



The 569th Nuclear Science Seminar

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Exploring nuclear shapes in the neutron-rich zirconium region through isomer and beta-delayed gamma-ray spectroscopy

March 10, 2017 (Fri) 16:00-17:00

Room 309, Faculty of Science Build 1,
Hongo campus, the University of Tokyo

The shape of the atomic nucleus is one of its most fundamental properties. The spherical distribution is realised when the number of protons and neutrons are equal to the “magic numbers”. The nuclear terrain in-between these shell closures is characterised by a myriad of non-spherical nucleonic distributions, both in ground- and excited states. Moreover, the shape is subject to change through isotopic and isotonic chains.

It has long been known that the neutron-rich zirconium region exhibits a rapid onset of deformation at $N=60$, with theoretical models suggesting competing shapes in the more exotic isotopes. Experimental determination of these shapes provides not only stringent tests to these models, but also provides vital inputs into elemental synthesis calculations. In order to extend our experimental knowledge of this interesting nuclear region, an investigation was carried out at the Radioactive Isotope Beam Factory (RIBF) at the RIKEN Nishina Center. Nuclei of interest were selected and identified with the BigRIPS spectrometer from a cocktail beam produced from the relativistic fission of ^{238}U . The selected nuclei were implanted into the WAS3ABi silicon stack and gamma rays emitted following beta decay, or decay of isomeric states were detected in an array of 12 cluster HPGe detectors (EURICA) augmented with 18 LaBr detectors.

During the seminar, I shall provide an overview of the parameters we use to describe nuclear deformations and the observables which give us access to them. The experimental configuration and techniques shall be presented and some of the key results from the investigation discussed.

Nuclear Science Seminar (NSS)

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