

Measurement of double helicity asymmetries (A_{LL}) in π^\pm production at mid-rapidity in longitudinally polarized $p + p$ collisions with PHENIX experiment

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One of the main goals of the RHIC spin program is the determination of the gluon helicity contribution to the proton spin. This can be accessed by measuring double spin asymmetries (A_{LL}) of pion production at mid-rapidity in longitudinally polarized proton collisions with the PHENIX experiment. The ordering of the asymmetries with the charge of the final state pions can in addition directly infer the sign of the gluon spin contribution.

Charged pions are reconstructed in the central PHENIX tracking system. The asymmetries are evaluated between collisions of bunches with the same and opposite helicity after correcting for differences in luminosity and for beam polarizations. The A_{LL} measurements of pion production at $\sqrt{s} = 200$ GeV have been published previously. To extend our understanding of the gluon polarization to a lower gluon momentum fraction (x), high statistics data was collected at a higher $\sqrt{s} = 510$ GeV in 2012-2013. We present the physics motivation, the analysis procedure and current status of the $\pi^\pm A_{LL}$ measurements at mid-rapidity.