

Single Spin Asymmetry of W Production in Longitudinally Polarized $p + p$ Collisions at $\sqrt{s} = 500$ GeV

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The “proton spin crisis”, emerged from an experiment carried out by the European Muon Collaboration, remains one of the major unsolved problems in nuclear physics. In solving this mystery, determining the polarized anti-quark parton distribution functions (PDFs) may hold key. So far the sea anti-quark polarizations have been measured in the polarized Semi Inclusive Deep Inelastic (SIDIS) experiments and are poorly constrained compared to the valence quark polarizations due to large uncertainties from fragmentation functions.

Measurement of parity violating longitudinal single spin asymmetries of W production is a complementary approach, free from fragmentation uncertainties compared to Semi-inclusive Deep Inelastic Scattering measurements, probing the flavor-separated polarized sea quark distributions in the proton. At mid-rapidity range of $|\eta| < 0.35$, candidate W_{\pm}/Z events are identified through their e_{\pm} decay channels. In 2013, PHENIX at the Relativistic Heavy Ion Collider recorded data with an integrated luminosity of ~ 146 pb⁻¹ in longitudinally polarized p+p collisions at $\sqrt{s}=510$ GeV. The single spin asymmetry results of the run 2013 will be presented.

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