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Cross sections of neutron-rich isotopes near $N=50$ in knock-out reactions

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We present cross sections for neutron-rich copper ($Z=29$) to germanium ($Z=32$) isotopes in nucleon-removal reactions. The experiments were carried out at the Radioactive Isotope Beam Factory of the Riken laboratory during the Seastar campaign, where an incident beam of ^{238}U at 345 MeV/u created a range of exotic nuclei in a beryllium target. These nuclei were sent through the Bigrips separator onto the Minos cryogenic hydrogen target, in which secondary reactions took place. The outcoming fragments were subsequently identified in the Zerodegree separator.

Our results are in agreement with our previous study [1] regarding the dependence of the proton knock-out cross section on the nucleon separation energy. For knock-out reactions of a single neutron, we find that the cross section reaches its highest value for projectiles with the magic neutron number $N = 50$, after which it drops sharply. This reflects the occupancy of the valence orbital and conforms to eikonal predictions [2], whilst departing from the flat trend that was noted in our earlier publication [1].

1. N. Paul et al., Physical Review Letters 122, 162503 (2019)
2. T. Aumann, C. Bertulani, and J. Ryckebusch, Physical Review C 88, 064610 (2013)

Topic

Experiment

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