Nuclear-moment measurements at RIKEN and perspectives in RIBF

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Based on the technique of fragment-induced spin-polarized radioactive-isotope beams combined with the β-NMR method, we have been conducting a series of the measurement of ground-state nuclear moment in the light neutron-rich nuclear region at RIKEN. Recently we have succeeded in measuring the magnetic moments and electric quadrupole moments of neutron-rich aluminum isotopes. These nuclei are placed near the "island of inversion", where deformed ground states originated from the inversion of sd-normal and pf-intruder configurations have been found for a localized area around the neutron number N=20. Modern large-scale shell models predict that aluminum isotopes are just outside the "island". However, the predicted admixture of the intruder configurations is not negligible for ^{33}Al. Comparison of thus obtained our data and theoretical predictions will be shown as well as the other reported experimental measurements.

The structure studies on unstable nuclei through the nuclear-moment measurement will be extended in the RIBF project. In addition to the BigRIPS experiments, it is also proposed to equip the present fragment separator RIPS at the E6 experimental room with a beam line that delivers beams of 115 AMeV heavy ions from Intermediate Ring Cycrotron (IRC). Radioactive nuclei produced by the primary beams of such an intermediate energy are suitably low in energy to be stopped in a sample material of limited thicknesses and also allow for a scheme to polarize their spins, thus enabling a number of stopped-RI type experiments to be conveniently performed. In order to enhance and fully capitalize the unique and valuable experimental opportunity provided by this IRC-RIPS configuration, a time-sharing beam delivery to BigRIPS and RIPS is also proposed. A pulsing magnet, which has already been equipped, can be used to change the beam path within a switching time of 10 ms for this purpose. Perspectives of nuclear-moment measurements in RIBF will be given in the talk.