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Forward quak dijet production in pA collisions in ITMD and CGC frameworks

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For studying small-x gluon saturation in forward dijet production in high-
energy dilute-dense collisions, the improved TMD (ITMD) factorization formula was recently proposed, which contains the leading-twist TMD factorization formula relevant for small gluon's transverse momentum kt, but also incorporates an all-order resummation of kinematical twists, resulting in a proper matching to high-energy factorization at large kt.
In the Color Glass Condensate (CGC) framework, ITMD represents the approximation neglecting the genuine twist corrections. Here we evaluate the accuracy of the ITMD formula quantitatively, for the azimuthal angle correlations of quark dijet production in high-energy proton-proton (p+p) and proton-nucleus (p+A) collisions at LHC energies. For a dijet with each quark momentum pt much larger than the target saturation scale, Qs, the ITMD formula is a good approximation to the CGC formula in a wide range of azimuthal angle. It becomes less accurate as the jet pt 's are lowered, as expected, due to the presence of genuine higher-twist contributions in the CGC framework, which represent multi-body scattering effects absent in the ITMD formula. We will extend our discussion to the finite mass corrections for the case of heavy quark production.

Reference: H. Fujii, C. Marquet, K. Watanabe, JHEP12(2020)181

Theory / experiment

Theory

Group or collaboration name

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