

# Threshold Resummation and Higher Order QCD Corrections for Longitudinally Polarized Processes

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## Abstract

Longitudinal spin asymmetries have been a prime source of information on the nucleon's spin structure for several decades. In order to match the precision of currently available and future data taken at Compass, JLab, RHIC and a future EIC, it is of great importance to understand higher order corrections in QCD. We review the current status of higher order QCD corrections for longitudinally polarized processes for both lepton-hadron and proton-proton collisions. Besides calculations at next-to-leading order in the strong coupling constant, we focus in particular on threshold resummation. Large logarithmic corrections arise near the exclusive phase space boundary, where real gluon emission is suppressed. Threshold resummation addresses these logarithms to all orders in the strong coupling constant. In addition, spin observables that involve jets in the final state, depend on potentially large logarithms in the jet radius parameter  $R$  which can also be resummed to all orders.