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Light-front dynamics and the 3He spectral function

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After the 12 GeV upgrade, several experiments involving 3He nuclear targets will be performed at JLab to extract information on the parton structure of the neutron. The parton transverse momentum distributions (TMDs) (see, e.g. [1,2]) in the neutron will be studied through polarized SIDIS experiments off 3He, where a high-energy pion is detected in coincidence with the scattered electron [3]. To reliably disentangle the nuclear and the partonic degrees of freedom an accurate theoretical description of the process is needed.
In Ref. [4] the plane wave impulse approximation was adopted. In a recent paper [5] the spectator SIDIS process off 3He was studied and the final state interaction (FSI) between the hadronizing quark and the detected deuteron was taken into account through a distorted spin-dependent spectral function. We are now studying the standard SIDIS process, where the FSI between the observed pion and the remnant is again taken into account through a distorted spin-dependent spectral function [6}. In these studies the description of the nuclear dynamics is non-relativistic.
This talk addresses an approach for the relativistic description of the nuclear dynamics based on the Light-front Hamiltonian Dynamics [7].
The key quantity we consider is the LF spectral function, where both normalization and momentum sum rule can be satisfied at the same time.
Preliminary results will be discussed.
Among them, a study of the role played by relativity in the EMC effect on 3He, for which JLab data have been taken at 6 GeV [8]. Our final goal is to evaluate SIDIS cross sections off 3He taking into account both the relativity and the FSI between the observed pion and the remnant, through our LF spin-dependent spectral function.

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