

Searches for and Characterization of Astrophysical Neutrinos using Starting Track Events in IceCube

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The IceCube Neutrino Observatory is a cubic kilometer-sized detector designed to detect neutrinos of astrophysical origin. However, muons created by cosmic rays interacting in the atmosphere pose a significant background for these astrophysical neutrinos particularly in the southern equatorial sky. Correctly identifying neutrino events that start in the detector allows us to reduce the atmospheric muon component while retaining a high rate of starting neutrino events. The method presented today also rejects atmospheric neutrinos if they are accompanied by muons from the same cosmic ray shower, lowering the 50% purity threshold for astrophysical-to-atmospheric neutrinos from 100 TeV to ~10 TeV at declinations less than -25° . This allows us to measure the diffuse astrophysical neutrino spectrum to ~10 TeV with excellent precision. In addition, we discuss searches for galactic plane point sources and diffuse galactic plane neutrino emission in the Southern sky and our plans to release high astrophysical-purity real-time alerts to the multi-messenger community using starting track events.

Keywords

icecube; low background; starting track; galactic plane; diffuse neutrino;

Collaboration

IceCube

other Collaboration

Subcategory

Experimental Results

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