

# Transverse Spin Dependent Azimuthal Correlations of Charged Pion Pairs in $p^\uparrow p$ Collisions at $\sqrt{s} = 200$ GeV at STAR

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## Abstract

At the leading twist, the transversity distribution function,  $h_1^q(x)$ , where  $x$  is the longitudinal momentum fraction of the proton carried by quark  $q$ , encodes the transverse spin structure of the proton. Extraction of it is difficult because of its chiral-odd nature. However, it can be coupled to a spin-dependent interference fragmentation function, leading to experimentally measurable azimuthal correlations,  $A_{UT}$ , between the spin of the fragmenting quark and oppositely charged final state hadron pairs (di-hadron). The STAR experiment at RHIC has previously observed non-zero  $A_{UT}$  for  $\pi^+\pi^-$  pairs using  $p^\uparrow p$  collision data at  $\sqrt{s} = 200$  GeV from 2006 and at  $\sqrt{s} = 500$  GeV from 2011, corresponding to integrated luminosities,  $L$ , of  $1.8 \text{ pb}^{-1}$  and  $25 \text{ pb}^{-1}$ , respectively. In 2015, STAR collected  $L \sim 52 \text{ pb}^{-1}$  of  $p^\uparrow p$  collisions at  $\sqrt{s} = 200$  GeV. This dataset provides highest precision  $A_{UT}$  measurement at  $\sqrt{s} = 200$  GeV to date, which covers quark momentum fractions  $0.1 < x < 0.4$ , and is sensitive to valence quark  $h_1^q(x)$ . We will present preliminary results on  $A_{UT}$  for  $\pi^+\pi^-$  pairs based on this dataset.