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Single pion production is neutrino interactions

This work represents an extension of the MK model. The MK model provides a full kinematic description of single pion production in the neutrino-nucleon interactions, including resonant and nonresonant interactions in the helicity basis, in order to study the interference effect. The resonant interactions of MK model are described by RS model. In the new approach, we use Rarita-Schwinger formalism to describe four important resonances ($P_{33}(1232)$, $P_{11}(1440)$, $D_{13}(1520)$, $S_{11}(1535)$). We also fit the vector form-factor of the MK model to the electron scattering data and estimate 1σ error.

At low Q^2 we can relate the neutrino-nucleon cross-section, which has pure axial contribution at $Q^2=0$, to pion-nucleon cross-section. Therefore we use pion scattering data to fit the axial form factor of the MK model.

Mini-abstract

The updated MK model has its own form factors extracted from electron and pion scattering data.

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