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

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Abstract

The trasverse polarization of quarks within a trasversely polarized nucleon, $h_1^q(x)$, can only be accessed through processes involving its coupling with another chiral-odd functions, such as the spin-dependent interference fragmentation function (IFF) in polarized proton-proton collisions. The coupling of $h_1^q(x)$ and IFF leads to a measurable azimuthal correlation asymmetry (A_{UT}) of di-hadron pairs in the final state. In previous work, the STAR experiment at RHIC measured a non-zero A_{UT} using polarized proton-proton ($p^{\uparrow}p$) data from 2011 at $\sqrt{s} = 500$ GeV, with an integrated luminosity of 25 pb^{-1}. The precise measuremnt of A_{UT} together with unpolarized di-hadron cross section will help to constrain the $h_1^q(x)$ in the global fits. In 2017, the STAR experiment collected dataset of approximately 350 pb^{-1} from $p^{\uparrow}p$ collisions at $\sqrt{s} = 510$ GeV. In 2022, another dataset featuring $p^{\uparrow}p$ collisions at $\sqrt{s} = 508$ GeV of an integrated luminosity of approximately 400 pb^{-1} was collected. These new datasets will significantly improve the statistical precision of the A_{UT} measurement. In this talk, we will present an update on the measurement of A_{UT} for pion pairs in the pseudorapidity region $|\eta| < 1$ based on the 2017 $p^{\uparrow}p$ dataset and the projection for the 2022 dataset.