

Predicting the $\sin\phi_S$ Transverse Single-spin Asymmetry of Pion Production at an Electron Ion Collider

Xiaoyu Wang and Zhun Lu*

Department of Physics, Southeast University, Nanjing 211189, China

We study the transverse single-spin asymmetry with a $\sin\phi_S$ modulation in semi-inclusive deep inelastic scattering after the transverse momentum of the final state hadron is integrated out. In particular, we consider the case in which the transverse momentum of the final state hadron is integrated out. Thus, the asymmetry is merely contributed by the coupling of the transversity distribution function $h_1(x)$ and the twist-3 collinear fragmentation function $\tilde{H}(z)$. Using the available parametrization of $h_1(x)$ from SIDIS data and the recent extracted result for $\tilde{H}(z)$, we predict the $\sin\phi_S$ asymmetry for charged and neutral pion production at an Electron Ion Collider. We find that the asymmetry is sizable and could be measured. We also include the QCD evolution effect of the transversity $h_1(x)$ and the fragmentation function $\tilde{H}(z)$, which affects the $\sin\phi_S$ asymmetry at EIC considerably.

*Electronic address: zhunlu@seu.edu.cn