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Latest astrophysical and particle physics results and future prospects from IceCube

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The IceCube neutrino observatory uses a cubic km of deep South Pole ice instrumented with over 5000 optical sensors to detect Cherenkov light produced by astrophysical and atmospheric neutrinos interacting in the ice. The detector probes neutrino energies from GeV to PeV, propagation distances ranging from a few km to astrophysical scales, and collects high statistics neutrino samples due to its extremely large volume.

IceCube has a broad physics reach in both astrophysical and particle physics observations. Astrophysical neutrinos are a crucial component of the nascent field of multimessenger astronomy, allowing observations of distant and extreme astrophysical phenomena. Additionally, neutrinos of both astrophysical and atmospheric origin can be used to test our understanding of fundamental physics, such as neutrino oscillations and interactions with matter, and to probe Beyond Standard Model (BSM) theories.

This talk will present the latest results from the IceCube collaboration and look ahead to future plans for next generation South Pole neutrino detection.

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