

# Polarized $^3\text{He}$ target and final state interactions in SiDIS

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## Summary

At JLab12 is starting a wide program to study the neutron's structure, for instance by extracting the parton transverse-momentum distributions (TMDs) through polarized Semi-inclusive deep-inelastic scattering (SIDIS) experiments on  $^3\text{He}$ , where a high-energy pion (or kaon) is detected in coincidence with the scattered electron.

This will provide, together with proton and deuteron data, a sound flavor decomposition of the TMDs.

Given the expected high statistical accuracy, it is crucial to disentangle nuclear and partonic degrees of freedom to get an accurate theoretical description of both initial and final states.

In a recent paper [1,2], we have carried out a study of a SIDIS process on polarized  $^3\text{He}$  where a spectator nucleon-pair in a deuteron state is detected.

Within a non-relativistic framework,

we have taken into account the very challenging issue of the final state interaction, between the observed deuteron and the remnant,

through a distorted spin-dependent spectral function, based on a generalized eikonal approximation. The  $^3\text{He}$  initial state was taken from the careful calculation with the AV18 NN interaction performed by the Pisa group. In this contribution, the extension to the standard

SIDIS, where a pion (or a kaon) is detected, and

the recoiling nucleon-pair can be in any state, will be presented

[2] together with preliminary results illustrating the possibility of a reliable extraction of the neutron TMDs.

This study will be very useful for the JLab experiments on  $^3\text{He}$  target.

In particular the derived distorted spectral function will be included in the MonteCarlo tools that will be used for the analysis of the forthcoming data.

[1] L. Kaptari, A. Del Dotto, E. Pace, G. Salmè and S. Scopetta  
 "Distorted spin-dependent spectral function of an  $A=3$  nucleus and semi-inclusive deep-inelastic scattering processes",  
 Phys. Rev. C **89**, (2014) 035206.

[2] Emanuele Pace, Alessio Del Dotto, Leonid Kaptari, Matteo Rinaldi, Giovanni Salmè, Sergio Scopetta  
 "Light-Front Dynamics and the  $^3\text{He}$  Spectral Function"  
 Few-Body Systems, **57**, 601-606 (2016) DOI : 10.1007/s00601-016-1067-3

[3] A. Del Dotto, L. Kaptari, E. Pace, G. Salmè and S. Scopetta,  
 "Final state interactions in deep inelastic meson electroproduction off transversely polarized  $^3\text{He}$  and the extraction of neutron single spin asymmetries", in preparation.

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