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Azimuthal Transverse Single-Spin Asymmetries of Charged Pions Within Jets from Polarized pp Collisions at $\sqrt{s} = 200$ GeV

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A complete understanding of the nucleon spin structure requires the knowledge of unpolarized parton distribution functions, helicity distribution functions, and the transversity distributions. Transversity, which describes the transverse spin structure of quarks in a transversely polarized proton, is the most difficult to probe and is still quite unconstrained in global analyses. It is chiral-odd and can only be accessed through channels that couple to another chiral-odd distribution like the Collins fragmentation function or the interference fragmentation function. Recently, STAR reported the first measurements of Collins asymmetries from jet + π^\pm production in polarized proton+proton collisions at $\sqrt{s} = 500$ GeV and 200 GeV based on the data taken during the years 2011 and 2012. These results probe higher momentum scales ($Q^2 \sim 960$ GeV² for 500 GeV and ~ 170 GeV² for 200 GeV) than the measurements from semi-inclusive deep inelastic scattering (SIDIS, $Q^2 < 20$ GeV²) and enable the test of the evolution, universality and factorization breaking in the transverse momentum dependent (TMD) formalisms. New preliminary results for the Collins asymmetry from 2015 proton+proton collisions at $\sqrt{s} = 200$ GeV with a much larger sample size and improved analysis procedures that lead to smaller systematic uncertainties will be presented.

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