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First characterization of Short-Range Correlations in an exotic nucleus at R3B

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Most of the knowledge we have to date about Short-Range Correlations (SRC) in nuclei comes from electron induced quasi-free scattering (QFS) experiments in large momentum transfer kinematics. Experiments performed at Jefferson Lab with a ^{12}C nucleus showed that the high-momentum tail of the nuclear momentum distribution is dominated by SRC and that the neutron/proton pairs are about 20 times more abundant than isospin-like pairs due to the tensor part of the nucleon-nucleon (NN) interaction [1]. Moreover, indications of a possible dependence of the high momentum fraction of protons and neutrons with the N/Z ratio was proposed from measurements on stable nuclei [2].

In this talk, I will present a novel experiment performed at the GSI accelerator facility with the R^3B setup [3]. For the first time we made use of a short-lived nucleus scattering off a proton probe in inverse kinematics, allowing a more direct and systematic access to SRC properties as function of the N/Z ratio. The study of ^{16}C will add a new measurement at N/Z = 1.67, above the largest available N/Z (^{208}Pb) and at a much smaller mass, close to the one of the reference system ^{12}C measured in the same experiment. Furthermore, we aim to extract the ratio of np/pp pairs as function of missing momentum and thus gain information about the NN interaction in comparison to different NN interaction theories. The concept of this experiment and some preliminary results will be discussed.

[1] R. Subedi, R. Shneor, Science, 1156675, 2008.

[2] M. Duer et al. (CLAS Collaboration), Nature, 560:617, 2018.

[3]https://www.gsi.de/work/forschung/nustarenna/nustarenna_divisions/kernreaktionen/activities/r3b.

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