstract

Results are given of a continuing search for ultra-high energy neutrinos using the Fly's Eye detector of the University of Utah (Baltrusaitis et al 1985a). Neutrino-induced extensive air showers are distinguished from normal hadronically produced air showers by their large estimated interaction depths or upward going trajectories. The sensitivity of the Fly's Eye detector to distant events has been improved since previously published results of this search (Baltrusaitis et al 1985b). The reconstructable data rate has increased by a factor of 2.5. We have searched through an additional 1.35×10^7 seconds of data with the increased sensitivity.

We have re-calculated the effective aperture of the detector in light of the above mentioned improvements to the detector and a change in the estimate of the ultra-high energy neutrino cross section (Reno and Quigg 1987) since our last report. The LPM effect (Landau and Pomeranchuk 1953) has been included in the calculation of the effective aperture for trajectories which pass through the earth. We place upper limits on the neutrino flux based on the additional running time and the new aperture calculations. Comparisons are made between these upper limits and estimates of the neutrino flux based on "galactic bright phase" and "superconducting cosmic string" models of cosmological neutrino production.

References

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