Contribution ID: **122** Type: **Talk**

Study of Short-Range Correlations using a 48 GeV/c carbon beam

Sunday 5 September 2021 13:00 (20 minutes)

Understanding the structure of strongly-interacting quantum mechanical systems such as atomic nuclei is a formidable challenge in physics. We recently demonstrated the feasibility to access nucleon-nucleon Short-Range Correlations (SRCs) in nuclei using hadronic probes in inverse kinematics [1]. The experiment was carried out at the JINR (Russia), a ^{12}C beam at 48 GeV/c impinged on a liquid hydrogen target where the reaction products were measured kinematically complete with the BM@N detector setup. At first, by measuring the fragment in the $^{12}\mathrm{C}(p,2p)^{11}\mathrm{B}$ reaction limitations posed by final-state interactions are overcome and single nucleon properties are shown to be probed in a distinct single-step knockout reaction. The extracted ground-state distributions are in agreement with theoretical calculations. We probe SRCs in the same way by the break up of SRC nucleon pairs in $^{12}\mathrm{C}(p,2pN)^{10}\mathrm{B}/^{10}\mathrm{Be}$ reactions. SRCs are not only identified for the first time in such kinematical conditions but also their properties like factorization are deduced in this direct measurement. This experimental technique opens the pathway for SRC studies in short-lived nuclei at upcoming accelerator facilities like FAIR. We will also perform a follow-up experiment at JINR end of 2021, which will take advantage of a new proton-detection system.

[1] M. Patsyuk, J. Kahlbow, G. Laskaris et al. (BM@N Collaboration), Nature Physics (2021). https://doi.org/10.1038/s41567-021-01193-4

Primary author: KAHLBOW, Julian (MIT & Tel Aviv University)

Presenter: KAHLBOW, Julian (MIT & Tel Aviv University)

Session Classification: Nuclear and particle astrophysics

Track Classification: Nuclear and particle astrophysics