

Testing Non-universality of TMD Sivers Functions in COMPASS Polarized Drell-Yan Experiment

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Next-generation nucleon parton density functions (PDFs) with additional transverse momentum dependence (TMD) provide crucial information to understand the role of partonic orbital angular momentum in the nucleon spin. Among them, Sivers function characterizes the distribution of unpolarized quarks with nonzero transverse momentum inside a transversely polarized nucleon. Based on TMD factorization, the difference between the final-state interactions in SIDIS process and the initial-state interactions in the Drell-Yan process leads to an opposite sign in the TMD Sivers function of nucleon quarks entering these two processes. Since measurements of Sivers asymmetries in SIDIS have been available, the testing of this non-universality (sign change) of Sivers function in the polarized DY process becomes a major challenge in hadron physics.

In this talk, we will report the first measurement of TMD azimuthal asymmetries in the pion-induced Drell-Yan process [1]. We use the CERN SPS 190 GeV/c pion beam and a transversely polarized ammonia target. Three spin-dependent azimuthal asymmetries representing different TMD PDFs are extracted using large-mass dimuon events. The observed sign of the Sivers asymmetry is found to be consistent with the fundamental prediction of QCD.

[1] M. Aghasyan et al. (COMPASS Collaboration), "First measurement of transverse-spin-dependent azimuthal asymmetries in the Drell-Yan process", arXiv:1704.00488 [hep-ex].

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