

E426

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:**Precise measurement of the $^{16}\text{O}(\alpha, 2\alpha)$ reaction at 400 MeV****SPOKESPERSON:**

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EXPERIMENTAL GROUP:

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M. Miura	RCNP, Osaka University	M1

RUNNING TIME: Installation time without beam 7 days (× 2)
 Startup and beam tuning 1 days (× 2)

	Test running time for experiment	2 days
	Data runs	12 days
BEAM LINE:		Ring : WS course
BEAM REQUIREMENTS:	Type of particle	${}^4\text{He}^{++}$
	Beam energy	400 MeV
	Beam intensity	≤ 500 pA
	Any other requirements	energy resolution ≤ 300 keV
		RF timing resolution ≤ 1 ns
		halo-free, small emittance
BUDGET:	Experimental expenses	1900,000 yen

TITLE:**Precise measurement of the $^{16}\text{O}(\alpha, 2\alpha)$ reaction at 400 MeV****SPOKESPERSON:** Yohei Matsuda**SUMMARY OF THE PROPOSAL**

We propose precise measurements of triple differential cross sections and recoil momentum distributions for the $^{16}\text{O}(\alpha, 2\alpha)$ reaction at $E_\alpha = 400$ MeV.

As a spectroscopic quantity, it is interesting to investigate which states of the residual nucleus overlap the ground state of the target nucleus. Due to the recent progress of experimental and theoretical researches, we have obtained reliable information about the α -cluster structures in nuclei. Thus, it seems to be a good time to discuss the topic with the degree of the α -cluster structure in residual nuclei. In this proposal, we choose ^{16}O as a target. In the residual nucleus ^{12}C , 3α gas-like states ($0_2^+, 0_3^+, \dots$) are well developed above the cluster-break up threshold in contrast to the ground 0_1^+ state. Due to the coexistence of the shell-model and the cluster structures in ^{12}C , ^{16}O is considered to be an interesting object to discuss the relation mentioned above.

In the proposed experiment, we will extract the strength distribution of the α -knockout state precisely up to the separation energy of 30 MeV to discuss the relation. For the separation energy region above the cluster-break up threshold, we will analyze the recoil momentum distribution of the cross section with the multipole decomposition analysis to extract the strength distribution. In order to perform the prescription, we will measure the recoil momentum between ± 200 MeV/c.

In fact, no experiment has succeeded in extracting the strength distribution. However, the present attempt will be accomplished by using a highly intense beam, a solid O_2 (or an ice) target, and the high resolution dual spectrometer: the GR and the LAS.