RCNP EXPERIMENT E248

PROPOSAL FOR EXPERIMENT AT RCNP

6 July 2004

TITLE:

Elastic proton scattering to deduce neutron skin thicknesses in lead isotopes

SPOKESPERSON:

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EXPERIMENTAL GROUP:

Name	Institution	Title or Position
T. Murakami	Department of Physics, kyoto University	(A)
M. Yosoi	Department of Physics, Kyoto University	(A)
Y. Yasuda	Department of Physics, Kyoto University	(D3)
Y. Terashima	Department of Physics, Kyoto University	(D2)
S. Kishi	Department of Physics, Kyoto University	(D1)
J. Zenihiro	Department of Physics, Kyoto University	(M2)
Y. Nakatsugawa	Department of Physics, Kyoto University	(M2)
T. Suda	RIKEN	(Senior Scientist)
T. Ohnish	RIKEN	(Special Postdoctoral Researcher)
H. Takeda	RIKEN	(Contract Researcher)
M. Itoh	RCNP	(COE)
M. Uchida	RCNP	(Research Fellow)
H.P. Yoshida	RCNP	(Research Fellow)

RUNNING TIME:	Installation time without beam	1.5 days(for each beam time)
	Development of device	0.5 days
	Data runs	5.0 days
BEAM LINE:		Ring : WS course
BEAM REQUIREMENTS:	Type of particle	polarized p
	Beam energy	300 MeV
	Beam intensity	500 nA
	Any other requirements	energy resolution $\leq$ 160 keV
		halo-free, small emittance
BUDGET:	Experimental expenses	2,000,000 yen

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SUMMARY OF THE PROPOSAL

We are proposing to measure elastic proton scattering off lead isotopes to deduce neutron density distributions. Since there are enough precise data for charge distributions for lead isotopes, we can easily deduce neutron density distributions from proton elastic scattering data, by combining with the charge distribution data.

Recently the asymmetry term in the EOS attracts many reseachers, because it reflects different approaches to calculate the nuclear incompressibilities and the neutron skin thickness is sensitve to the asymmetry term. From the experience of analysis of tin isotopes we are now in a position to deduce neutron density distributions and the neutron root mean square radius precisely with the accuarcy of about 0.02 fm, which is enough to pin down the correct EOS's and discern correct effective interactions.