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High energy astrophysical neutrino flux characteristics for neutrino-induced cascades using IC79 and IC86-string IceCube configurations

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We have performed a new measurement of the all-sky diffuse flux of high energy, E>10TeV, extraterrestrial neutrino induced showers (cascades) based on IceCube data collected during 641 days in 2010–2012. Cascades arise predominantly in electron and tau neutrino interactions and have good energy resolution, so that they are well-suited for the spectral characterization of the extraterrestrial flux. For the first time, we have included also high-energy cascades with vertices in near proximity to the detector, thereby enlarging the event sample by up to a factor of two for E > 100TeV. A total of 172 cascades with energies ranging from 10TeV to 1PeV have been observed, of which approximately 60% (75% above 100TeV) have not previously been reported by IceCube. Based on Monte Carlo simulations we estimate the neutrino purity to be 95%. The dominant extra-terrestrial component is well described by a smooth and featureless power-law. The result is in agreement with previous IceCube results and is preferred over a background-only hypothesis with a significance of more than 4 sigma. Additionally we will present a comparison between the results obtained when upward oriented and downward oriented showers are considered separately, showing that the extraterrestrial neutrino fluxes originating from the Northern and Southern hemispheres are consistent.

Collaboration

IceCube

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