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Measurement of transverse-spin-dependent azimuthal asymmetries in Drell-Yan process at COMPASS

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The first measurement of transverse-spin-dependent azimuthal asymmetries in the pion-induced Drell-Yan (DY) process will be presented, which was reported in PRL 119, 112002. We use the CERN SPS 190 GeV/c pi- beam and a transversely polarized ammonia target. Three azimuthal asymmetries giving access to different transverse-momentum-dependent (TMD) parton distribution functions (PDFs) are extracted using dimuon events with invariant mass between 4.3 GeV/c² and 8.5 GeV/c². Within the experimental uncertainties, the observed sign of the Sivers asymmetry is found to be consistent with the fundamental prediction of quantum chromodynamics (QCD) that the Sivers TMD PDFs extracted from DY have a sign opposite to the one extracted from semi-inclusive deep-inelastic scattering (SIDIS) data. We present two other asymmetries originating from the pion Boer-Mulders TMD PDFs convoluted with either the nucleon transversity or pretzelosity TMD PDFs. A recent COMPASS SIDIS measurement was obtained at a hard scale comparable to that of these DY results. This opens the way for possible tests of fundamental QCD universality predictions.

Primary author: Dr CHIOSSO, Michela (University of Torino and INFN)

Presenter: Dr CHIOSSO, Michela (University of Torino and INFN)

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