Spin-alignment in abrasion-fission reaction –Nuclear moment measurements of isomeric states

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The measurement of the nuclear moments of isomeric states using the well-known TDPAD method requests a spin-aligned ensemble of nuclei. Spin-aligned isomeric nuclear states are produced in several types of nuclear reactions. Particularly, the amount of spin-alignment of fragments produced in spontaneous and neutron-induced fission was found to be up to 40%.

In order to produce neutron-rich isotopes the fragmentation reaction and the fission are of particular interest. Further, the abrasion-fission reaction allows the production of very exotic species. During the g-RISING campaign g-factors of 126,127Sn microsecond isomeric states produced in abrasion-fission reaction have been measured with an observed 18(8) % spin-alignment.

A measurement performed at the RIBF, RIKEN Nishina Center, using the abrasion-fission reaction, allows to observe the relationship between the momentum distribution of the produced isotopes and the amount of spin-alignment. The obtained results show the opportunity to perform nuclear moment measurements of neutron-rich microsecond isomers produced by the abrasion-fission reaction with respect to the momentum position of the fission fragment.

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