Extraction of Drell-Yan Angular Coefficients using Neural Network-based Classifiers

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June 13, 2023

Abstract

Study of angular distributions in the Drell-Yan process is a valuable tool for unraveling the structure of hadrons. Measuring the $\cos 2\phi$ angular dependence, where ϕ denotes the azimuthal angle of dimuons in the Collins-Soper frame, can be used to extract the Boer-Mulders (BM) function. The BM function describes the transverse-polarization asymmetry of quarks within an unpolarized hadron and is a result of the coupling between transverse momentum and transverse spin of the quarks inside the hadron. Conventional methods for extracting the angular-distribution coefficients typically involve unfolding low-dimensional detector data, which may not fully exploit the complete phase space for best parameter optimization. To overcome this limitation, we propose a novel approach utilizing Neural Network-based Classifiers to directly extract the angular coefficients using high-dimensional information at the detector level. In this presentation, we will explain the design of the neural network architecture, training strategies, and outline our plans to achieve conclusive results.