

Neutrino Astrophysics to Particle Physics with IceCube

Tuesday 15 October 2024 10:00 (30 minutes)

The IceCube Neutrino Observatory is a flagship cubic-kilometer neutrino detector made up of transparent, natural Antarctic ice at the South Pole, which is instrumented with digital optical modules to detect Cherenkov light emitted during interactions of neutrinos with energies spanning more than 10 orders of magnitude. It is a unique multidisciplinary facility that has produced several outstanding results over the past decade in neutrino astrophysics to particle physics, including the first observation of high-energy astrophysical neutrinos as well as the detection of an event at the Glashow resonance. In this talk, I will provide an overview of the latest results from IceCube, with a special emphasis on the first observation of the Galactic Plane via neutrinos, multi-messenger study of a flaring blazar - TXS 0506+056, first point source of steady high-energy neutrino emission - NGC 1068, detection of long-awaited Glashow-resonance event, and recent progress in measuring the flavor composition of the astrophysical neutrino flux, including the latest observation of seven astrophysical tau neutrino candidates. I will also highlight how the DeepCore array in the central region of IceCube enables the detection and reconstruction of atmospheric neutrinos with energies as low as a few GeV, providing high-precision measurements of oscillation parameters and first glimpse of Earth matter effects. I will end my talk with a summary of the extensions of IceCube namely IceCube Upgrade (under construction) and IceCube-Gen2 (in the planning stage).

Track type

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