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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.

In this contribution, new results are presented for searches of neutrino sources utilizing an improved cascade dataset that builds upon recent advances in deep-learning-based reconstruction methods. 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.

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