

Transverse Spin Dependent Azimuthal Correlations of Charged Pion Pairs in $p^\uparrow p$ collisions at $\sqrt{s} = 200$ and $\sqrt{s} = 510$ GeV at STAR

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Abstract

1 The transversity distribution, $h_1^q(x)$, describes transversely polarized quarks inside
2 a transversely polarized nucleon. As $h_1^q(x)$ is chiral-odd, it can only be accessed via
3 a process where it couples to another chiral-odd function, such as the spin-dependent
4 interference fragmentation function (IFF), in $p^\uparrow p$ collisions. The coupling of $h_1^q(x)$
5 and IFF yields an experimentally measurable di-hadron correlation asymmetry, A_{UT} .
6 To access $h_1^q(x)$ at high Q^2 , where the QCD calculation is well understood, precise
7 measurement of A_{UT} at high center-of-mass energies, \sqrt{s} , is crucial. Previously, the
8 STAR experiment at RHIC has measured non-zero A_{UT} using $p^\uparrow p$ data at $\sqrt{s} = 200$
9 GeV recorded in 2006 with an integrated luminosity of 1.6 pb^{-1} and $\sqrt{s} = 500$ GeV
10 recorded in 2011 with an integrated luminosity of 25 pb^{-1} . In 2015 and 2017, STAR
11 collected additional $\sim 52 \text{ pb}^{-1}$ of $p^\uparrow p$ data at $\sqrt{s} = 200$ GeV and $\sim 350 \text{ pb}^{-1}$ of
12 $p^\uparrow p$ data at $\sqrt{s} = 510$ GeV, which will significantly improve the statistical precision
13 of A_{UT} measurement and thus further constrain global fits of $h_1^q(x)$, especially for
14 $0.07 < x < 0.4$. We will present preliminary results for 2015 data and an update for
15 2017 data on the A_{UT} measurement for charged pion pairs in the pseudorapidity region
16 $|\eta| < 1$.