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## Recent STAR Results on the Measurement of the Unpolarized and Polarized Light Quark Flavor Structure of W-Boson Production at RHIC at BNL

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The STAR experiment at the Relativistic Heavy-Ion Collider at Brookhaven National Laboratory is carrying out a spin physics program in high-energy polarized proton collisions to gain a deeper insight into the spin structure and dynamics of the proton.

The collision of polarized protons at  $\sqrt{s} = 510$  GeV opens a new era of spin-flavor structure measurements from  $W^+/W^-$  boson production through a measurement of the longitudinal single-spin asymmetry,  $A_L$ . In addition, the measurement of the cross-section ratio of  $W^+/W^-$  boson production provides an independent way to probe the ratio of unpolarized  $\bar{d}$  and  $\bar{u}$  quark distribution functions.  $W^{-(+)}$  bosons are produced in  $\bar{u} + d$  ( $\bar{d} + u$ ) collisions and can be detected through their leptonic decays,  $e^- + \bar{\nu}_e$  ( $e^+ + \nu_e$ ), where only the respective charged lepton is measured. The discrimination of  $\bar{u} + d$  ( $\bar{d} + u$ ) quark combinations requires distinguishing between high  $p_T$   $e^{-(+)}$  through their opposite charge sign, which in turn requires precise tracking information.

The main STAR detector sub-systems used in this measurement are the Time Projection Chamber (TPC) and the Barrel and Endcap Electromagnetic Calorimeters (BEMC, EEMC). The TPC provides tracking inside an axial magnetic field of 0.5 T for a pseudorapidity range of  $|\eta| < 1.3$ . The BEMC and EEMC provide full azimuthal coverage for  $|\eta| < 1$  and  $1.09 < \eta < 2$ , respectively. This detector acceptance range measuring scattered  $e^{-(+)}$  from  $W^{-(+)}$  boson decays in polarized proton collisions at  $\sqrt{s} = 510$  GeV allows to probe a kinematic range of roughly  $0.05 < x < 0.3$ .

The status and recent STAR results will be presented on the measurement of  $W^+/W^-$  longitudinal single-spin asymmetry and the cross-section ratio based on data samples taken in 2011, 2012 and 2013. These results are expected to provide important constraints through a global analysis on the understanding of  $\bar{d}$  and  $\bar{u}$  quark distribution functions.

**Primary author:** SURROW, Bernd (Temple University)

**Co-author:** BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

**Presenter:** SURROW, Bernd (Temple University)

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