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Imaging Galactic Dark Matter with IceCube High-Energy Cosmic Neutrinos

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IceCube's discovery of cosmic neutrinos has opened a new window to explore the high-energy Universe. IceCube has continued to observe cosmic neutrinos since their discovery. The origin of the observed neutrinos is still unknown, and their arrival directions are compatible with an isotropic distribution. This observation, together with dedicated studies of Galactic plane correlations, suggest a predominantly extragalactic origin. Interactions between this isotropic extragalactic flux and the dense dark matter bulge of the Milky Way would thus lead to a slight suppression of flux at energies below a PeV and deficit of events in the direction of Galactic center, which would be seen by IceCube. We perform an extended unbinned likelihood analysis using the four-year high-energy starting event dataset to constrain the strength of dark matter-neutrino interactions and show that inspite of low statistics IceCube can probe regions of the parameter space inaccessible to current cosmological methods.

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