

Gluon distributions in the proton in a light-front spectator model

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We formulate a light-front spectator model for the proton incorporating the gluonic degree of freedom. In this model, at high energy scattering of the proton, the active parton is a gluon and the rest is viewed as a spin-1/2 spectator with an effective mass. The light front wave functions of the proton are constructed using a soft wall AdS/QCD prediction and parametrized by fitting the unpolarized gluon distribution function to the NNPDF3.0nlo dataset. We investigate the helicity distribution of gluon in this model. We find that our prediction for the gluon helicity asymmetry agrees well with existing experimental data and satisfies the perturbative QCD constraints at small and large longitudinal momentum regions. We also present the transverse momentum dependent distributions (TMDs) for gluon in this model. We further show that the model-independent Mulders-Rodrigues inequalities are obeyed by the TMDs computed in our model.

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