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Axial and pseudoscalar form factors from charged current quasielastic neutrino-nucleon scattering

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We study the sensitivity to axial nucleon structure of single-spin asymmetries in (anti)neutrino charged current quasielastic scattering on free nucleons. In contrast to electromagnetic processes, the parity-violating weak interaction gives rise to large single-spin asymmetries at leading order. Future polarization measurements could provide independent access to the proton axial structure and allow the first extraction of the pseudoscalar form factor from neutrino data without the conventional partially conserved axial current ansatz and assumptions about the pion-pole dominance. The pseudoscalar form factor can be accessed with precise measurements with muon (anti)neutrinos of a few hundred MeV of energy or with tau (anti)neutrinos. Recoil and target longitudinal asymmetries are the most promising single-spin asymmetries for the extraction of the axial form factor at GeV energies.

Summary

Primary author: TOMALAK, Oleksandr (University of Kentucky)

Presenter: TOMALAK, Oleksandr (University of Kentucky)

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