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Next-to-Eikonal corrections for gluon production in pA

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In the high energy limit, scattering processes can be described within the eikonal approximation, neglecting contributions which are power-suppressed at high energy. In the case of processes involving a large nuclear target, like pA or AA collisions, the Color Glass Condensate effective theory (CGC) is one of the most convenient formalisms based on the eikonal approximation. However, at LHC and RHIC energies, it is not known to what extent is the eikonal approximation reliable.
We develop a method to expand systematically propagators in a strong background field, beyond the eikonal approximation. This allows one to calculate the power-suppressed corrections with respect to the CGC which are enhanced by the width of the target.
As a first example, we calculate such next-to-eikonal power-suppressed corrections for central gluon production in pA collisions. In that context, the first corrections (linear in the width of the target) vanish for the unpolarized cross-section, making the CGC more reliable than expected, but dominate in the case of some single-transverse-spin asymmetries.

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