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Next-generation nuclear DIS with spectator tagging at EIC

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An Electron-Ion Collider (EIC) would enable next-generation measurements of DIS on light nuclei (deuteron, ^3He , ...) with detection of nucleons and fragments in the forward region and measurement of their recoil momentum ("spectator tagging"). Such experiments allow one to control the nuclear configuration during the high-energy process and could be used for (a) precision measurements of neutron spin structure using in electron-deuteron DIS with proton tagging, eliminating nuclear binding through on-shell extrapolation in the recoil momentum; (b) controlled measurements of the nuclear modifications of quark/gluon densities (EMC effect) in defined nuclear configurations; (c) novel studies of diffraction and nuclear shadowing at $x \ll 0.1$. We review the physics applications of spectator tagging at EIC, summarize the experimental and theoretical challenges, and report process simulations and physics impact studies from a dedicated R&D project.

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