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Next-generation nuclear DIS: spectator tagging with light ions at an 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 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 « 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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