Mapping the 3D Structure of Hadrons through Asymmetries in Single-Inclusive Pion Production from Electron-Proton Collisions
MICHEL MALDA, JOSHUA MILLER, DANIEL PITONYAK, Lebanon Valley Coll, ALEXEI PROKUDIN, Penn State Berks, NOBUO SATO, Jefferson Lab
— By utilizing high-energy single-spin asymmetry data, researchers are able to map and understand the 3D structure of hadrons. However, for single-inclusive processes these studies mostly analyze the observable A_N in proton-proton collisions at RHIC, which operates at $\sqrt{S} = 200$ GeV in the forward region. HERMES and JLab provide data for lower-energy electron-proton collisions in the backward region. By using the results from a recent global analysis, we are interested in comparing to existing data and making predictions for the Electron-Ion Collider. We implemented hadronic mass corrections (HMC) for fixed-target experiments and analyzed separately the Collins-type and Sivers-type functions. The HMC seem to have little impact on the asymmetry, whereas studying the Collins-type and Sivers-type terms gave insight into the hard factors and functions that play the largest role in describing the asymmetry data. EIC kinematics prove to be very sensitive to the extractions of the Collins-type and Sivers-type functions from single-spin asymmetries. With global fits including EIC data we will gain a greater understanding of these observables and the 3D structure of hadrons.

Michel Malda
Lebanon Valley Coll

Electronic form version 1.4