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Core-valence absorption in breakup and stripping reactions and its isospin dependence

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Nucleon removal reactions at intermediate energies have proven of great value to extract spectroscopic information from exotic atomic nuclei. For the case of nucleon removal at intermediate energies, a trend was noticed in the early 2000s in which cross sections were found to be significantly overestimated for the removal of deeply-bound nucleons in asymmetric nuclei, while the removal of the weakly-bound species in these same nuclei did not present such an overestimation [1]. The fact that this trend has not been observed in transfer or knockout reactions with proton targets (p, pN) urges for the reevaluation of the description for these reactions [2].

After nucleon removal, removed nucleon and residual nucleus (the core) are left in a state of medium or high relative energy, and their interaction can lead to the destruction of the core, which results in a reduction of the cross section. This effect would naturally be more intense in the removal of more deeply-bound nucleons, which interact more strongly with the core, but has not been considered in standard calculations of nucleon removal reactions until now.

In order to assess the importance of this effect, in this contribution we extend the usual description of breakup reactions (where both removed nucleon and core are detected) via Continuum-Discretized Coupled-Channels (CDCC) [3] to include the absorption between nucleon and core through an expansion in the eigenstates of a complex potential which describes this absorption, correcting for their non-orthogonality through the use of a biorthogonal basis [4], applying these results to neutron breakup of ^{11}Be and ^{41}Ca on ^{12}C targets at energies of 70 MeV/A.

We also present some preliminary results for stripping reactions (where the removed nucleon is absorbed and only the core is detected), where absorption is modelled via an effective density, focusing on the modification of the “quenching factors” and their dependence on isospin asymmetry, where we find a significant reduction in this dependence.

[1] A. Gade et al, Phys. Rev. C 77, 044306 (2008)

[2] T. Aumann et al, Prog. Part. Nucl. Phys. 118, 103847 (2021)

[3] N. Austern et al, Phys. Rep. 154, 125 (1987)

[4] B. H. McKellar and C. M. McKay, Aust. Jour. Phys. 36, 607 (1983)

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