

## Search for K-isomers in neutron-rich $Z \approx 60$ isotopes

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The neutron-rich  $A \sim 150$  region contains a wide variety of shape phenomena, including shape coexistence and possible static octupole and hexadecapole deformations. Although quadrupole deformation has been extensively examined across most of the nuclear chart, both octupole and hexadecapole deformations remain much less well studied in comparison. These higher-order deformations can have a strong influence on gamma-decay rates and the quasi-particle energies of nuclei, and hence, their detailed studies are necessary to test the various differing predictions of several nuclear models. We have performed an experiment to search for  $\mu$ s isomers in the neutron-rich  $A = 150 \sim 160$  Nd, Ce, Ba nuclei and to study their  $\beta$ -decay, in order to examine octupole and hexadecapole deformations in this region. These studies have become possible for the first time using the world's highest intensity in-flight RI beams available at RIBF with the high-efficiency gamma spectrometer, EURICA<sup>1)</sup>.

To study the excited levels of these  $A = 150 \sim 160$  isotopes, we have performed isomer and beta-gamma spectroscopy using EURICA in two different RI beam settings. One setting involves focusing on the Nd region and the other, on the Ba region.

During the experiment for the Nd setting (see Fig. 1), a previously reported isomer in  $^{156}\text{Nd}$ <sup>2)</sup> was confirmed and a new isomer in  $^{158}\text{Nd}$  was identified. We also succeeded to find some more isomers in neutron-rich Nd isotopes up to  $^{160}\text{Nd}$ <sup>3)</sup>. These findings will allow us to study the systematic analysis of

isomers in neutron-rich Nd isotopes, and the development of quadrupole and hexadecapole deformations as a function of neutron numbers will be investigated. In addition, we have also found several more new microsecond isomeric states in this region<sup>4)</sup>. These data are currently being analyzed.

In the Ba setting run, RI beams of  $^{149-151}\text{Ba}$ ,  $^{151-153}\text{La}$ , and  $^{154,155}\text{Ce}$  were mainly collected, as shown in Fig. 2. The isotopes were stopped at the active stopper, WAS3ABi,<sup>5)</sup> and beta-gamma spectroscopy of these isotopes was performed using the EURICA setup. All the isotopes indicated above are newly studied with the aim of systematic investigation of octupole correlations, a study that has not been possible so far. Detailed analyses are underway.

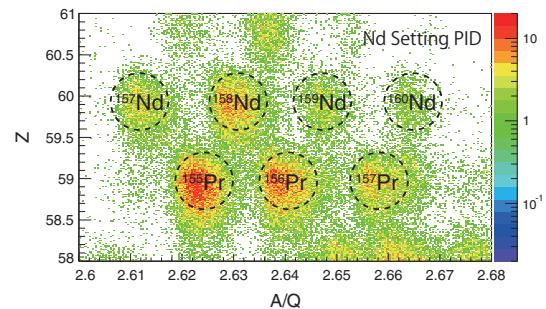


Fig. 1. Particle identification ( $A/Q$  vs  $Z$ ) plot for the Nd setting run.

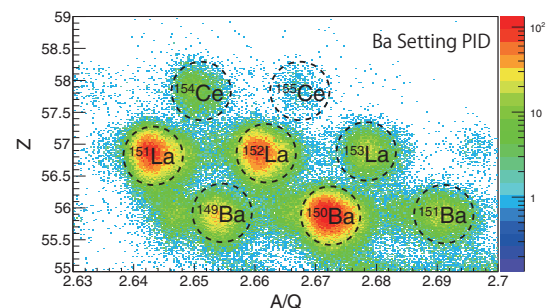


Fig. 2. Particle identification plot for the Ba setting run.

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