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Measurement of Longitudinal Spin Asymmetries for Weak Boson Production at STAR

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The production of W^\pm bosons in longitudinally polarized proton-proton collisions at RHIC provides a direct probe for the spin-flavor structure of the proton through the parity-violating single-spin asymmetry, A_L . At STAR, the leptonic decay channel $W \rightarrow e\nu$ can be effectively measured with the electromagnetic calorimeters and time projection chamber. STAR has measured the $A_L(W)$ as a function of the decay-electron's pseudorapidity from datasets taken in 2011 and 2012, which has provided significant constraints on the helicity-dependent PDFs of \bar{u} and \bar{d} quarks.

In 2013 the STAR experiment collected an integrated luminosity of $\sim 250 \text{ pb}^{-1}$ at $\sqrt{s} = 510 \text{ GeV}$ with an average beam polarization of $\sim 56\%$, which is more than three times larger than the total integrated luminosity of previous years. The final results from 2013 dataset for W -boson A_L as well as for Z -boson A_L and W -boson double-spin asymmetry A_{LL} will be reported. Also the impacts of STAR data on our knowledge of the sea-quark spin-flavor structure of the proton will be discussed.

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