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Observation of High-Energy Neutrinos from the Galactic Plane

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IceCube has discovered a flux of astrophysical neutrinos and presented evidence for the first neutrino sources, a flaring blazar known as TXS 0506+056 and the active galaxy NGC 1068. However, the sources responsible for the majority of the astrophysical neutrino flux remain elusive. High-energy neutrinos can be produced when cosmic rays interact at their acceleration sites and during propagation through the interstellar medium. The Galactic plane has therefore long been hypothesized as a neutrino source.

Recent results from Galactic neutrino searches are presented in this contribution, with focus on an IceCube analysis on 10 years of cascade events. An improved cascade dataset, built upon recent advances in deep-learning-based reconstruction methods, is utilized for searches of neutrino emission in the Galactic plane. This work presents the first observation of high-energy neutrinos from the Milky Way Galaxy, rejecting the background-only hypothesis at 4.5σ . The neutrino signal is consistent with diffuse emission from the Galactic plane, potentially in combination with emission by a population of sources.

Primary author: HÜNNEFELD, Mirco (TU Dortmund University)

Presenter: HÜNNEFELD, Mirco (TU Dortmund University)

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