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Machine learning based jet and event classification at the Electron-Ion Collider

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In this talk, we explore machine learning-based event and jet identification at the future Electron-Ion Collider (EIC). We study the effectiveness of machine learning-based classifiers at the relatively low EIC energies, focusing on (i) identifying the flavor of the jet, in terms of both quark flavor tagging and quark vs. gluon tagging, and (ii) identifying the hard-scattering process, using full event information instead of using only information associated with the identified jet. We establish first benchmarks and contrast the performance of flavor tagging at the EIC with that at the LHC. We will discuss applications of these machine learning-based taggers in the key research areas at the future EIC, including the extraction of (transverse momentum dependent) parton distribution functions, studies of hadronization, and quantifying the modification of hadrons and jets in the cold nuclear matter environment in electron-nucleus collisions. Moreover, we outline how machine learning techniques can help to improve experimental access to transverse spin asymmetries in current experiments at the Relativistic Heavy Ion Collider (RHIC) and the future EIC.

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