

## Study of nucleon transfer and knockout reactions with high-resolution gamma-ray spectroscopy

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Nucleon-transfer reactions like (d,p) or (t,p) have been a well-established tool to investigate the single-particle properties of nuclei for many decades. Applied to exotic nuclei they have to be performed in inverse kinematics and, in many cases, combined with gamma-ray spectroscopy.

The region around the “island of inversion” where the traditional shell closure at  $N=20$  disappears has been studied at REX-ISOLDE (CERN)[1,2] with the MINIBALL array consisting of 24 six-fold segmented HPGe detectors [3] and the particle detector T-REX [4]. Similar investigations have been performed around  $68\text{Ni}$  evaluating a local shell closure at  $N=40$  [5].

For more energetic beams nucleon-knockout reactions are a similar tool. A possible new magic number at  $N=32$  or  $34$  beyond  $48\text{Ca}$  has been addressed at GSI by studying neutron-rich Ti and Sc isotopes [6,7]. The combination of the FRS with MINIBALL allowed for the measurement of exclusive momentum distributions. Nucleon-knockout reactions are also a sensitive method to populate different configurations in the final nucleus by varying the primary beam. This has been exploited recently to study neutron-rich Mg and Na isotopes at NSCL employing the GRETINA array for gamma-ray detection [8].

We will present the status of the research programmes as well as discuss the perspectives for future experiments at HIE-ISOLDE (CERN) and with R3B at FAIR.

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### References

- [1] K. Wimmer et al., Phys. Rev. Lett. 105, 252501 (2010).
- [2] V. Bildstein et al., to be published.
- [3] N. Warr et al., Eur. Phys. J. A 49, 40 (2013).
- [4] V. Bildstein et al., Eur. Phys. J A 48, 85 (2012).
- [5] J. Diriken et al., to be published.
- [6] P. Maierbeck et al., Phys. Lett. B 675, 22 (2009).
- [7] S. Schwertel et al., Eur. Phys. J. A 48, 191 (2012).
- [8] K. Wimmer et al., to be published.

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