

# Longitudinal Spin Asymmetry and Cross Section of Inclusive $\pi^0$ Production in Polarized p+p Collisions at 200 GeV

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One goal of the polarized p+p program at RHIC, the first high-energy polarized p+p collider, is the study of the gluon polarization in the proton via spin asymmetry measurements in a variety of processes. Due to its large acceptance tracking and electromagnetic calorimetry the STAR detector is an ideal tool for these studies.

We present the first measurement of the cross section and the double longitudinal spin asymmetry of inclusive  $\pi^0$  production in polarized p+p collisions at mid-rapidity with the STAR detector, using the barrel electromagnetic calorimeter. The measured cross section is compared to NLO pQCD calculations, and can provide constraints on fragmentation functions. The comparison of the measured unpolarized cross section to theory is crucial in order to validate model calculations used to extract the gluon polarization from the observed asymmetries. The double longitudinal spin asymmetry is compared to NLO pQCD calculations based on different assumptions for the gluon polarization in the nucleon to provide constraints on  $\Delta g/g$ . Although at present the asymmetry result is still limited by statistics, it provides a proof of principle for future analysis with higher integrated luminosity and increased acceptance.