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Review of results on polarized glue from fixed target DIS experiments

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The question of how the spin of the nucleon is made up from the spins and orbital angular momenta of its constituents is now in the front line since two decades. Due to the smallness of the contribution from the quark spins the focus is on the gluon polarization $\Delta g/g$. Our present knowledge of this quantity as obtained from deep-inelastic lepton–nucleon scattering experiments is mainly based on the recent results from COMPASS at CERN and HERMES at DESY. The main tools to study $\Delta g/g$ in DIS are scaling violations of the g_1 structure function and—in a more direct way—longitudinal double spin asymmetries in hadron production. For the latter the information on the gluon polarization enters the asymmetries via the photon–gluon fusion part of the cross-section. The relative contribution of this part must be determined using Monte Carlo simulations before the gluon polarisation can be determined. Results are shown from hadron pairs produced with $Q^2 < 1$ GeV^2 and $Q^2 > 1$ GeV^2 as well as from single hadrons. In the case of charmed mesons basically only the photon–gluon fusion process contributes and thus the analysis is almost independent of MC simulations. Recent results from COMPASS obtained from D meson asymmetries are presented and an outlook is given. All data indicate that the gluon polarization is small compared to earlier expectations, but still can make a major contribution to the nucleon spin.