

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

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Abstract

The transversity distribution function, $h_1^q(x)$, a leading twist parton density which describes the distributions of transversely polarized quarks inside transversely polarized hadrons, is a fundamental component of the spin structure of the nucleon, and is loosely constrained by global fits. Being chiral odd, h_1^q can be accessed only when it is coupled with another chiral-odd partner, such as transverse spin-dependent fragmentation function. This gives rise to the azimuthal correlation between the polarization of the struck quarks and the final state scalar mesons, called transverse single-spin asymmetry (TSSA), that directly measures quark transversity distribution. The STAR experiment at RHIC has previously measured TSSA using polarized proton-proton collision data from 2006 at $\sqrt{s} = 200$ GeV and 2011 at $\sqrt{s} = 500$ GeV. Both measurements reported nonzero asymmetries which are sensitive to h_1^q . We will present an update on the recent TSSA analysis using data from 2015 polarized proton-proton collisions at $\sqrt{s} = 200$ GeV, ~ 30 times larger sample than that from 2006, in the mid pseudorapidity region ($|\eta| < 1$) for exclusive charged pion pairs ($\pi^+\pi^-$) in the final state.