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Geometry tagging with heavy ions at the EIC

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The Electron-Ion Collider (EIC) will provide the first opportunity to study electron-nucleus (eA) scattering at high energies. For heavy ions, key measurements include QCD at high gluon densities and the onset of saturation, mapping of the transverse spatial gluon distribution through coherent diffraction, and parton/hadron propagation in cold nuclear matter. All these measurements greatly benefit from, or in the case of coherent diffraction critically rely on, an excellent capability to detect the outgoing nuclear fragments (geometry tagging). Knowing the path length traversed inside the nucleus allows a better understanding of parton propagation, and being able to select central collisions at low-x gives a significant boost to the nuclear thickness (and effective gluon density) beyond the average value for a heavy nucleus. It has also been shown that for coherent diffraction, a sufficient suppression of the large incoherent background can be achieved if, in addition to emitted nucleons and light ions, also the residual nucleus can be detected (including A-1 nuclei). This talk will present the physics opportunities and detection requirements for geometry tagging in eA at an EIC, and discuss some specific results from a project on this topic funded through JLab LDRD.

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