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Gamma-ray spectroscopy at Osaka

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We are performing the experimental studies on high-spin isomers [1].
These isomers have been reported in N=83 isotones with Z=60−67.
The spins of these isomers are $49/2^+$ and 27^+ for odd and odd-odd
nuclei, respectively. Their shapes were known to be oblate with a deformation
parameter $\beta\sim-0.2$. These isomerism were understood to be
caused by the sudden shape change from near spherical to oblate shapes.
The experiments to search for the isomers of the same origin in other isotopes
of $A\sim90$ and $A\sim150$ near β-stability line were made
using the secondary beam line, EN course [2] at RCNP, Osaka University.
Although EN course was developed as the fragment mass separator,
experiments using low-energy heavy ion beams have been successfully
performed.

Experiment to search for isomers in nuclei near $A\sim90$ based on the
recoil catcher method was carried out using EN course as a recoil mass
separator. Reaction products produced by the fusion reaction of ^{13}C
+ ^{86}Kr with the beam energy of 7.4 MeV/u were transported
through ∼16m down to a catcher with flight time of ∼500ns.
A Ge detector ball which consists of 14 coaxial-type detectors was installed
at the catcher position. Gamma-rays emitted from isomers and daughter nuclei
of the β decays were clearly observed.

The RI beam of ^{17}N was also developed to search for isomers in nuclei
near $A\sim150$. The neutron rich RI beam is necessary to produce
high-spin states by the fusion reaction in nuclei near β-stability line.
The ^{17}N beam was produced by the ^{9}Be(^{18}O, ^{17}N)^{10}B
reaction with the primary beam energy of 9.1 MeV/u. This secondary beam
of 5.3 MeV/u was separated from the primary ^{18}O beam and
was transported up to secondary achromatic focal plane. The ^{17}N
beam intensity was $\sim10^4\sim10^5$ pps.

The recent experimental results obtained by using the secondary beam line
EN course and Ge ball at RCNP will be presented.

[1] A. Odahara, et al., Phys. Rev. {\bf C 72} (2005) 061303(R).
[2] S. Mitsuoka et al., Nucl. Inst. and Meth. {\bf A 372} (1996) 489.
T. Shimoda et al., Nucl. Inst. and Meth. {\bf B 70} (1992) 320.

Primary author: ODAHARA, Atsuko (Department of Physics, Osaka University)

Co-authors: TAKASHIMA, Anna (Department of Physics, Osaka University); IDEGUCHI, Eiji (CNS, University of Tokyo); KURA, Ken-ichiro (Department of Physics, Osaka University); TAJIRI, Kunihiko (Department of Physics, Osaka University); SUGA, Masaki (Department of Physics, Osaka University); KAZATO, Masayuki (Department of Physics, Osaka University); SHIMODA, Tadashi (Department of Physics, Osaka University); SUZUKI, Tomokazu (Department of Physics, Osaka University); FUKUCHI, Tomonori (RIKEN); HORI, Toshikazu (Department of Physics, Osaka University); MASUE, Toshiyuki (Department of Physics, Osaka University); WAKABAYASHI, Yasuo (CNS, University of Tokyo); GONO, Yasuyuki (RIKEN)

Presenter: ODAHARA, Atsuko (Department of Physics, Osaka University)

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