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Spectroscopy of neutron-rich nuclei with MINIBALL

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Experiments with exotic nuclei are the essential tool to investigate nuclear structure far-off stability. In particular, our research programme focuses on the study of the evolution of magic shell closures. These may change or even (dis)appear globally as function of isospin or locally because of a variation of the residual interactions.

An important instrument for our studies employing gamma-ray spectroscopy is the highly efficient MINIBALL spectrometer consisting of 8 triple clusters of six-fold segmented HPGe crystals, each of them encapsulated individually in a vacuum-tight Al can. The clusters can be arranged in different configurations allowing to adapt the set-up to the experimental requirements. Furthermore, MINIBALL pioneered the use of digital electronics for gamma-ray spectroscopy.

As experimental tools we utilised "safe" Coulomb excitation and nucleon transfer reactions as well as nucleon knockout reactions at relativistic beam energies. The experiments have been performed at REX-ISOLDE (CERN, Switzerland) and GSI (Darmstadt, Germany).

This contribution centres on recent results from the study of the region of the "island of inversion'", neutron-rich Ca and Ti isotopes for which a new shell closure is predicted at N=34 (or 32), the shell evolution from N=40 to N=50 for neutron-rich Ni, Cu and Zn isotopes, and the quadrupole collectivity of nuclei in the vicinity of the doubly-magic 132Sn.

We will present the status of the research programmes and discuss the perspectives for future experiments.

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