

## PROPOSAL FOR EXPERIMENT AT RCNP

28 May 2001

**TITLE:**

**Study of decay mode of the  $1^+$  states in  $^{176}\text{Lu}$  after solar neutrino absorption via  $^{1276}\text{Yb}(^3\text{He},t\gamma)^{176}\text{Lu}$  high resolution coincidence measurement**

**SPOKESPERSON:**

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**EXPERIMENTAL GROUP:**

Name	Institution	Name	Institution
T. Adachi	Univ. of Osaka	H. Akimune	Univ. of Konan
M. Fujimura	RCNP	M.N. Harakeh	KVI
T. Ishikawa	Univ. of Kyoto	J. Jänecke	Univ. of Michigan
J. Kamiya	RCNP	T. Kawabata	RCNP
S. Nakayama	Univ. of Tokushima	R.S. Ragahavan	Bell Laboratories
Y. Sakemi	RCNP	Y. Shimbara	Univ. of Osaka
Y. Shimizu	RCNP	K. Takahisa	RCNP
M. Tanaka	Kobe Tokiwa Jr. College	M. Uchida	Univ. of Kyoto
K. Yamasaki	Univ. of Konan	H.P. Yoshida	RCNP
M. Yosoi	Univ. of Kyoto	R.G.T. Zegers	JAERI

**RUNNING TIME:** Installation time without beam 3 days(for each beam time)  
 Data runs 10 days

**BEAM LINE:** Ring : WS course

**BEAM REQUIREMENTS:** Type of particle  $^3\text{He}$   
 Beam energy 450 MeV  
 Beam intensity  $\sim 0.5$  nA  
 Any other requirements energy resolution  $\leq 200$  keV  
 halo-free, small emittance

**BUDGET:** Experimental expenses 1,700,000 yen  
 Travel plans 8 participants should be supported by RCNP

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**Study for decay mode of the  $1^+$  states in  $^{176}\text{Lu}$  after solar neutrino absorption via  $^{176}\text{Yb}(^3\text{He,t})^{176}\text{Lu}$  high resolution coincidence measurement**

**SPOKESPERSON:** Keigo Hara and Mamoru Fujiwara

**SUMMARY OF THE PROPOSAL**

Discrete Gamow-Teller transitions  $^{176}\text{Yb} \rightarrow ^{176}\text{Lu}$  at low excitation energies have been measured via the  $^{176}\text{Yb}(^3\text{He,t})^{176}\text{Lu}$  reaction at 450 MeV. The low  $Q(\nu)$ -value in Yb-Lu indicates that Yb-based  $\nu$  detectors are well suited for a direct measurement of the sub-MeV solar electron-neutrino ( $\nu_e$ ) spectrum including pp neutrinos. Furthermore, we can reduce the background greatly by employing a delayed- $\gamma$  coincidence technique. Detailed study of the  $\gamma$ -decay mode after the solar neutrino absorption is required for this purpose. A test experiment of a  $\gamma$ -coincidence measurement with  $\Delta E_\gamma \sim 4$  keV has already successfully completed. It is demonstrated that the  $(^3\text{He,t}\gamma)$  experiments with high resolution Ge detectors at RCNP will provide a new means to study the nuclear structure via the measurements of the discrete  $\gamma$ -decays from the spin-isospin states in nuclei