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Measurement of the parity-violating longitudinal single-spin asymmetry A_L for $W^{-(+)}$ boson production in polarized proton collisions at $\sqrt{s} = 510$ GeV at RHIC BERND SURROW, Temple University, STAR COLLABORATION — The STAR experiment at the Relativistic Heavy-Ion Collider at Brookhaven National Laboratory is carrying out a spin physics program in high-energy polarized proton collisions to gain a deeper insight into the spin structure and dynamics of the proton. The collision of polarized protons at $\sqrt{s} = 500$ GeV opened a new era of spin-flavor structure studies using the production of $W^{-(+)}$ bosons which are primarily produced in $\bar{u} + d$ ($\bar{d} + u$) collisions. The STAR experiment is well equipped to measure $W^{-(+)}$ $\rightarrow e^- + \bar{\nu}_e$ ($e^+ + \nu_e$) in longitudinally polarized proton collisions. The published STAR A_L results (combination of 2011 and 2012 data) have been used by two global analyses groups suggesting a significant impact in constraining the helicity distributions of anti- u and anti- d quarks. In 2013, the STAR experiment collected a data set at $\sqrt{s} = 510$ GeV with a factor of three larger figure of merit based on a total integrated luminosity of ~ 300 pb $^{-1}$ and an average beam polarization of $\sim 54\%$. We will report on the status of the STAR 2013 $W A_L$ analysis along with future plans.

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