

The study of Double-spin asymmetry in SIDIS process at CLAS12, COMPASS and EicC

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We investigate the longitudinal-transverse double-spin asymmetry in the semi-inclusive deep inelastic scattering (SIDIS) for Lambda hyperon production by scattering a longitudinally polarized beam off a transversely polarized proton target. With the transverse momentum of the final hadron is integrating out, we predict the asymmetry with a modulation for the Lambda hyperon production. We take into account both contributions to predict the asymmetry at the kinematics of CLAS12, COMPASS and EicC. We find that the asymmetry in Lambda hyperon production SIDIS process are sizable. In addition, we consider the contribution of sea quarks to the asymmetry within the kinematics of CLAS12, COMPASS, and EicC. The result shows that the asymmetries are larger when sea quarks are included, and the contribution of sea quarks to the asymmetry mainly comes from the convolution of the transversity distribution function $h_1(x)$ and the twist-3 chiral-odd FF $\tilde{E}(z)$. It shows that the measurement of the asymmetry in Lambda hyperon production SIDIS process can provide an effective way to access the contribution of the twist-3 FF $\tilde{E}(z)$ of Lambda hyperon.

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