

Nucleon axial-vector form factor, neutrino cross sections, and QED nuclear medium effects

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Charged-current quasielastic neutrino scattering is the signal process in neutrino oscillation experiments and requires precise theoretical prediction for the analysis of modern and future experimental data, starting with the nucleon axial-vector form factor. In this talk, I compare a new MINERvA measurement of this form factor with lattice-QCD calculations and deuterium bubble-chamber data, provide uncertainty projections for future extractions, and present recent calculations of radiative corrections to charged-current processes. The exchange of photons with nuclear medium modifies (anti)neutrino and electron scattering cross sections. We study the distortion of (anti)neutrino-nucleus and charged lepton-nucleus cross sections and estimate the QED-medium effects on the final-state kinematics and scattering cross sections. We find new permille-to-percent level effects, which were never accounted for in either (anti)neutrino-nucleus or electron-nucleus scattering.

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