

# Constraining the Sea Quark Distributions Through $W$ and $Z$ Cross Sections and Cross Section Ratios Measurements at STAR

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Over the past several years, parton distribution functions (PDFs) have become more precise. However there are still kinematic regions where more data are needed to help constrain global PDF extractions, such as the the ratio of the sea quark distributions  $\bar{d}/\bar{u}$  near the valence region. Current measurements appear to suggest different high- $x$  behaviors of this ratio. The STAR experiment at RHIC is well equipped to measure the leptonic decays for  $W$  and  $Z$  bosons in proton+proton collisions at  $\sqrt{s} = 500/510$  GeV. These cross sections and their ratios are sensitive to quark and anti-quark distributions. In particular the  $W^+/W^-$  cross section ratio is sensitive to the  $\bar{d}/\bar{u}$  ratio. RHIC runs from 2011 through 2013 have collected about  $350 \text{ pb}^{-1}$  of integrated luminosity. This talk will present preliminary results of the 2011-2013  $W^+/W^-$  and  $W/Z$  cross section ratios, as well as  $W$  and  $Z$  differential and total cross sections.