

**Measurement of longitudinal single-spin asymmetries for  $W^\pm$  boson production  
in polarized  $p + p$  collisions at  $\sqrt{s} = 510$  GeV at RHIC**

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$W^\pm$  boson production in longitudinally polarized  $p + p$  collisions provides unique and clean access to the individual helicity polarizations of quarks and antiquarks in the colliding protons. Due to maximal violation of parity in the production,  $W^\pm$  bosons couple to left-handed quarks and right-handed anti quarks and hence offer direct probes of their respective helicity distributions in the nucleon. These can be observed in measured large parity-violating longitudinal single-spin asymmetries,  $A_L$  as a function of decay lepton pseudo-rapidity,  $\eta$  for  $W^\pm$  boson production at the STAR experiment at the Relativistic Heavy Ion Collider (RHIC).

The final results of  $W A_L$  measured between  $|\eta| < 1.1$  at  $\sqrt{s} = 510$  GeV from the dataset collected in 2011 and 2012 running periods with an integrated luminosity of  $86 \text{ pb}^{-1}$  and an average beam polarization of  $\sim 55\%$  will be presented. The status for the analysis of  $W A_L$  from the larger dataset collected during 2013 (more than 3 times of 2012) at  $\sqrt{s} = 510$  GeV with an average beam polarization of  $\sim 54\%$  will be reported.