Contribution ID: **233** Type: **Contributed Talk**

Non-perturbative contributions to transverse momentum spectra in hadronic collisions

Wednesday, 25 March 2020 09:00 (20 minutes)

Experimental measurements of Drell-Yan (DY) vector-boson production
are available from the Large Hadron Collider (LHC) and from lower-energy collider and fixed-target experiments. In the low transverse momentum end of DY spectra, important for the extraction of the W-boson mass at the LHC, QCD contributions from non-perturbative Sudakov form factors and intrinsic transverse momentum become relevant. We study the potential for determining such contributions from fits to LHC and lower-energy experimental data, using the framework of low-q_T factorization for differential DY cross sections in terms of transverse momentum dependent (TMD) distribution functions. We investigate correlations between different sources of TMD non-perturbative effects, and correlations with collinear parton distributions. We stress the relevance of accurate low-mass DY measurements with fine binning in transverse momentum for improved determinations of long-distance contributions to Sudakov evolution processes and TMDs.

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Session Classification: Electroweak Physics and Beyond the Standard Model

Track Classification: Electroweak Physics and Beyond the Standard Model