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Shape Evolution in the Refractory Isotopes 100Zr and 110Ru Studied by Low-energy Coulomb Excitation

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The N=60 region, for the Sr and Zr isotopic chains, is an interesting example of shape evolution. On the neutron-rich side of these isotopic chains, N=56 is observed to become an effective sub-shell closure with ^{96}Zr (and ^{98}Sr) exhibiting the properties of a doubly-magic nucleus. However, with the addition of only four neutrons, ^{100}Zr is observed to become strongly deformed. This sudden change from a spherical shape to one with large deformation has attracted numerous theoretical and experimental investigations and is probably the most sudden change from a spherical shape to one with large deformation of known nuclei.
The case of ^{110}Ru is also intriguing as the possible existence of triaxial shapes close to the ground state has been discussed for ruthenium isotopes lying close to the mid-shell between N=50 and N=82. It has been shown previously that empirical criteria for triaxiality, such as the relative positions of excited states, are satisfied for neutron-rich ruthenium isotopes.

In order to shed new light on these phenomena, Coulomb excitation experiments were performed with the aim of determining matrix elements between low-lying excited states. Radioactive ^{100}Zr and ^{110}Ru beams were provided by the CARIBU system at Argonne National Laboratory, the only facility able to deliver
intense beams of refractory elements. De-excitation
-rays were detected with GRETINA detector
array with the CHICO2 particle detector array employed for the detection of beam particles and recoiling target nuclei. In this presentation, an overview of the recently performed experiments will be given and initial results presented along with a comparison with state-of-the-art Beyond Mean Field theoretical calculations.

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