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# Neutral Pion ( $\pi^0$ ) Analysis in Longitudinally Polarized $p + p$ Collisions

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Beyond the valence quarks' spin contribution to the total spin of a proton, gluon and sea quark contributions are becoming clear as well. For proton+proton collisions at a center of mass energy of 510 GeV, neutral pion production is dominated by gluon-gluon and gluon-quark scattering. An avenue to constrain the gluon polarization is the asymmetry,  $A_{LL}$ , in the production of neutral pions from collisions of longitudinally spin-polarized proton beams. Our experiment was performed with the STAR detector at the Relativistic Heavy Ion Collider (RHIC), unique for its ability to collide spin-polarized proton beams. The Endcap Electromagnetic Calorimeter (EEMC) of the STAR detector with its pseudorapidity ( $\eta$ ) range between 1.09 and 2.00 and full azimuthal coverage measures energies of photons from  $\pi^0$  decays. We consider the invariant mass of all photon pairs in the EEMC as we identify  $\pi^0$  candidates. We will present the current status of the analysis of the  $\pi^0$   $A_{LL}$  as measured by the EEMC at STAR in 2012 data with center-of-mass energy of 510 GeV.