RCNP EXPERIMENT E216

PROPOSAL FOR EXPERIMENT AT RCNP

22 July 2003

TITLE:

Extraction of neutron density distributions in the calcium isotopes

SPOKESPERSON:

Full Name	TAKEDA, Hiroyuki
Institution	The Institute of Physical and Chemical Research (RIKEN)
Title or Position	Contract Researcher
Address	2-1, Hirosawa, Wako, Saitama 351-0198, Japan
Phone number	+81-48-467-9473
FAX number	+81-48-462-4689
E-mail	takeda@rarfaxp.riken.go.jp

EXPERIMENTAL GROUP:

Name	Institution	Title or Position
H. Sakaguchi	Department of Physics, Kyoto University	(AP)
T. Murakami	Department of Physics, Kyoto University	(A)
M. Yosoi	Department of Physics, Kyoto University	(A)
Y. Yasuda	Department of Physics, Kyoto University	(D3)
S. Terashima	Department of Physics, Kyoto University	(D1)
S. Kishi	Department of Physics, Kyoto University	(M2)
J. Zenihiro	Department of Physics, Kyoto University	(M1)
I. Tanihata	RIKEN	(Executive Director)
T. Suda	RIKEN	(Senior Scientist)
T. Ohnishi	RIKEN	(Special Postdoctoral Researcher)
R. Kanungo	RIKEN	(Contract Researcher)
M. Itoh	RCNP, Osaka University	(COE)
M. Uchida	RCNP, Osaka University	(Research Fellow)
H.P. Yoshida	RCNP, Osaka University	(D3)

RUNNING TIME:	Setup time without beam (for each beam time)	2.5 days
	Data runs	6.0 days
BEAM LINE:		Ring : WS course

BEAM REQUIREMENTS:

Type of particle	polarized proton
Beam energy	300 MeV
Beam intensity	$1 \sim 700\,\mathrm{nA}$
Energy resolution	$\leq 300\,\mathrm{keV}$
Any other requirements	stable, small emittance

BUDGET:	Experimental expenses	2,500,000 yen
	Travel expenses	12 participants should be supported by RCNP

RCNP EXPERIMENT E216

TITLE:
Extraction of neutron density distributions in the calcium isotopes

SPOKESPERSON: TAKEDA, Hiroyuki

SUMMARY OF THE PROPOSAL

We propose to extract neutron density distributions in ^{40,42,44,48}Ca by measuring precisely proton elastic scattering using the frequent target changer developed for the tin isotope measurements. Electron scattering data indicate that the charge radius of the calcium isotopes does not increase as the target mass number increases but remains almost constant. It is of great interest whether the neutron radii increase or not according to the neutron number. If the neutron radius increases, it means that there exists the neutron skin in ^{48}Ca. If the neutron radius remains constant, it shows an anomaly. Since we have recently developed a new approach to extract neutron density distribution, we think we can give decisive information on the neutron distributions in the Ca isotopes.