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TALK: Modeling prompt atmospheric lepton fluxes with intrinsic charm contribution

Friday, July 11, 2025 2:45 PM (45 minutes)

Speaker: Diksha Garg

Abstract: The all-sky very-high-energy (\sim GeV) atmospheric muon flux has been measured by IceCube. The higher end of this energy range is expected to come from the prompt component. IceCube also measures the atmospheric muon neutrino flux at high energies; however, due to the dominant contribution from astrophysical sources, it is only able to place an upper limit on the prompt atmospheric muon neutrino flux. In this work, we present a new evaluation of the prompt atmospheric muon flux, incorporating for the first time an intrinsic charm component in the colliding nucleons. The inclusion of intrinsic charm enhances the forward production of hadrons such as π^+ and π^- , which subsequently decay into muons and muon neutrinos. We demonstrate that the intrinsic charm contribution leads to an increase in both the prompt muon and muon neutrino fluxes. To model intrinsic charm production, we consider the Regge-based ansatz that is implemented within the MCEq framework for lepton flux calculations. Finally, we explore the challenges in reconciling predictions that simultaneously match IceCube's measured atmospheric muon flux and its upper bound on the prompt muon neutrino flux.

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