国立研究開発法人理化学研究所　仁科加速器研究センター
第267回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 267th RIBF Nuclear Physics Seminar

Angular momenta in atomic nuclei – investigated by the population of nuclear isomers

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In the nuclear fission process, excited neutron-rich nuclei are produced. These nuclei carry considerable amounts of angular momenta, which is still challenging to describe in the framework of contemporary nuclear models. Isomers are relatively long-lived, metastable, nuclear states arising due to the high spin difference to underlying (ground) states. A better knowledge about isomers and angular momenta generation in fission, improves modeling of the r-process in nuclear astrophysics, and contributes to more precise nuclear mass measurements, nuclear structure data, and benefits nuclear energy applications. In order to determine the angular momenta carried by nuclei, one can for instance measure gamma-ray emission or isomeric yields, and indirectly infer the angular momentum.

Systematic measurements of isomeric population are being performed at the IGISOL-JYFLTRAP facility in Finland. By utilizing a so-called Penning Trap, isomers can be distinguished from the ground states (GS), by the mere mass difference. Recently, a novel Phase-Imaging Ion-Cyclotron-Resonance technique was implemented which can resolve isomers separated down to 100 keV from the GS, and with half-lives of the order of a few hundred milliseconds. In this presentation, we discuss recent IYR results obtained for 81Ge, 96-97Y, 128,130Sn, 129Sb and the odd-A isotopes of 119-127Cd and 119-127In.

In parallel, a calculation method to extract angular momentum of fission fragments has been developed. The calculations have been validated using literature IYR data as well as other codes. The calculations were successfully applied to the recently measurements at IGISOL in Finland.

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＊ The talk will be given in English language.

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