QCD Analysis of Polarized Deep Inelastic Scattering Data and New Parton Distributions

J. Blümlein[a] and H. Böttcher[a]

[a] *DESY, Platanenallee 6, D-15738 Zeuthen, Germany*

A QCD analysis of the world data on polarized deep inelastic scattering is presented in leading and next-to-leading order. New parameterizations are derived for the quark and gluon distributions for the kinematic range $x \epsilon [10^{-9}, 1]$, $Q^2 \epsilon [1, 10^6]$ GeV^2 and the value of $\Lambda_{\rm QCD}$ and $\alpha_s(M_z)$ are determined. Emphasis is put on the derivation of the fully correlated 1σ error bands for these distributions, which are also given in terms of parameterizations and are directly applicable to determine experimental errors of other polarized observables. The impact of the variation of both the renormalization and factorization scales on the value of α_s is studied. Finally we perform a factorization–scheme invariant QCD analysis based on the observables $g_1(x, Q^2)$ and $dg_1(x, Q^2)/d\log(Q^2)$ in next-to-leading order, which is compared to the standard analysis. A series of low moments of parton densities, accounting for error correlation, are given to allow for comparison with results from lattice simulations.

References

[1]J. Blümlein and H. Böttcher, `hep-ph/0203155`, Nucl. Phys. **B** (2002) in print.