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Nuclear effects on transverse momentum dependent Drell Yan production in pA

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The Drell-Yan process is essential for the determination of the collinear and transverse momentum dependent (TMD) parton distribution function. For a nuclear target, in addition to the non-perturbative parton structure that is intrinsically different from that of a free nucleon, there are dynamical nuclear matter effects that modify the TMD cross section in proton-nucleus (pA) collisions. Perturbatively, they arise from forward scatterings between proton-collinear partons and the nuclear medium before the hard process. We study explicitly the opacity-one nuclear corrections to the TMD Drell-Yan cross section up to next-to-leading order. We find that the associated collinear and rapidity divergences lead to i) an in-medium renormalization group equation that encodes parton energy loss, and ii) a Balitsky-Fadin-Kuraev-Lipatov evolution equation for the forward scattering cross-section. I will discuss the connection of this work to earlier studies and phenomenological applications.

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