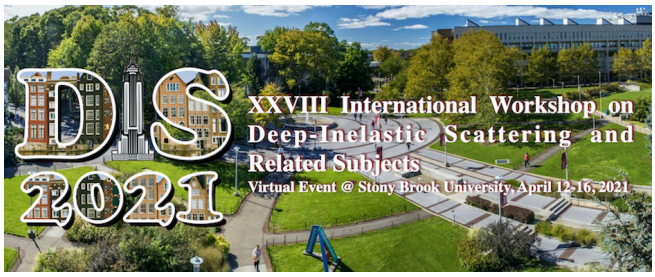

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Heavy flavor and jet studies for the future Electron-Ion Collider

Wednesday, 14 April 2021 11:08 (18 minutes)

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. We propose to develop a new physics program to study the flavor tagged hadrons/jets, heavy flavor hadron-jet correlations and flavor dependent jet fragmentation processes in the nucleon/nucleus going direction (forward region) 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). Progresses of heavy flavor hadron and jet reconstruction in simulation and the corresponding physics projection such as the flavor dependent hadron nuclear modification factor in electron+nucleus collisions and flavor dependent jet angularity distributions in electron+proton collisions will be presented. Initial design and performance of a proposed forward (proton/nuclei going direction) silicon tracking detector, which is essential to carry out these measurements at the EIC will be discussed as well.

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