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## Measuring neutrino beam flux with NA61/SHINE

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Accelerator-based neutrino experiments require precise understanding of their neutrino flux, which originates from meson decays in flight. These mesons are produced in hadron-nucleus interactions in extended targets. The cross-sections of the primary and secondary hadronic processes involved are generally poorly measured, and as a result hadron production is the leading systematic uncertainty source on neutrino flux prediction at all major experimental neutrino facilities. The NA61/SHINE multi-particle spectrometer at the CERN SPS has a dedicated program to make precise measurements of hadron production processes for neutrino beams, and has taken data on processes important for both T2K and the Fermilab long-baseline neutrino program. This talk will present the newest measurements of hadron production cross-sections at multiple energies and targets, as well as more specialized measurements using replicas of neutrino beam production targets. NA61/SHINE is completing a major detector upgrade, and physics measurements will begin in June 2022; over the next four years NA61/SHINE will perform a new program of measurements dedicated to neutrino physics including the production of mesons from a replica of the LBNF/DUNE target. Finally, a possible new low-energy beam facility for NA61/SHINE and its physics program will be discussed.

### In-person participation

Yes

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