Helicity evolution at small x

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ABSTRACT: We construct small-x evolution equations which can be used to calculate quark and anti-quark helicity TMDs and PDFs, along with the g_1 structure function. These evolution equations resum powers of $\alpha_s \ln^2(1/x)$ in the polarization-dependent evolution along with the powers of $\alpha_s \ln(1/x)$ in the unpolarized evolution which includes saturation effects. The equations are written in an operator form in terms of polarization-dependent Wilson line-like operators. While the equations do not close in general, they become closed and self-contained systems of non-linear equations in the large-N_c and large-N_c & N_f limits. As a cross-check, in the ladder approximation, our equations map onto the same ladder limit of the infrared evolution equations for the g_1 structure function derived previously by Bartels, Ermolaev and Ryskin [1].