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Quasi-free scattering reactions along the calcium isotopic chain

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Several properties of atomic nuclei are known to be sensitive to the neutron-to-proton (isospin) asymmetry. In particular, the evolution of the single-particle strength as a function of isospin has been the subject of experimental and theoretical debate.
Quasi-free scattering (QFS) reaction is an established method to probe the structure of atomic nuclei. This reaction in inverse kinematics using radioactive-ion beams at relativistic energies has been successfully employed as an effective tool to study very exotic nuclei with high luminosity. Recent studies [1, 2] reported on the evolution of the proton single-particle strength as a function of isospin asymmetry using (p,2p) QFS reactions along the Oxygen isotopic chain and found a weak or no dependence. The reduction of the single-particle strength has been attributed to nucleon-nucleon correlations and a recent phenomenological study [3] has quantified the long and short-range part of these correlations and their dependency with isospin. The QFS result is at variance with nucleon-removal reactions with heavy targets [4] where they report a single-particle strength is strongly correlated with isospin.
To shed light on this puzzle, we performed a systematic study of (p,2p) and (p,pn) cross sections along the calcium isotopic chain (from 39Ca to 50Ca) at 500 MeV/nucleon using proton and carbon targets. The experiment was performed with the large acceptance spectrometer GLAD with the R3B setup at GSI-FAIR. The difference in reactions with the targets and the identification of reactions with recoil protons are investigated. The results of the analysis and comparison to the theoretical calculations will be discussed in this contribution.

[1] L. Atar et al., Phys. Rev. Lett. 120, 52501 (2018).
[2] Shoichiro Kawase et al., Prog. Theor. Exp. Phys. 2018, 021D01.
[3] S. Paschalis, M. Petri, A. O. Macchiavelli, O. Hen, E. Piasetzky, Phys. Lett. B 800, 135110 (2020).
[4] J. A. Tostevin and A. Gade, Phys. Rev. C 90, 057602 (2014).

Collaboration

The s467 experiment, R3B collaboration

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