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Probing Nuclear Structure and Dynamics at the Electron-Ion Collider REBECCA CORLEY, University of North Georgia — In January 2020, the United States Department of Energy announced that the Brookhaven National Laboratory will be the site for a new cutting-edge accelerator facility called the Electron-Ion Collider (EIC). Particle physics at the EIC will involve electron-nucleus collisions as a means of probing nuclear structure and dynamics of the quarks and gluons that make up protons and neutrons. To contribute to a world-wide effort of investigating subatomic structure at the EIC, we simulate hundreds of millions of electron-nucleus collisions using a Monte Carlo simulation program called PYTHIA. The EIC will use the deep inelastic scattering (DIS) process, where a high energy electron beam is used to shatter a nuclear target. The resulting collision releases energetic, collimated sprays of particle debris known as "jets". These emerging jets allow us to probe the internal structure and dynamics of the quarks and gluons within protons and neutrons. In this project, we are particularly interested in a quantity that characterizes the pattern of jets known as "1-jettiness". This project is a study for constraining nuclear parton distribution functions using 1-jettiness at the EIC. We present simulation results for the proposed kinematics at the EIC and compare to theoretical predictions.

Rebecca Corley
University of North Georgia

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