Abstract Submitted
for the DNP19 Meeting of
The American Physical Society

Inclusive lepton-nucleus scattering from Quantum Monte Carlo[1]

ALESSANDRO LOVATO, Argonne National Laboratory — One of the challenges in quantum many-body physics is calculating the electroweak response of a nucleus by fully accounting for the dynamics of its constituent nucleons. Electron-scattering experiments have been pivotal to expose the role of nuclear correlations and in particular their spin-isospin dependence in the initial target state. Besides, accurate calculations of lepton-nucleus scattering are of paramount importance to the accelerator-neutrino experimental program. Greens function Monte Carlo (GFMC), using as inputs realistic Hamiltonian and consistent electroweak currents, enables first-principles calculations of nuclear electroweak responses in the quasi-elastic region. I will present our GFMC results for electron and neutrino scattering on ^{12}C, induced by electromagnetic-, neutral-, and charged-current transitions. I will argue how the strength and energy-dependence of two-nucleon processes associated with correlation effects and interaction currents are crucial in providing the most accurate description of lepton-nucleus scattering in the quasi-elastic regime.

[1]Office of Science, Office of Nuclear Physics, under contract DE-AC02-06CH11357

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Date submitted: 01 Jul 2019 Electronic form version 1.4