RCNP EXPERIMENT E164

PROPOSAL FOR EXPERIMENT AT RCNP

28 Aug. 2000

TITLE:
Search for excited α-cluster states in ^{6}Li via ^{6}Li (^{7}Li,^{7}Be,d) reaction

SPOKESPERSON:

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EXPERIMENTAL GROUP:

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Hiroaki Utsunomiya	Dep. of Physics, Konan Univ.	(P)
Hidetoshi Akimune	Dep. of Physics, Konan Univ.	(L)
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Ayako Shiokawa	Dep. of Physics, Konan Univ.	(M1)
Shintaro Nakayama	Dep. of Physics, Univ. of Tokushima	(P)
Masaru Yosoi	RCNP, Osaka Univ.	(RA)
Yasushi Arimoto	JAERI (SPring-8)	(RF)
Masayoshi Tanaka	Kobe Tokiwa College	(P)

RUNNING TIME: Data runs — 5 days (including test running time)

BEAM LINE: Ring : WS course

BEAM REQUIREMENTS:

Type of particle	^{7}Li^{3+}
Beam energy	65 MeV/A
Beam intensity	≤ 3 nA
Any other requirements	Energy stability over running time

BUDGET: Experimental expenses — 200,000 yen

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SUMMARY OF THE PROPOSAL

The present work aims at the search for an excited states of an α-cluster in the ^{6}Li nucleus (excited-cluster states, ECS), i.e. the giant dipole resonance (GDR) and spin-dipole resonance (SDR) of an α-cluster, by observing their analogue states in the 6He nucleus excited via the 6Li (^{7}Li,^{7}Be) reaction. In our previous experiment with this reaction, a such possible peak for ECS has been found in singles spectra at an excitation energy about 28 MeV in ^{6}He, riding on the broad bumps of known GDR and SDR of the ^{6}Li nucleus itself.
We suppose that a deuteron-cluster also presents as a spectator in ECS. In a decay of this excited nucleus the deuteron-cluster should be emitted, while analogue states of the GDR and SDR in ^{6}He decay mainly via a neutron emission. Thus, observing the deuterns decaying from excited states of 6He in coincidence with 7Be particles, ECS should be enhanced and should be discriminated from other non-cluster excitation.