



Contribution ID: 72

Type: **Leading contributed talk**

Recent open heavy flavor studies for the Electron-Ion Collider

Thursday, 11 July 2024 14:15 (25 minutes)

The proposed Electron-Ion Collider (EIC) will utilize high-luminosity high-energy electron+proton ($e + p$) and electron+nucleus ($e + A$) collisions to solve several fundamental questions, which include searching for gluon saturation and studying the proton/nuclear structure. Due to their high masses ($M_{c,b} > \Lambda_{QCD}$), heavy quarks do not transfer into other quarks or gluons once they are produced. This feature makes the heavy flavor product an ideal probe to explore how a heavy flavor hadron is formed from a heavy flavor quark, which is referred to as the heavy quark hadronization. A series of heavy flavor hadron and jet simulation studies, which include the projected EIC detector performance, have been carried out recently. We will present the heavy flavor hadron and jet reconstruction capability, the projected nuclear modifications of heavy flavor hadrons inside jets, and heavy flavor jet substructure distributions in $e + p$ and $e + A$ collisions with the EIC project detector design and the projected integrated luminosities at the EIC. These proposed EIC heavy flavor measurements will provide a unique path to explore the flavor dependent fragmentation functions and reveal the heavy quark nuclear transport properties in cold nuclear medium. The expected results will provide great discriminating power in separating different theoretical calculations and help constraining initial and final state effects for heavy ion measurements at the Relativistic Heavy Ion Collider (RHIC) and the Large Hadron Collider (LHC).

session

F. Heavy Flavor and Quarkonia

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Session Classification: F. Heavy Flavor and Quarkonia