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Comparison of optical potential for nucleons and Δ resonances for electron and neutrino scattering on nuclear targets

Precise modeling of neutrino interactions on nuclear targets is essential for neutrino oscillations experiments. The modeling of the energy of final state particles in quasielastic (QE) scattering and resonance production on bound nucleons requires knowledge of both the removal energy of the initial state bound nucleon as well as the Coulomb and nuclear optical potentials for final state leptons and hadrons. We extract the values of the nuclear optical potential for final state nucleons (U_{opt}^{QE}) from inclusive electron scattering data on nuclear targets in the QE region and compare to theoretical calculations by Cooper et al. We also extract for the first time values of the nuclear optical potential for a $\Delta(1232)$ resonance in the final state (U_{opt}^{Δ}). We find that U_{opt}^{Δ} is more negative than U_{opt}^{QE} .

Mini-abstract

We extract values of the optical potential for nucleons and Δ resonances in the final state.

Experiment/Collaboration

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