

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

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Abstract

The Drell-Yan dilepton angular distribution is a valuable tool for unraveling the structure of hadrons. For example, the $\cos 2\phi$ dependence of the angular distribution can be used to extract the Boer-Mulders (BM) function, which characterizes the net polarization of quarks within an unpolarized proton. The BM function captures the presence of a handedness phenomenon within the proton and represents a quark distribution that quantifies a specific spin-orbit correlation. Conventional methods for extracting the angular coefficients typically involve unfolding low-dimensional detector data, which may not fully exploit the complete phase space for optimal 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 from 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.