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The Transparent Nucleus: Unperturbed inverse kinematics nucleon knockout measurements with a 48 GeV/c carbon beam

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Measuring ground-state distributions of nucleons in atomic nuclei is a formidable challenge in nuclear physics, often met by particle knockout reactions. In this talk I present results from a new fully exclusive proton-knockout measurement in inverse kinematics at high energy that overcomes limitations posed by initial and final state interactions (ISI/FSI). The experiment was carried out at the JINR (Russia), where a 12C beam at 48 GeV/c impinged on a liquid hydrogen target, the reaction products were measured with the BM@N detector setup, using in particular a proton spectrometer and charged particle tracking system. By missing momentum reconstruction, quasi-elastic pp scattering at large angles is identified, while the selection of the heavy fragment suppresses FSI. It is shown that this kind of 12C(p, 2p)11B reaction probes single nucleon properties in a single-step knockout reaction, being in agreement with theoretical calculations. We probe Short-Range Correlations (SRC) in the same way by the breakup of SRC pairs in 12C(p, 2pN)10B/10Be reactions. We not only identify SRCs in such kinematical conditions for the first time but also deduce factorization and other pair properties from direct measurements.

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