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Detecting Astrophysical Neutrinos with the IceCube Observatory

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Observations spanning TeV gamma rays to EeV cosmic rays suggest that a correlated flux of neutrinos within this energy range should also exist. The principal mission of the IceCube Neutrino Observatory is to detect these high energy neutrinos and identify their sources. The leading candidates are objects long suspected of accelerating cosmic rays, including supernova remnants, active galactic nuclei, and gamma ray bursts. Other potential sources of high energy neutrinos include dark matter annihilation in the Sun, which offers a complementary search channel to direct detection experiments on Earth. Next winter, the 7-year construction of the observatory will be completed, and the challenge begins in earnest. I will describe the promising results obtained so far with the early stages of the detector, and what we might learn with the full observatory in the not-too-distant future.

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