

Spin asymmetries for vector boson production in polarized p+p collisions

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We investigated the cross section and the associated spin asymmetries for vector boson ($W^\pm/Z^0/\gamma^*$) production in polarized proton-proton collisions at tree level within the TMD factorization formalism. Besides the well-known Sivers function f_{1T} , the single transverse asymmetry could also probe the transversal helicity distribution g_{1T} via the parity-violating nature of W/Z^0 production. Contrary to Sivers function, which is expected to change sign from SIDIS to DY-type of processes, transversal helicity is universal between SIDIS and DY. To assess the feasibility of experimental measurements, we estimate the spin asymmetries for W^\pm/Z^0 boson production in polarized proton-proton collisions at the Relativistic Heavy Ion Collider (RHIC) by using current knowledge of the relevant TMDs. We find that both the parity-conserving and parity-violating single transverse asymmetries can be sizable, if the suppression effect from TMD evolution is not too strong.

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