RCNP EXPERIMENT E190

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:

Charged particle decay from analog of excited alpha-cluster state in ^{6,7}He

(Update proposal of E164)

SPOKESPERSON:

Hidetoshi AKIMUNE, Lecturer,

Department of Physics, Konan University,

Okamoto 8-9-1, Higashinada, Kobe 658-8501, Japan.

Phone number : +81-78-435-2470

FAX number : +81-78-435-2539

E-mail : akimune@konan-u.ac.jp

EXPERIMENTAL GROUP:

Tamio YAMAGATA	Dept. of Physics, Konan University	P
Hiroaki UTSUNOMIYA	Dept. of Physics, Konan University	P
Kaoru YAMASAKI	Dept. of Physics, Konan University	D2
Shinataro NAKAYAMA	Dept. of Physics, University of Tokushima	P
Ken-ichi FUSHIMI	Dept. of Physics, University of Tokushima	AP
Kyouko ICHIHARA	Dept. of Physics, University of Tokushima	M1
Masayoshi TANAKA	Kobe Tokiwa Jr. College	P
Mamoru FUJIWARA	RCNP, Osaka University	AP
Keigo HARA	RCNP, Osaka University	D2
Keigo KAWASE	RCNP, Osaka University	M1
Kosuke NAKANISI	RCNP, Osaka University	M1
Masaru YOSOI	Dept. of Physics, Kyoto University	R

RUNNING TIME:

Test running time for experiment not including beam preparation 5 days

BEAM LINE:

WS-course, Grand RAIDEN

BEAN REQUIREMENTS:

Type of particle	^{7}Li^{3+}
Beam energy	65 AMeV
Beam intensity	$\sim$ 6 nA or more
Other requirements	Energy resolution $\sim$ 400 keV
	Beam must be halo-free
	Energy stability over experimental run is required

BUDGET: Travel plans 9 participants should be supported by RCNP

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(Updated proposal of E164)

SPOKESPERSON:

Hidetoshi Akimune
Department of Physics, Konan University, Kobe 658-8501

SUMMARY OF THE PROPOSAL

In order to investigate the cluster structure of ^{6}He we studied a charged particle decay from highly excited energy region of ^{6}He populated via the (^{7}Li, ^{7}Be) reaction in the E164 experiment. We found a binary triton decay from a resonance at $E_x \approx 18$ MeV, which suggests a di-triton cluster structure of this resonance. We also investigated, a charged particle decay from the resonance at $E_x = 25$ MeV which was very recently reported by Nakayama *et al.* to be an analogue of an α cluster excitation in a nucleus. However, due to small energies of the decaying particles (less than 3 MeV) and due to high threshold discrimination level for Si - SSD detector we could not clearly identify the decaying particles from the 25 MeV resonance.

In this proposal, we focus our attention to a re-measurement of the charged particle decay from the analog of α cluster excitation at $E_x = 25$ MeV in ^{6}He and a new measurement of ^{7}He. The decaying charged particles are detected by Si-SSD's located at a distance about 30 cm from a target. Particle identification is performed by using a time of flight method. This method was well established in our E172 experiment. Thus, we aim to clarify the decay mode of the analog of α cluster excitation.