

Azimuthal asymmetries in SIDIS and Drell-Yan processes: from high to low transverse momentum

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We consider the azimuthal distribution of the final observed hadron in semi-inclusive deep-inelastic scattering and the lepton pair in the Drell-Yan process. In particular, we focus on the $\cos\phi$ modulation of the unpolarized cross section and on its dependence upon transverse momentum. At low transverse momentum, for these observables we propose a factorized expression based on tree-level approach and conjecture that the same formula is valid in transverse-momentum dependent (TMD) factorization when written in terms of subtracted TMD parton distributions. Our formula correctly matches with the collinear factorization results at high transverse momentum, solves a long-standing problem and is a necessary step towards the extension of the TMD factorization theorems up to the subleading twist.

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