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Heavy flavor and jet studies for the future Electron-Ion Collider

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The proposed high-luminosity high-energy Electron-Ion Collider (EIC) will explore the proton/nuclear structure, search for gluon saturation and precisely determine the nuclear parton distribution functions (nPDFs) in a wide x-Q^2 phase space. Heavy flavor and jet measurements at the future EIC will allow us to better constrain the nPDFs within the poorly constrained high Bjorken-x region, precisely determine the quark/gluon fragmentation processes and directly study the quark/gluon energy loss within the nuclear medium. Heavy flavor hadrons, flavor tagged jets and their correlations are golden channels to explore flavor dependent jet fragmentation processes at the EIC. These proposed measurements will provide a unique path to explore the flavor dependent fragmentation functions and energy loss in heavy nuclei, which can constrain the initial state effects for previous and ongoing heavy ion measurements at the Relativistic Heavy Ion Collider (RHIC) and the Large Hadron Collider (LHC). These studies will not only shed light into the ongoing EIC physics developments, but also provide guidance on the detector design and technology selections. Details of recent simulation studies for heavy flavor and jet developments at the EIC and their physics projections will be shown in this presentation.

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