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Hadron identification with an Electron Ion Collider based on the sPHENIX experiment LILLIAN DE BRUIN, NILS FEEGE, ABHAY DESHPANDE, Stony Brook University, SPHENIX COLLABORATION — The proposed Electron Ion Collider (EIC) aims to investigate the frontiers of quantum chromodynamics by colliding polarized electrons with ions and polarized protons. In electron-proton collisions, narrow cones of hadrons called jets are formed when a quark or gluon undergoes hadronization. Determining the identity of the leading hadron in these jets is critical to the study of the structure of the proton. The leading hadron is correlated to the flavor of the struck quark, so by identifying the leading hadron, the flavor of the struck quark can be discerned. In this work, we analyze hadron identification at the proposed EIC upgrade of the upcoming sPHENIX experiment at Brookhaven National Laboratory's Relativistic Heavy Ion Collider. The proposed upgrade would require additional tracking, calorimeters, and particle identification systems, one of which is a gas-radiator Ring Imaging Cerenkov (RICH) detector in the hadron-going direction. In this analysis, we wrote a module that identifies the leading hadron using jet information from the GEANT4 simulation of the RICH and ran this through simulated electron-proton collisions. Then, we ran the simulation with different collision energies. Finally, we checked its performance by comparing simulation results with known information.

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