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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 parityconserving and parity violating single transverse asymmetries can be sizable, if the suppression effect from TMD evolution is not too strong.

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