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

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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  $u / d$  quarks and anti-quarks. Due to maximal violation of parity,  $W$  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 extracted from measured parity-violating longitudinal single-spin asymmetries,  $A_L$ , for  $W^{-(+)}$  boson production as a function of decay lepton (positron) pseudorapidity  $\eta$ . The STAR experiment is well equipped to measure  $A_L$  for  $W^{-(+)}$  boson production between  $|\eta| < 1$ .

The published STAR  $A_L$  results (combination of 2011 and 2012 data) have been used by several theoretical analyses

suggesting a significant impact in constraining the helicity distributions of anti- $u$  and anti- $d$  quarks.

In 2013 the STAR experiment has collected a large data sample of  $\sim 250 \text{ pb}^{-1}$  which is more than 3 times larger than the total integrated luminosity in 2012, at  $\sqrt{s} = 510$  GeV with an average beam polarization of  $\sim 54\%$ , comparable to run 2012. The status of the 2013  $A_L$  analysis will be discussed along with an overview of future plans.

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