Constraints on Gluon Sivers Distribution from RHIC Results

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We consider recent RHIC data on the transverse single spin asymmetry (SSA) A_N, measured in $p^\uparrow p \to \pi^0 + X$ processes at mid-rapidity by the PHENIX Collaboration. The measurement is consistent with a vanishing SSA. We analyze this experimental information within a hard scattering model based on a generalized QCD factorization scheme, with transverse momentum dependent (TMD) parton distribution and fragmentation functions. It turns out that, in the kinematical region of data, the dominant contribution to A_N originates from the gluon Sivers effect; its vanishing value is thus an indication about the possible size of the gluon Sivers function. Approximate upper limits on its magnitude are derived. Additional constraints obtained combining parameterizations of the quark Sivers function by fits to available data on SSA and the Burkardt sum rule for the Sivers distribution are also discussed.