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Study of multi-nucleon knockout reactions of exotic nuclei in the region of Sn

The experimental data collected during the S515 experiment performed by R3B collaboration at GSI/FAIR represent a great opportunity to investigate nucleon knockout reactions of exotic nuclei around ^{132}Sn in complete kinematic measurements. These cross sections can be used to investigate the quenching in the knockout of the minority species (neutrons or protons) in nuclei far from stability [2]. Some of the arguments put forward are the underestimation of the knockout of deeply bound nucleons of final state interactions or the role of short-range correlations [1].

Recently, several works based on inclusive measurements [2,3] have shown that these SRCs could reduce the single nucleon knockout cross sections by around 50%, depending on the neutron excess (N/Z) of the initial projectile. The S515 data could help us to go further in this investigation because we could correlate the knockout cross sections of one, two, etc, nucleons with the number of protons and neutrons detected by CALIFA and NeuLAND and perform complete kinematical studies to separate between SRC events and others (evaporation of particles, emission of clusters, final-state interactions...). At the moment, the identification of the incoming projectiles is done for the ^{124}Sn settings, as well as charge calibrations for the outgoing fragments thanks to the use of a multi-sampling ionization chamber. The energy calibration for CALIFA crystals is performed using the photopeaks of a ^{60}Co source. Thus, the resulting isotope yields for different incoming energies and targets can be compared.

[1] M. Duer et al., Nature 560 620 (2018)

[2] J. Díaz-Cortés et al., Physics Letters B 811 (2020) 135962

[3] V. Vaquero et al., Physics Letters B 795 (2019) 356

Primary author: FEIJOO FONTÁN, Martina

Presenter: FEIJOO FONTÁN, Martina

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