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Asymptotic solutions to the full next-to-leading order Balitsky-Kovchegov equation

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The high energy regime of quantum chromodynamics (QCD) has been under intense investigation in electron-hadron and hadron-hadron collisions. In this regime, saturation effects associated with the high gluonic density are expected to modify the QCD dynamics, implying the presence of non-linear effects that reduce the growth of the gluon distribution at small-x. The description of the saturation region is given by the Color Glass Condensate (CGC), which is an effective theory for the high density regime. The CGC theory implies that the dipole-hadron scattering amplitude satisfies the Balitisky-Kovchegov (BK) equation in the mean-field approximation, which allows us to estimate the contribution of the non-linear effects. In recent years, several authors have obtained the numerical solution of the BK equation at leading order in the full kinematical range, as well as its analytical solutions in the linear and saturation regimes. On the other hand, the description of the next-to-leading order (NLO) corrections for the BK equation is still a theme of intense debate in the literature. Currently, there are different treatments for the NLO corrections and distinct prescriptions for the hard scale of the running coupling constant. One of them is the full next-to-leading order correction which consists of the implementation of the quark and gluon loops to the BK equation, which is called the full Next-to-leading order BK equation (BK - fNLO). We derive a solution to the NLO BK equation on the saturation regime for the hard scale given by Q_s^2, and compares this solution with the others' analytics solutions to the NLO BK equation in the saturation regime derived for the different prescriptions to the hard scale, present in the literature.

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