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Searches for point sources and small-scale anisotropies in IceCube

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The IceCube neutrino observatory built in the antarctic ice offers unique opportunities for studying high energy neutrino emission from galactic and extragalactic sources. Detecting such neutrino emission could give invaluable information about the origin of cosmic rays. Recently, the first evidence for astrophysical neutrinos in the PeV range was found with IceCube. No identification of point sources has been achieved yet, but advanced analysis methods are being developed in order to improve the sensitivity to point sources. An energy-dependent likelihood scan was performed on IceCube data. A complementary way to get insight into the cosmic ray production is the study of an event clustering at small scales for high-energy neutrinos. We will also report about a search for multiple neutrino point sources with four years of IceCube data, performing an autocorrelation test on the full sky. In addition, we will present an autocorrelation analysis of the Cygnus region, which is a promising area in terms of star formation and therefore a particularly interesting target for high-energy neutrinos.

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