

Unpolarized cross section and transverse single spin asymmetry of Z^0 in 500/510 GeV $p+p$ collisions

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Abstract

We present the preliminary results of unpolarized cross section and transverse single spin asymmetry (TSSA) of Z^0 measured by the STAR experiment. The cross section results combine 500/510 GeV $p+p$ data from 2011, 2012, 2013 and 2017, corresponding to a total luminosity of 700 pb^{-1} . The differential Z^0 cross section, measured as a function of the boson's transverse momentum, provides important constraints on the energy dependence of the transverse momentum dependent parton distribution functions (TMDs). The TSSA of Z^0 is measured using 510 GeV $p^\uparrow+p$ data from 2017 with the integrated luminosity of 350 pb^{-1} . This observable is sensitive to one of the TMDs, the Sivers function, which is predicted to have the opposite sign in $p+p \rightarrow W/Z + X$ from that observed in semi-inclusive deep inelastic scatterings. Our data aim to investigate the non-universality of the Sivers function.