NUSTAR Seminar

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Zoom Link

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First studies of Short-Range Correlations in inverse kinematics and prospects at GSI/FAIR

Understanding the structure of strongly-interacting quantum mechanical systems such as atomic nuclei is a formidable challenge. The short-range interactions between nucleons lead to the formation of correlated, high-momentum nucleon pairs, known as Short Range Correlations (SRCs). SRCs, their properties, and their impact on the many-body system and nucleon structure have been widely studied using electron-scattering experiments. While highly effective, these experiments are limited to stable nuclei. To overcome this limitation, we developed a program of inverse-kinematics experiments with hadronic probes at GSI/FAIR.

In my talk, I will present this new program. First, I will discuss the results of the feasibility study performed at the BM@N setup at JINR (Russia) using a 48 GeV/c Carbon-12 ion beam scattering off a liquid hydrogen target [1]. I will show how the unique features of such experiments allow to reveal the characteristics of SRCs, and highlight the advantages of inverse kinematics to probe nuclear ground-state distributions. Following, I will discuss the next generation of experiments our collaboration will perform at the R³B setup at GSI in 2022 on Carbon-16, the first radioactive nucleus. Building upon these experiments, GSI/FAIR is a unique facility to explore SRCs along isotopic chains and eventually advance our understanding of cold dense nuclear matter.

[1] M. Patsyuk, J. Kahlbow, G. Laskaris et al. (BM@N Collaboration), Nature Physics 17 (2021).

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Convener: T. Dickel
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