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Coherent Pion Production for Constraining the Neutrino Flux at Accelerator Neutrino Experiments

This poster presents a study on using neutrino induced charge current coherent pion production ($\nu\text{CC-Coh}\pi$) as a tool for constraining the neutrino flux at the neutrino experiments, specifically the Deep Underground Neutrino Experiment (DUNE). We develop a procedure that leverages measured $\nu\text{CC-Coh}\pi$ events to fit for the neutrino flux while simultaneously accounting for relevant effects in the cross section modeling, which uses the Adler relation with the pion-nucleus elastic scattering cross section. This study demonstrates the potential utility of a $\nu\text{CC-Coh}\pi$ flux constraint, though further work will be needed to determine the range of validity and precision of the Adler relation upon which it relies, as well as to measure the pion-argon elastic scattering cross section to the requisite precision. We discuss the experimental and phenomenological developments necessary to unlock the $\nu\text{CC-Coh}\pi$ process as a “standard candle” for neutrino experiments.

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