Cross section measurements of kinematically reconstructed weak bosons in unpolarized $p + p$ collisions at STAR

Salvatore Fazio

Brookhaven National Laboratory

Abstract

We present cross sections for the weak bosons measured by the STAR experiment at RHIC in unpolarized proton-proton collisions at $\sqrt{s} = 500(510)$ GeV. The results combine data from run 2011, 2012, and 2013, corresponding to an integrated luminosity of 350 $pb^{-1}$. The differential $Z^0$ cross section measured as a function of the boson’s $p_T$, provides important constrains on the energy dependence of intrinsic transverse momentum effects of partons inside the proton. The $W^+/W^-$ cross section ratio as function of the reconstructed boson’s rapidity, is sensitive to the non-pertubative $d/\bar{u}$ distribution. The probed $x$-range ($0.1 < x < 0.3$) covered by our data naturally complements the phase space accessed at the LHC, providing critical input to global fits.