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Transverse single-spin asymmetries and cross section of weak bosons in p+p collisions at $\sqrt{s}$ = 510 GeV

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The STAR experiment at RHIC has measured transverse single-spin asymmetries of $W^{\pm}/Z_0$-bosons in proton-proton collisions at a center-of-mass energy $\sqrt{s}$ = 510 GeV (2017 data). These asymmetries probe correlations between parton motion and the proton spin in the initial state which are described in terms of transverse momentum dependent parton distribution functions (TMD), in this case the Sivers function. The Sivers function is of particular theoretical interest because its process dependence can be linked to underlying kinematics, namely the gauge link structure of the scattered parton with the nucleon remnant. This means that the Sivers function is not universal and a sign change is expected between the asymmetries measured in semi-inclusive deep inelastic scattering compared to those in hadronic collisions. The new STAR preliminary results with an integrated luminosity of about 350 pb^{-1} improve significantly on previous data from 2011. We will discuss details of the full reconstruction of the W-boson kinematics which are required for a true TMD measurement. Comparison with recent global fits will illustrate the potential impact of the new data. In addition, we will present an improved cross section measurement of Z_0-bosons as function of transverse momentum which now comprises an integrated luminosity of about 700 pb^{-1}. The STAR data are complementary to existing LHC results and will provide important input into unpolarized TMD fits.

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