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Determination of the High-Energy Neutrino-Nucleon Cross Section with Muon Tracks around the TeV

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Over the past decade, high-energy neutrino events have been piling up, resulting in a large statistical dataset covering a broad range of energies and directions. As neutrinos traverse the Earth, they undergo energy- and angle-dependent attenuation, which encodes information about the neutrino–nucleon cross section. In this work, we extract the neutrino–nucleon cross section using a large sample of upward-going muon neutrino events in the 0.5–10 TeV range, detected by IceCube. By analyzing the angular distribution of 305,735 track-like events, we determine the cross section in multiple energy bins. The analysis accounts for systematic uncertainties, including those related to the neutrino flux and the detector.

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