

Transverse Spin Physics Programs at STAR

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The unique capability of the Relativistic Heavy Ion Collider (RHIC) to collide transversely polarized protons, accompanied by the excellent coverage and particle identification provided by the Solenoidal Tracker at RHIC (STAR) detector, provides an ideal testing ground for rich and diverse spin physics programs.

This overview talk will encompass recent highlights from the STAR experiment with transversely polarized pp collisions produced in RHIC. The asymmetric production of $W^\pm/Z$ bosons with respect to the transverse proton polarization provides insights into the transverse partonic motion in the initial state and tests the non-universality of the Sivers mechanism. Spin-dependent shifts in the azimuthal separation between two jets in a dijet event can be used to extract the initial state parton transverse momenta. Additionally, the asymmetric production of charged hadrons within a jet can be used to probe quark transversity, and investigate the evolution, universality and factorization breaking of the Collins mechanism in the transverse momentum dependent formalism. The asymmetric production of hadron pairs provides an independent measurement of quark transversity in the collinear framework. Measurements of asymmetries in diffractive processes investigate the contribution of these processes to the unexpectedly large asymmetry found in the forward ($2.5 < \eta < 4$) regime.

Finally, prospects for the recent STAR data-taking periods, with enhanced forward tracking and calorimetry delivered by the STAR forward upgrade, will be discussed.