RCNP EXPERIMENT E234

PROPOSAL FOR EXPERIMENT AT RCNP

20 January, 2004

TITLE: Medium effect in the excitation of the giant dipole resonance in α-cluster

SPOKESPERSON:

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EXPERIMENTAL GROUP:

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Takashi KUDO	Dept. of Physics, Kyushu University	M2
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RUNNING TIME:

Total running time not including beam preparation — 5 days

BEAM LINE:

WS-course, Grand RAIDEN

BEAM REQUIREMENTS:

Type of particle	proton
Beam energy	300 MeV
Beam intensity	$\sim$ 20 nA
Other requirements	Energy resolution $\sim$ 150 keV
	Beam must be halo-free
	Energy stability over experimental run is required

BUDGET:

Experimental expense — 300,000 yen

Travel plans - 14 participants should be supported by RCNP

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SUMMARY OF THE PROPOSAL

The present work aims at the search for the nuclear-medium effect in the excitation of the giant dipole resonance (GDR) of α-clusters in ^{6,7}Li via the (p,p') reactions at 300 MeV. In the previous RCNP experiments we found the GDR's of an α-cluster in ^{6}Li and ^{7}Li at Ex=27 and 29 MeV, respectively, by using the (p,p') reactions. We also observed the analogs of the GDR's in ^{6,7}He by using the (^{7}Li,^{7}Be) reactions and in ^{6,7}Be by using the (^{3}He,t) reactions. In the present experiment we will determine the accurate excitation energies, resonance shape, widths, and cross sections for the GDR in *a free* ^{4}He. We will comprare these quantities with those obtained for the GDR in the α-clusters in ^{6,7}Li. We will be able to obtain the information about nuclear-medium effect from the detailed comparison of these quantities.