RCNP EXPERIMENT E343

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:

Development of high-spin isomer beam using EN course

SPOKESPERSON:

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EXPERIMENTAL GROUP:

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RUNNING TIME :

Installation time without beam	7 days
Test running time for experiment	^{136}Xe : 4 days

BEAM LINE: EN course

BEAM REQUIREMENTS :

Type of particle	^{136}Xe
Beam energy	9.7 MeV/u
Beam intensity	10 pnA

BUDGET :

Experimental expenses	800,000 yen
Travel expense	360,000 yen

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SUMMARY OF EXPERIMENT

We propose to develop high-spin isomer beams by taking advantage of the unique combination of the high intensity, low energy heavy-ion beams and the reaction product separator at RCNP. The high-spin isomer beams give efficient opportunities to investigate exotic collective motions such as precession mode built on rigid oblate shape with high spin. Such mode has been predicted since many years ago, but no experimental evidence has been observed for nuclei with oblate deformation so far. One of the difficulties is due to that the band of the precession mode does not appear along the yrast line, thus it is hard to identify the deexciting gamma-rays. We propose Coulomb excitation experiments with the high-spin isomer beams in order to efficiently populate the states of precession mode.

As the first step of the experiment we would like to develop a ^{147}Gd ($I^{\pi} = 49/2^{+}$, E_x=8.588 MeV, $T_{1/2}$=510 ns) beam with an energy of 3-4 MeV/u at the rate of 10^5 pps. This high-spin shape isomer will be produced by the fusion reaction of ^{20}Ne + ^{136}Xe. The ^{136}Xe beam of 9.7 MeV/u with 10 pnA is requested to be directly provided by the AVF cyclotron. We have a plan to construct a new gas target system at primary target position of EN course. We will obtain the $\sim 10^5$ pps high-spin isomer beam on the secondary target position.

We request 4 days test runs to develop the high-spin isomer beam of ^{147}Gd, by test of the new gas target system using beam (2 days) and beam tuning (2 days).