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Twist-3 gluon fragmentation contribution to transversely polarized hyperon production in semi-inclusive deep-inelastic scattering

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We study the transverse polarization of hyperons produced in semi-inclusive deep inelastic scattering, $ep \to e\Lambda^{\uparrow}X$, in the collinear twist-3 factorization. This process receives three types of twist-3 contributions: (i) twist-3 distribution in the initial proton combined with the transversity fragmentation function (FF) for the hyperon, (ii) Twist-3 quark FFs for the hyperon, and (iii) Twist-3 gluon FFs for the hyperon. In this talk, we present the twist-3 cross section for (iii) in the leading order (LO) with respect to the QCD coupling constant, which completes the LO cross section for this process. Since gluons are ample in the nucleons, this contribution representing multi-gluon correlations in the fragmentation process is potentially as important as other two contributions. We also show that the QCD equation of motion relations and the Lorentz invariance relations among the twist-3 FFs are crucial to gurantee the color and electromagnetic gauge invariance of the cross section. This study is relevant for the future Electron-Ion Collider experiment.

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