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Dipole picture at Next-to-Leading Order meets HERA data

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Deep inelastic scattering (DIS) total cross section data at small- x as measured by the HERA experiments is well described by Balitsky-Kovchegov (BK) evolution in the leading order dipole picture [1-3]. Recently the full Next-to-Leading Order (NLO) dipole picture total cross sections have become available for DIS [4-6], and a working factorization scheme has been devised which subtracts the soft gluon divergence present at NLO [7].

We report our ongoing work in which we make the first comparisons of the NLO DIS total cross sections to HERA data. The non-perturbative initial condition to BK evolution is fixed by fitting the HERA reduced cross section data. As the NLO results for the DIS total cross section are currently available only in the massless quark limit, we also fit a light quark only cross section constructed with a parametrization of published total and heavy quark data. We find an excellent description of the HERA data. Since the full NLO BK equation is computationally expensive [8], we use a number of beyond LO prescriptions for the evolution that include most important higher order corrections enhanced by large transverse logarithms, including the recent version of the equation formulated in terms of the target rapidity [9].

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