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Multiple Argon Experiments (M_{Ar}EX) at n_TOF

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Liquid argon has become the primary detector material in many neutrino and dark matter experiments like DUNE, SBND, ICARUS, MicroBooNE, and DarkSide. In particular, multi-kiloton experiments like the Deep Underground Neutrino Experiment (DUNE) have stringent requirements for systematic uncertainties on the energy scale and resolution. Neutron production from neutrino interaction brings a large uncertainty on neutrino energy reconstruction. Calibrations to achieve these requirements also face a hurdle as the DUNE far detector is located 1.5 km underground. One of the proposed calibration systems is the Pulsed Neutron Source (PNS) system which utilizes neutrons traveling long distances in liquid argon to calibrate the enormous DUNE far detector volume.

Thus it is of utmost importance to understand neutron propagation and capture in liquid argon. In recent times, the ACED and the ARTIE experiments at LANSCE have taken steps to precisely measure the neutron capture cross section at eV energies and total cross section in the 20-70 keV region respectively. Through the Multiple Argon Experiments (M_{Ar}EX) initiative, we endeavor to perform accurate measurements for the transmission and capture reaction channels for neutron interactions in liquid argon at the n_TOF facility in CERN.

The first tests for the feasibility of transmission measurements have been performed recently at n_TOF and in this presentation, I will present some preliminary results from this test run.

Early Career

No

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