Study of Nuclear TMDs in SIDIS Production with CLAS12 at Jefferson Lab

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Abstract

Understanding the transverse momentum-dependent distributions (TMDs) in semi-inclusive deep inelastic scattering (SIDIS) is essential to explore the three-dimensional nucleon structure. In this presentation, we discuss extending this framework into the nuclear domain, where TMDs enable investigating of nuclear effects. This study explores the modifications induced by nuclear medium on SIDIS observables, specifically on their transverse momentum (p_{T}) and momentum-fraction (z) dependencies. For this analysis, we use the data collected in the Fall of 2023 by the CLAS Collaboration at Jefferson Lab. The experiment used a 10.5 GeV polarized electron beam impinging on various nuclear targets, such as liquid deuterium and a set of solid foils (C, Cu and Sn). We will present our first preliminary results of the π^+ electroproduction in the SIDIS regime and compare these results with an existing Monte Carlo simulation. Then, we will show the necessary corrections still to be applied to the data and the limitations of the ongoing analysis. Finally, we will discuss how the present data can offer an insight into the transverse momentum structure of partons in nuclei regarding the current status of nuclear TMDs phenomenology.

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