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Analysis of the gluon distribution function from the solution of nonlinear GLR-MQ evolution equation at small-x

We present the solution of the nonlinear Gribov, Levin, Ryskin, Mueller and Qiu (GLR-MQ) evolution equation at small-x by incorporating Regge-like behavior of the gluon distribution function G(x,Qˆ2) at small-x. We have also performed the study of Qˆ2 and x dependence of gluon distribution function from the solution of GLR-MQ evolution equation in the small-x region. Moreover, we have investigated the effect of nonlinearity in the results and observed that with the inclusion of the nonlinear terms, the growth of G(x,Qˆ2) slows down relative to the linear DGLAP gluon distribution. Further for each x, the Qˆ2-dependence of the data is well described by nonlinear corrections to the GLR-MQ equation. It is an impressive observation from our results that nonlinearities decrease with increasing correlation radius (R) between two interacting gluons. Here we have also examined the sensitivity of λ_G in our calculations, where λ_G is the Regge intercept for gluon distribution function. We made comparisons of the computed gluon distribution function with H1 and ZEUS data and with those obtained by the global QCD fits viz. GRV1998, MRST2001, MSTW2008, CT10. Results are also compared with the EHKQS model. The comparison is performed for different input parametrisations for 2≤Qˆ2≤20 GeVˆ2 and 10ˆ{−5}≤x≤10ˆ{−2}.

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