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Studying final state interaction with neutrino experiments

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The interactions between neutrinos and target nuclei resting in neutrino detectors are demanding to study both experimentally and theoretically. Thus, systematic uncertainties in neutrino interaction cross sections are usually the largest uncertainties reported by long-baseline neutrino oscillation experiments. Recent experimental results on Final State Interactions (FSI) show that theoretical models programmed into neutrino cross section simulators are not accurately representing the observed outputs. Currently, experimental studies are ahead of their theoretical counterparts. However, resourceful theoretical models are under development to explain the novel data. Neutrino experiments, at the front of the new findings, use various statistical techniques to tune available theoretical cross section models seeking better fits to the experimental results. The tunes do close the gap between theory and experiment, although not for all energies. This work summarized the latest attempts to tune the neutrino cross section simulators and the resulting agreements with the state-of-the-art experimental results.

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