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Atmospheric neutrino oscillations with IceCube: Recent results from DeepCore and future potential with the IceCube Upgrade

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The IceCube DeepCore detector at the South Pole has been collecting GeV-scale atmospheric neutrino data for the past decade. DeepCore measures atmospheric neutrino oscillations with precision comparable to accelerator-based experiments, while also complementing accelerator measurements by probing longer distance scales and higher energies, peaking above the tau lepton production threshold. In recent years, DeepCore's measurement of neutrino oscillations has improved significantly due to improvements in background rejection, reconstruction techniques, particle identification, and modeling of systematic uncertainties, in addition to extra years of data.

The IceCube Upgrade, to be deployed in the 2025-2026 Antarctic season, will further improve IceCube's sensitivity to these parameters. The Upgrade will consist of 7 additional densely-instrumented strings within the DeepCore region, greatly enhancing detector performance for GeV-scale neutrinos. In combination with the existing decade of DeepCore data, the IceCube Upgrade will provide highly competitive sensitivity to atmospheric muon neutrino disappearance, tau neutrino appearance, and the neutrino mass ordering.

Mini Symposia (Invited Talks Only)

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