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Sign Flip of Single Transverse Spin Asymmetries in Drell-Yan and DIS: The Role of Cuts and Complex Phases MATTHEW SIEVERT, The Ohio State University, STANLEY BRODSKY, SLAC National Accelerator Laboratory, Stanford University, DAE SUNG HWANG, Sejong University, YURI KOVCHEGOV, The Ohio State University, IVAN SCHMIDT, Universidad Tecnica Federico Santa Maria — The transverse polarization of a hadron's spin can couple to its partons' transverse momentum distribution, resulting in an asymmetry known as the Sivers asymmetry. Depending on the scattering mechanism, this asymmetry of the parton distribution may persist into the final-state hadron distribution. Such single transverse spin asymmetries provide unique insights into the internal spin structure of hadrons and can couple to different scattering processes than the usual unpolarized cross-section. One hallmark prediction of transverse-momentum-dependent factorization is that the Sivers asymmetry should have equal magnitude and opposite sign between the Drell-Yan process and semi-inclusive deep inelastic scattering. We explicitly verify this prediction in greater detail than had previously been considered, using a toy model for the proton wave function. With an explicit representation of the transverse spinors, we demonstrate how $C/P/T$ invariance couples the asymmetry to the imaginary part, or cut, of the diagrams. To establish the validity of the predicted sign flip, we demonstrate a non-trivial equivalence between the cuts present in deep inelastic scattering and the Drell-Yan process.

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