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Measurement of $W^{\pm}$ Boson Production at Mid-rapidity in 510 GeV Polarized $p+p$ Collisions at PHENIX MIKHAIL STEPANOV, University of Massachusetts, Amherst, PHENIX COLLABORATION — The measurement of $W^{\pm}$ production in polarized proton-proton collisions provides access to the flavor-separated quark and anti-quark polarized parton distribution functions. The PHENIX experiment at RHIC observes $W^{\pm} \to e^{\pm}$ decays at mid-rapidity with the PHENIX central arm detectors ($\mid \eta \mid \leq 0.35$). In 2012, the new silicon VTX detector was fully operational, allowing for improved analysis techniques in order to reduce background from conversion electrons in the detector material. The recently recorded data in 2012 at $\sqrt{s} = 510$ GeV with an integrated luminosity of $\approx$30 pb^{-1} is about twice the size of previous data sets and also takes an advantage of improved beam polarization ($P \approx 52\%$). We report the status of the analysis of the cross section and the parity violating longitudinal single-spin asymmetry of $e^{\pm}$ from $W^{\pm}$ decays.

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