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Science Overview for the IceCube Neutrino Observatory and Future Gen2

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The IceCube Neutrino Observatory is the largest neutrino telescope in the world and uses clear Antarctic ice to detect neutrinos and cosmic rays over an incredibly wide range of energies. The multifaceted experiment runs with over 99% uptime and has been taking high-quality data for over a decade. In my talk I will give a brief overview of IceCube science including real-time efforts in partnership with multi-messenger observatories, the possible first identification of astrophysical tau neutrinos and the recent result of the detection of W boson (Glashow) resonance at the energy beyond reach of the currently operating and future planned particle accelerators. The next generation detector, IceCube Gen2, is designed to do precision neutrino astronomy at high energies. I will briefly discuss the science gain with Gen2.

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