

High-Energy Neutrino Observations by IceCube

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The IceCube neutrino observatory at the geographic South Pole has been operating at full capacity for the past ten years. In 2013, IceCube reported first evidence of an isotropic flux of astrophysical neutrinos in the TeV-PeV energy range. While the flux is by now observed with high significance, its astrophysical origin is unknown. Only recently, IceCube was able to report first compelling evidence of neutrino emission from the gamma-ray blazar TXS 0506+056. The present lack of neutrino point source detections indicates that the observed isotropic flux is dominated by relatively weak extragalactic sources. Most likely, the neutrino sky is complex and several source classes may contribute. I will summarize the status of IceCube's high-energy neutrino observations, highlight the strong role of multi-messenger astronomy for the identification of neutrino sources, and give an outlook on the scientific potential of future IceCube upgrades and extensions.

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