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Single transverse-spin asymmetry in QCD

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So far large single transverse-spin asymmetries (SSA) have been observed in many high-energy processes such as semi-inclusive deep inelastic scattering and proton-proton collisions. Since the conventional parton model and perturbative QCD can not accomodate such large SSAs, the framework for QCD hard processes had to be extended to understand the mechanism of SSA. In this extended frameworks of QCD, intrinsic transverse momentum of partons and the multi-parton (quark-gluon and pure-gluonic) correlations in the hadrons, which were absent in the conventional framework, play a crucial role to cause SSAs, and well-defined formulation of these effects has been a big challenge for QCD theorists. Study on these effects has greatly promoted our understanding on QCD dynamics and hadron structure. In this talk, I will present an overview on these theoretical activity, emphasizing the important role of the Drell-Yan process.