

1 **Transverse Spin Dependent Azimuthal Correlations of Charged hadron(s) in**
2 **$p^\uparrow p$ Collisions at $\sqrt{s} = 200$ GeV**

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4 **Abstract**

5 The transversity distribution function, $h_1^q(x)$, a leading twist parton distribution function, is a
6 fundamental component of the spin structure of the nucleon. $h_1^q(x)$ describes the distributions of
7 transversely polarized quarks inside a transversely polarized nucleon where x is the longitudinal mo-
8 mentum fraction of the proton carried by quark q , which is loosely constrained by global fits. Being
9 chiral odd, $h_1^q(x)$ can be accessed only when it is coupled with another chiral-odd partner, such as
10 the spin-dependent Collins fragmentation function (FF) or the interference fragmentation function
11 (IFF), which serves as a quark polarimeter. In transversely polarized proton-proton ($p^\uparrow p$) collisions,
12 the resulting azimuthal correlation between the polarization of the struck quarks and the final state
13 single charged hadron(involving Collins FF) or di-hadron (involving IFF) can be measured, which
14 are sensitive to quark transversity. The STAR experiment at RHIC has previously measured IFF
15 asymmetries for $\pi^+\pi^-$ pairs using $p^\uparrow p$ collisions data from 2006 at $\sqrt{s} = 200$ GeV and from 2011 at
16 $\sqrt{s} = 500$ GeV and Collins asymmetries for charged pions within jets from 2011 at $\sqrt{s} = 500$ GeV.
17 Non-zero IFF and Collins asymmetries were reported which are consistent with predictions based on
18 global analyses of e^+e^- and SIDIS data. In 2012 and 2015, STAR collected ~ 14 pb^{-1} and ~ 48 pb^{-1}
19 of $p^\uparrow p$ data at $\sqrt{s} = 200$ GeV, respectively. These datasets provide the most precise measurement
20 of the Collins and IFF asymmetries in $p^\uparrow p$ collisions, especially at the quark momentum fractions
21 $0.1 < x < 0.4$. We will present preliminary results for Collins asymmetries of identified pions, kaons,
22 and protons in jets based on 2012 and 2015 $p^\uparrow p$ collisions datasets and IFF asymmetries based on
23 2015 $p^\uparrow p$ collisions dataset at $\sqrt{s} = 200$ GeV.