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Non-linear evolution in QCD at high-energy beyond leading order

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The next-to-leading order (NLO) Balitsky-Kovchegov (BK) equation describing the high-energy evolution of the scattering between a dilute projectile and a dense target suffers from instabilities unless it is supplemented by a proper resummation of the radiative corrections enhanced by large transverse logarithms. Earlier studies have shown that if one expresses the evolution in terms of the rapidity of the dilute projectile, the dominant, anti-collinear, contributions can be resummed to all orders. However, in applications to physics, the results must be re-expressed in terms of the rapidity of the dense target (which corresponds to Bjorken x). We show that although they lead to stable evolution equations, resummations expressed in the rapidity of the projectile show a strong, unwanted, scheme dependence when translated in the rapidity of the target. We circumvent this problem by working directly with the rapidity of the dense target [1]. This avoids the large anti-collinear contributions but introduces new, collinear, instabilities, which are however milder since disfavoured by the typical BK evolution. We propose several prescriptions for resumming these new double logarithms and find only little scheme dependence. The resummed equations are non-local in rapidity and can be extended to full NLO accuracy. We present the first applications of these resummed equations to deep inelastic scattering at HERA.

[1] B. Ducloué et al, e-Print: arXiv:1902.06637 [hep-ph]

Primary authors: DUCLOUE, Bertrand (IPhT Saclay); IANCU, Edmond (IPhT Saclay); MUELLER, Al (Columbia University); SOYEZ, Gregory (IPhT Saclay); TRIANTAFYLLOPOULOS, Dionysios (ECT* Trento)

Presenter: DUCLOUE, Bertrand (IPhT Saclay)

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