Double Helicity Asymmetry of Inclusive Neutral Pion Production in Polarized pp Collisions at sqrt(s)=62.4GeV

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The so-called "proton spin crisis," initiated by the results from the polarized deep inelastic scattering experiments, has triggered wide effort towards the understanding of proton spin. Despite the wide efforts, there has remained large uncertainty on ΔG, the gluon spin contribution to the proton. RHIC, the world's first polarized proton-proton collider, provides us the opportunity to directly probe gluon polarization through its strong interactions. The PHENIX experiment at RHIC has the ability to clearly identify π^0 through its gamma decay by using an EMCal(Electro-Magnetic Calorimeter) which covers the central rapidity region ($|\eta|<0.35$) and half in azimuth angle. PHENIX also has an excellent gamma triggering capability (the threshold is ~0.8GeV or ~1.4GeV in energy) which makes high-statistics π^0 measurement feasible. PHENIX has previously reported the double-helicity asymmetry A_{LL} of inclusive π^0 production in pp collisions at sqrt(s)=200 GeV [1,2] and it indicates that ΔG is not large.[3] But a large uncertainty remains for large x (>0.1) and more statistics are needed.

In the year 2006, data taking has been performed at sqrt(s)=62.4 GeV. Spin rotator commissioning was successful and we had longitudinally polarized collisions. Integrated luminosity of about 70 nb^{-1} with average polarization of 50% was achieved. x_T scaling ($x_T = 2p_T/\mathrm{sqrt}(s)$) is considered to hold in this energy region and the cross section is ~300 times larger at fixed x_T than that in 200GeV. It corresponds to 10 times larger statistics than the previously reported π^0 A_{LL} at 200GeV which is based on integrated luminosity of 1.8pb^{-1}.

In this presentation, the analysis on the cross section and the double helicity asymmetry A_{LL} of π^0 at sqrt(s)=62.4 GeV will be discussed.

[1] S.S.Adler et al., Phys. Rev. Lett. **93**, 202002(2004)
[2] K.Boyle for the PHENIX Collaboration, nucl-ex/0606008, talk at the XVIIth Particles and Nuclei International Conference
[3] M.Hirai, S.Kumano, and N.Saito. hep-ph/0603213