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In-beam gamma-ray spectroscopy and lifetime measurements with HiCARI

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The coexistence of single-particle and collective degrees of freedom in atomic nuclei gives rise to various exotic phenomena. In nuclei with very asymmetric proton-to-neutron ratios, the strong nuclear interaction drives shell evolution which alters the orbital spacing, and in some cases even the ordering present in stable nuclei. Such changes in the structure can have profound consequences for structure and dynamics of nuclei as well as the synthesis of elements in the universe.

In-beam gamma-ray spectroscopy with fast radioactive beams is an excellent tool to study the structure of the most exotic nuclei in the laboratory. High-resolution spectroscopy also allows to determine excited state lifetimes.

In this talk, I will present the HiCARI project “High-resolution Cluster Array at RIBF”. This hybrid array of segmented germanium detectors was constructed from contributions from around the world. The physics program includes a wide range of topics in nuclear structure addressing collective and single-particle structure of nuclei very far from stability. I will discuss highlights of the experimental campaign and present new ideas to further enhance the sensitivity of the experimental method through the use of active targets.

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