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Kinematic power corrections for TMD factorization theorem of semi-inclusive deep-inelastic scattering

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Abstract

We evaluate the complete set of kinematic power corrections to the leading power term of the transverse momentum dependent (TMD) factorization theorem for semi-inclusive deep-inelastic scattering (SIDIS) with polarized target. It allows us to recover contributions of twist-two TMD distributions to all structure functions, including those that are zero at the leading power, such as the contributions of longitudinal photons. Resulting expressions are explicitly gauge and frame invariant, and inherit all main features of ordinary TMD factorization (coefficient function, evolution equations, etc.). Numerical estimations show that kinematical power corrections are of order of few percent for $Qsim10$GeV, and rise to tens of percents for $Qsim 2$GeV. Therefore, the accounting of KPC can be vital for description of actual SIDIS measurements.

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