RCNP EXPERIMENT E263

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE: Dipole resonances in ^{4}He

SPOKESPERSON:

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EXPERIMENTAL GROUP:

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Keigo KAWASE	RCNP, Osaka University	D2
Hisanobu HASHIMOTO	RCNP, Osaka University	D1
Masaru YOSOI	Dept. of Physics, Kyoto University	RA
M.B. GREENFIELD	Dept. of Physics, ICU	P

RUNNING TIME:

Total running time not including beam preparation 6 days

BEAM LINE: WS-course, Grand RAIDEN, NYMPHS

BEAM REQUIREMENTS:

Type of particle	^{7}Li^{3+}
Beam energy	455 MeV
Beam intensity	a few tens nA
Target	^{4}He, ^{12}C, Kapton foil
Other requirements	Energy resolution $\sim$ 150 keV

Beam must be halo-free and stability over several days is required

BUDGET:

Experimental expenses 600,000 yen
Travel plans - 10 participants should be supported by RCNP

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SUMMARY OF THE PROPOSAL

We aim at investigating dipole resonances, i.e., the giant dipole resonance (GDR) and spin dipole resonance (SDR), in ^{4}He by using the (^{7}Li,^{7}Be) reaction at 455 MeV on ^{4}He. The GDR and SDR of ^{4}He will be obtained by measuring the 0.43-MeV γ-ray of ^{7}Be in coincidence with ^{7}Be-scattered particles. These resonances are important for studies of the charge symmetry of nuclear force and the reaction mechanism.

The GDR in ^{4}He was investigated with the photonuclear reactions, (γ,n) and (γ,p), and widely discussed during the past few decades. However, reported observations of their cross sections and resonance shapes were in contradiction. Further there are scarce data for the SDR in ^{4}He. In the present experiment we will measure the excitation energies, resonance shapes, and widths for the GDR and SDR in ^{4}He.

The noble gas, ^{4}He, should be prepared as a gas target which is to be installed inside a cell with a Kapton foil window. ^{7}Li induced reactions on ^{12}C and the Kapton foil will be measured in order to account for the background they produce.