Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

Unified model of nucleon elastic form factors and implications for neutrino-oscillation experiments[1] XILIN ZHANG, Ohio State Univ - Columbus, T.J. HOBBS, Southern Methodist University, GERALD A. MILLER, University of Washington — Precise knowledge of the nucleon's axial-current form factors is crucial for modeling GeV-scale neutrino-nucleus interactions. However, these form factors remain insufficiently constrained to meet the precision requirements of upcoming long-baseline neutrino-oscillation experiments. In this talk, I will discuss our recent study of the axial pseudo-vector elastic form factor, using the light-front approach to build a quark-diquark model of the nucleon with an explicit pion cloud. The model is first calibrated to existing experimental information on the nucleon's electromagnetic form factors, and then used to predict the axial form factor. We use our form factor results to explore the (quasi-)elastic scattering of neutrinos by (nuclei)nucleons. Based on this exploration, I will address the inadequacy of the widely-implemented dipole ansatz for modeling neutrino scattering processes: the ansatz leads to a 5-10% over-estimation of the total cross section, depending on the (anti)neutrino energy, and over-estimations of similar size in the flux-averaged cross sections for the upcoming DUNE long-baseline neutrino-oscillation experiment. Relevant reference: arXiv:1912.07797.

[1]Supported by the DOE.

Xilin Zhang
Ohio State Univ - Columbus

Date submitted: 25 Jun 2020 Electronic form version 1.4