Contribution ID: **252** Type: **Talk**

Prospects for GeV Neutrino Transient Searches with the IceCube Upgrade

Wednesday 16 July 2025 15:50 (15 minutes)

The recent detection of TeV neutrino sources by the IceCube Neutrino Observatory demonstrates the detector's advanced capabilities in detecting high-energy astrophysical neutrinos. At lower energies, down to the GeV range, a variety of transient phenomena, such as novae, supernovae, and gamma-ray bursts, are expected to emit neutrinos. Observations of these neutrinos can provide unique insights into processes below the photosphere and offer clues to identifying their emission mechanisms. We have searched for these neutrinos intensively with IceCube's existing infill array, DeepCore. Although no significant detections have been made, strong constraints on astrophysical environments in these transients, such as the baryon loading factor in gamma-ray bursts, have been obtained. A denser infill array, called the IceCube Upgrade, will enhance sub-TeV neutrino searches with its unprecedented sensitivity to GeV neutrinos. The Upgrade, set to be deployed in the 2025-2026 South Pole season, will consist of seven new strings, adding approximately 700 novel optical modules with multiple photomultiplier tubes in the DeepCore volume. The denser arrangement of high-efficiency modules will significantly improve IceCube's sensitivity between 1 GeV and 1 TeV. We present an initial assessment of the astrophysical capabilities of the IceCube Upgrade, using preliminary simulated data and an event selection similar to that used for DeepCore. We explore the detectability of GeV neutrino transients compared to DeepCore and discuss potential sensitivity enhancements through advanced detector simulations and optimized analysis techniques, including refined triggering conditions and event selection criteria.

Collaboration(s)

IceCube

Author: KOBAYASHI, Yukiho (ICEHAP, Chiba University)

Presenter: KOBAYASHI, Yukiho (ICEHAP, Chiba University)

Session Classification: NU

Track Classification: Neutrino Astronomy & Physics