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NA61/SHINE experiment for neutrino physics

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For atmospheric and long-baseline neutrino oscillation experiments, as well as astro-neutrino-like supernova neutrinos, understanding hadron reactions is essential for neutrino generation. Neutrinos are produced by striking a nucleus such as carbon, nitrogen or oxygen with a primary proton, and then the emitted hadrons, such as pions and kaons, decay in flight providing neutrinos. The hadron interaction is a primary source of the atmospheric and beam neutrino flux prediction uncertainty. Therefore, accurate hadron production and hadron-nucleus interaction measurements are critical. This is one of the objectives of the NA61/SHINE experiment at the Super Proton Synchrotron at CERN. In this presentation, the results of the neutrino program are reviewed. Next, the recent measurements for T2K and Fermilab long-baseline neutrino experiments are presented. Finally, we discuss the prospects for future hadron production measurements including a low-energy beamline that may extend NA61/SHINE's physics program in the near future. The low-energy hadron production measurements will be beneficial for not only neutrino oscillation experiments but also supernova neutrino observations because atmospheric neutrinos are one of serious backgrounds.

Neutrino Properties

Current status of experimental measurement for atmospheric and long-baseline neutrinos

Neutrino Telescopes & Multi-messenger

Supernova neutrinos

Neutrino Theory & Cosmology

none

Data Science and Detector R&D

none

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