Contribution ID: **23** Type: **not specified**

From deep inelastic scattering to double parton scattering off light nuclei

Wednesday 1 October 2025 09:00 (30 minutes)

In this talk I review the most important and recent results collected by the Perugia group about the study of polarized and unpolarized deep inelastic scattering (DIS) off light nuclei and the new project to propose extracting nuclear double parton distributions (DPDs) in the future electron Ion collider (EIC). In particular, I will discuss the calculation of the so-called European Muon Collaboration (EMC) effect for He3, H3 and He4 systems. The nuclear structure is described within the relativistic Light-Front (LF) approach which leads to fulfill Poincaré covariance and macroscopic locality, and therefore, number of particles and momentum sum rules are preserved. As inputs, use has been made of the nuclear wave-functions obtained from the phenomenological Av18 + UIX potential and the chiral potentials called NVIa +3N and NVIb+3N. The evaluated momentum distribution with the corresponding wf has been used to calculate the structure functions of the considered nuclei. We predict a sizable EMC effect for He3[1] and for He4[2]. The approach has been extended to evaluate the polarized He3 structure functions and results remarkably compare well with data [3].

Finally, we propose studying nuclear double parton scattering at the EIC to access nuclear DPDs for the first time. These quantities encode the probability of finding two partons with given longitudinal momentum fractions located at a specific transverse distance. DPDs are therefore sensitive to unknown double parton correlations that are crucial for understanding the non-perturbative structure of hadrons. In this context, nuclear targets such as the deuteron [4] are essential for enhancing the production rate of this rare process, making the use of light nuclei indispensable for generating realistic predictions. Furthermore, we demonstrate how nuclear DPS studies could yield novel insights into the origin of the EMC effect [5].

REFERENCES

[1] E. Pace, M. Rinaldi, G. Salme', S. Scopetta, PLB 839 (2023) 137810

[2] F. Fornetti, E. Pace, M. Rinaldi, G. Salme', S. Scopetta and M. Viviani, PLB 851 (2024), 138587

[3] E. Proietti, F. Fornetti, E. Pace, M. Rinaldi, G. Salmè and S.Scopetta, PRC 110 (2024) no.3, L031303

[4] F. A. Ceccopieri, F. Fornetti, E. Pace, M. Rinaldi, G. Salmè and N. Iles, arXiv:2507.02495 [nucl-th], EPJC submitted

[5] F. A. Ceccopieri, F. Fornetti, E. Pace, M. Rinaldi, G. Salmè and N. Iles, in preparation.

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Session Classification: Long talks of IS (I)