

RCNP EXPERIMENT E

PROPOSAL FOR EXPERIMENT AT RCNP

TITLE:

Study of high-spin state population by light-ion reactions

SPOKESPERSONS :

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EXPERIMENTAL GROUP:

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and CAGRA collaboration

RUNNING TIME

Beam tuning and DAQ setup	1 days
<u>Data runs</u>	<u>2 days</u>
Total	3 days

BEAM LINE:

Ring: WS course

BEAM REQUIREMENTS:

Type of particle	${}^6\text{Li}^{3+}$
Beam energy	100 MeV/u
Beam intensity	1 pnA

BUDGET:

${}^{40}\text{Ca}$, ${}^{100}\text{Mo}$ target	400,000 JPY
<u>Local expense</u>	<u>100,000 JPY</u>
Total	500,000 JPY

SAFETY CONTROLLED ITEMS:

N/A

OTHER REQUIREMENTS:

CAGRA-Grand Raiden setup

Summary of the Experiment

We propose an experiment to study high-spin population in the (${}^6\text{Li},d$) α transfer reaction. We are currently investigating the limit of nuclear deformation, especially $A\approx 40$ region. So far, super-deformed rotational bands are systematically observed $A\approx 40$ nuclei and existences of remarkable super-deformed and hyper-deformed shell structure are expected. Therefore, this region is suited to investigate extremely deformed nucleus such as hyper-deformed states. Such states are theoretically predicted to locate near yrast at spin 20 or larger. In order to populate and observe γ rays associated with the hyper-deformed rotational bands with good signal-to-noise ratio, a development of new method to provide high-spin states is necessary. We propose particle- γ coincidence measurements by light-ion reaction utilizing a combination of CAGRA γ -ray detector array with Grand Raiden (GR) spectrometer. High-spin population of ${}^{44}\text{Ti}$ and ${}^{104}\text{Ru}$ by the (${}^6\text{Li}, d$) reaction will be investigated.