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Parameterization and applications of the low momentum transfer nucleon vector form factors

We present the proton and neutron vector form factors in a convenient parametric form that is model independent and optimized for momentum transfers \leq few GeV^2 . The form factors are determined from a global fit to electron scattering data and precise charge radii measurements. We apply a new treatment of radiative corrections. We evaluate the neutrino–nucleon scattering cross sections at GeV energies of neutrino oscillation experiments. The neutrino–nucleon charged current quasielastic cross section differs by 3–5% compared to commonly-used form factor models when the vector form factors are constrained by recent high-statistics electron-proton scattering data from the A1 collaboration. A primary goal of this work is to provide a consistent framework for applications such as neutrino event generators to propagate form factor constraints and uncertainties into cross section predictions.

Mini-abstract

Accounting for ep scattering data of A1@MAMI, neutrino-nucleon CCQE cross sections change by 3-5%.

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