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The $(p,3p)$ two-proton removal from neutron-rich nuclei

The knockout of nucleons from nuclei is a powerful tool to investigate nuclear structure. It was observed in several occurrences that different final states in a nucleus are populated when produced from one nucleon knockout ($p, 2p$) or from two nucleon knockout ($p, 3p$). The understanding of the latter could provide a new tool for nuclear spectroscopy.

Two experimental campaigns conducted at the RIBF in RIKEN, Japan, were investigated. The scattered proton angular distribution from several neutron-rich medium-mass nuclei were analysed. The radioactive nuclei were impinging onto a 100-mm long liquid hydrogen target. The protons issued from the reaction were measured with the MINOS time-projection chamber surrounding the target, giving access for the first time to angular correlations of the three protons in the final state. The obtained proton distributions were benchmarked against kinematical models assuming three different reaction mechanisms.

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