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Small-x Asymptotics of the Quark and Gluon Helicity Distributions

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Content

We construct small-x evolution equations for the quark and gluon helicity distributions. The equations present a new type of evolution, resumming double logarithms of energy, that is, powers of $\alpha_s \ln^2(1/x)$. We solve the equations both analytically and numerically and obtain the following small-x asymptotics for the quark and gluon helicity distributions: $\Delta q \sim \left(\frac{1}{x}\right)^{\alpha_h^q}$ with $\alpha_h^q = \frac{4}{\sqrt{3}} \sqrt{\frac{\sim N_c}{2\pi}} \approx 2.31 \sqrt{\frac{\sim N_c}{2\pi}}$ and $\Delta G \sim \left(\frac{1}{x}\right)^{\alpha_h^G}$ with $\alpha_h^G = \frac{13}{4\sqrt{3}} \sqrt{\frac{\sim N_c}{2\pi}} \approx 1.88 \sqrt{\frac{\sim N_c}{2\pi}}$. These results should help us constrain the amount of proton spin residing in small-x partons.

Session

Proton structure, small and large x physics

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