INELASTIC SCATTERING OF NI AND ZN ISOTOPES OFF A PROTON TARGET

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For decades, one of the fundamental pillars of nuclear structure has been the concept of single-particle motion in a central potential. This view leads to the appearance of shell structure governed by a mean-field with strong spin-orbit interaction. Nevertheless, shell structure changes as one moves away from the stability line. These effect can be studied using nuclei around doubly-closed shells, for example nuclei around ^{78}Ni. Such exotic nuclei can only be produced at advanced facilities such as RIBF at RIKEN, Japan, or the future FAIR facility at Darmstadt, Germany.
Inelastic proton scattering off Ni and Zn isotopes was performed at RIKEN as part of the first SEASTAR campaign. Isotopes were produced by the in-flight fission of a ^{238}U beam incident on a Beryllium target. After production, isotopes were selected and identified on an event-by-event basis using the BigRIPS separator. Selected isotopes were focused onto the liquid-hydrogen target of the MINOS device and gamma rays from inelastic (p,p') reactions were detected with the DALI2 array. Outgoing particles were identified using the ZeroDegree spectrometer. Gamma rays produced in the nuclear reactions were Doppler corrected and the first 2^+ and 4^+ states of ^{70,72,74}Ni and ^{76,78,80}Zn isotopes were identified. Using detailed Geant4 simulations, exclusive cross-sections for inelastic proton scattering were obtained from which deformation lengths can be extracted. The ongoing data analysis will be presented and a discussion on the implications of the measured cross sections on the independent motion of protons and neutrons in neutron-rich Ni and Zn isotopes will be shown.