

PROPOSAL FOR EXPERIMENT AT RCNP

28 May, 2001

TITLE: Study of Isovector Resonances in Nuclei by (${}^7\text{Li}, {}^7\text{Be}$) Reaction
(Updated proposal of E145)

SPOKESPERSON:

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EXPERIMENTAL GROUP:

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Saori UMEHARA	Dept. of Physics, Osaka University	D1
Hisako FUJIMURA	RCNP, Osaka University	Research Fellow
Keigo HARA	RCNP, Osaka University	D2
Sydney GALES	IPN, Orsay	Professor
M.B. GREENFIELD	Dept. of Physics, ICU	Professor

RUNNING TIME:

Total running time not including beam preparation 8 days

BEAM LINE:

WS-course, Grand RAIDEN

BEAM REQUIREMENTS:

Type of particle	${}^7\text{Li}^{3+}$
Beam energy	65 AMeV
Beam intensity	~ 3 nA
Targets	${}^6,7\text{Li}$, ${}^{12}\text{C}$, ${}^{28}\text{Si}$, ${}^{60}\text{Ni}$, ${}^{90}\text{Zr}$, ${}^{120}\text{Sn}$, ${}^{208}\text{Pb}$
Other requirements	Energy resolution ~ 300 keV Beam must be halo-free Stability over several days is required

BUDGET:

Experimental expenses: two entrance slits 500,000 yen
Travel plans - 11 participants should be supported by RCNP

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SUMMARY OF THE PROPOSAL

In the E99 experiment, we confirmed the existence of the isovector electric monopole resonance (IVMR) in ${}^{60}\text{Ni}$ by using the (${}^7\text{Li}, {}^7\text{Be}$) reaction at 65A MeV. The IVMR was observed at an excitation energy of 20 ± 2 MeV with a width of 10 ± 2 MeV in ${}^{60}\text{Co}$, which is an analogue of the T_0+1 isospin component of the IVMR estimated at $E_x \approx 31$ MeV in ${}^{60}\text{Ni}$. The result is consistent with the previous results using the pion charge-exchange reaction.

In this proposal, we investigate isovector resonances in medium and heavy mass nuclei. The heavy mass nuclei have been investigated by using various probes, such as (π^\pm, π^0), (n, γ), (n, p) and (${}^{13}\text{C}, {}^{13}\text{N}$) reactions. However, identification of the isovector electric resonances have not been definitive due to experimental difficulties. We aim at measuring angular distributions of isovector excitations via the (${}^7\text{Li}, {}^7\text{Be}$) reaction at forward scattering angles of $\theta_L \leq 3^\circ$, the shapes of which critically depend on their transferred ΔL .