Using π^0's to Understand Proton Spin Structure through Polarized p+p Collisions at $1 < \eta < 2$ and $\sqrt{s} = 200$ GeV at STAR

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Measurements of spin dependent observables at the Relativistic Heavy Ion Collider at Brookhaven National Laboratory provide unique insight into the contribution of a proton's constituents to its spin. The Solenoidal Tracker at RHIC (STAR) can be used to measure effects of the quark and gluon spins in the proton by observations of neutral pions that result from longitudinally and transversely polarized proton-proton collisions in STAR. The neutral pions (π^0's) decay into two photons that, for pseudorapidity (η) 1 to 2, can be observed in the endcap electromagnetic calorimeter in STAR. These are used to reconstruct the kinematic properties of the π^0's and we can then look for spin asymmetries in π^0 production. Measurements of both the longitudinal and transverse spin asymmetries in the production of π^0's from data taken in 2006 have made some contributions to our understanding of the structure of the proton. New data taken in 2009, in a longitudinal spin run with greater luminosity, will provide greater precision in the final results. Results from 2006 (STAR's most recent spin paper, submitted to Phys. Rev. D: arXiv:1309.1800) and preliminary work on 2009 data are shown.

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