Unique Description of Single Transverse-Spin Asymmetries in DIS and Hadron Collisions

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The two well-known mechanisms for single transverse-spin asymmetries in hard processes are unified: the twist-three quark-gluon correlations, and the time-reversal-odd and transverse-momentum dependent parton distributions. We demonstrated that these two mechanisms provide a consistent description for SSAs in semi-inclusive DIS and Drell-Yan processes in the kinematical domain where both mechanisms apply. Based on this observation, we derived a unified formula for SSA in semi-inclusive DIS in the whole transverse momentum region, and its moment can be directly compared to the SSAs in the single inclusive hadron production in hadronic collisions. With the fitted quark-gluon correlations from the SSAs in hadron collisions (including RHIC and E704 data), we studied the SSA phenomenon in DIS, and compared to the experimental data from HERMES and COMPASS. [1]

[1] References: X.Ji, J.W. Qiu, W. Vogelsang, F. Yuan, Phys. Lett. B638, 178(2006); Phys. Rev. D73, 094017 (2006); to be published