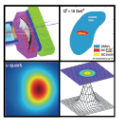

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A study of neutron structure with (un)polarized deuterons and forward spectator tagging at EIC

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An Electron-Ion Collider (EIC) would enable measurements of neutron structure through deep-inelastic electron-deuteron scattering with coincidence tagging of the forward-moving spectator proton ("spectator tagging"). This technique allows one to positively identify the active neutron and control its quantum state in the deuteron through measurement of the recoil proton momentum. A R&D project at Jefferson Lab has established the feasibility of spectator tagging, including measurements of neutron spin structure with a polarized deuteron beam. In this study, we developed a Monte Carlo simulation on the GEANT4 modular framework with the physical processes and the MEIC accelerator and detector/IR/forard tagger design and used to optimize the analysis strategy. A novel technique is implemented for obtaining the free neutron structure function by extrapolating the measured recoil momentum distributions to the on-shell point. Such measurements provide essential information for the flavor separation of the nucleon parton densities, the nucleon spin decomposition, and precision studies of QCD evolution in the flavor-singlet and non-singlet sectors. The EMC effect in light nuclei can be elucidated by studying the recoil momentum dependence of the nuclear modification away from the on-shell point. In this talk we describe the proposed experimental setup and analysis procedure, and present results of a model-independent extraction of the free neutron structure through on-shell extrapolation, both for the unpolarized (F_2n) and the polarized neutron structure functions (g_1n).

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