

## Institut de recherche sur les lois fondamentales de l'univers Département de Physique Nucléaire

## **Séminaire DPhN-ESNT**

Vendredi 03/02/2023 11h-12h

B.713 Salle Galilée CEA Saclay, Orme des Merisiers

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## Nucleon-nucleon correlations and the quarks within

Atomic nuclei are made of protons and neutrons, themselves composed of quarks and gluons. Understanding how the nuclear environment affects the quark-gluon structure of bound nucleons is an outstanding challenge. While the first evidence for such impact, known as the "EMC effect", was observed over 40 years ago [1], a generally accepted explanation of the dynamics driving it is still lacking.

I will present new high-energy electron-scattering data that, combined with existing data, indicate correlation between the EMC effect and the structure modification of close-proximity nucleons. A global analysis of deep inelastic scattering (DIS) data on the proton and on nuclei from A=2 (deuterium) to 208 (lead) presented here, quantify the modification of the structure function of nucleons bound in atomic nuclei (the EMC effect) within the framework of a universal modification of nucleons in short-range correlated (SRC) pairs. It also allows extracting neutron-to-proton structure function ratio  $(F_n/F_p)$  with smaller uncertainties than previous extractions.

[1] EMC effect = European Muon Collaboration effect The ratio of the nucleon structure functions  $F_{2N}$  for iron and deuterium J.J. Aubert *et al.*, European Muon Collaboration, Phys. Lett. B **123** (1983), p. 275.

The coffee break before the seminar will be organized in b.713. This seminar is given in the framework of the ESNT workshop on "Quantitative Challenges in Short-Range Correlations in nuclei" <a href="https://esnt.cea.fr/Phocea/Page/index.php?id=112">https://esnt.cea.fr/Phocea/Page/index.php?id=112</a>

