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Factorization theorem for Quasi-TMD correlators with kinematic power corrections

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Abstract

We derive the factorization theorem for the quasi-transverse-momentum-dependent (quasi-TMD) correlator, including kinematic power corrections to all orders. The resulting expression contains only twist-two TMD distributions and is manifestly Lorentz invariant. The reduced soft factor factorizes multiplicatively. In contrast to the leading-power approximation, the effects of TMD evolution are not multiplicative but are convoluted with the nonperturbative TMD distribution. We present a numerical estimate of the difference between the derived expression and the leading-power approximation and find that it is of the order of tens of percent for current lattice simulations. We also demonstrate that the inclusion of these corrections improves the agreement between phenomenological extractions of the Collins–Soper kernel and lattice simulations.

