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Shape Coexistence in ^{100}Zr Studied by Low-energy Coulomb Excitation

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The region surrounding the neutron number N = 60 for the Sr and Zr isotopic chains is an interesting example of shape evolution. Starting from the N = 50 closed spherical shell, and removing a few neutrons, the Sr and Zr isotopes become well deformed. On the neutron-rich side of these isotopic chains, N = 56 is observed to become an effective sub-shell closure with ^{96}Zr exhibiting the properties of a doubly-magic nucleus. However, with the addition of only four more neutrons, ^{100}Zr is observed to become strongly deformed. This sudden change from a spherical shape to one with large deformation, which is also observed for neighbouring N = 60 isotones such as ^{98}Sr, has attracted many theoretical and experimental investigations over several decades and is probably the most sudden change from a spherical shape to one with large deformation of known nuclei. A stringent analysis of the nuclear structure and intrinsic shape of the nucleus ^{100}Zr is, therefore, imperative. In order to shed new light on this phenomenon a Coulomb excitation experiment was performed with the aim of measuring reduced transition probabilities between low-lying excited states and quadrupole moments in order to determine the states'intrinsic shapes.

The ^{100}Zr beam was provided by the Californium Rare Isotope Breeder Upgrade (CARIBU) system, the only facility able to deliver intense beams of refractory elements such as zirconium. De-excitation γ-rays were detected with GRETINA detector array with the CHICO2 particle detector array employed for the detection of ^{100}Zr projectiles and recoiling target nuclei. In this presentation, an overview of the recently performed experiment will be given and initial results presented.

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