

PROPOSAL FOR EXPERIMENT AT RCNP

20 January, 2004

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

Tamio YAMAGATA

Professor of Physics

Department of Physics, Konan University, Kobe 658-8501

e-mail: yamagata@center.konan-u.ac.jp

TEL: 078-435-2469

FAX: 078-435-2539

EXPERIMENTAL GROUP:

Hiroaki UTSUNOMIYA	Dept. of Physics, Konan University	Professor
Hidetoshi AKIMUNE	Dept. of Physics, Konan University	Associate Professor
Kaoru YAMASAKI HARA	Dept. of Physics, Konan University	D3
Maki KINOSHITA	Dept. of Physics, Konan University	M1
Shintaro NAKAYAMA	Dept. of Physics, Univ. of Tokushima	Professor
Mamoru FUJIWARA	RCNP, Osaka University	Associate Professor
Keigo KAWASE	RCNP, Osaka University	D1
Kosuke NAKANISI	RCNP, Osaka University	D1
Hisanobu HASHIMOTO	RCNP, Osaka University	M2
Masaru YOSOI	Dept. of Physics, Kyoto University	Research Associate
Mark B. GREENFIELD	Dept. of Physics, ICU	Professor
Masayoshi TANAKA	Kobe Tokiwa College	Professor
Kenshi SAGARA	Dept. of Physics, Kyushu University	Professor
Tetsuo NORO	Dept. of Physics, Kyushu University	Professor
Tomotsugu WAKASA	Dept. of Physics, Kyushu University	Associate Professor
Takashi KUDO	Dept. of Physics, Kyushu University	M2
Shun ASAJI	Dept. of Physics, Kyushu University	M2

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	~ 20 nA
Other requirements	Energy resolution ~ 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 ${}^6,{}^7\text{Li}$ via the (p,p') reactions at 300 MeV. In the previous RCNP experiments we found the GDR's of an α -cluster in ${}^6\text{Li}$ and ${}^7\text{Li}$ at $E_x=27$ and 29 MeV, respectively, by using the (p,p') reactions. We also observed the analogs of the GDR's in ${}^6,{}^7\text{He}$ by using the (${}^7\text{Li},{}^7\text{Be}$) reactions and in ${}^6,{}^7\text{Be}$ by using the (${}^3\text{He},t$) reactions. In the present experiment we will determine the accurate excitation energies, resonance shape, widths, and cross sections for the GDR in *a free* ${}^4\text{He}$. We will compare these quantities with those obtained for the GDR in the α -clusters in ${}^6,{}^7\text{Li}$. We will be able to obtain the information about nuclear-medium effect from the detailed comparison of these quantities.