RCNP EXPERIMENT E296

PROPOSAL FOR EXPERIMENT AT RCNP

July 5, 2006

TITLE: Study of UCN basic parameters for experiments

SPOKESPERSON:

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EXPERIMENTAL GROUP:

Name	Institution	Title or Position
A. Maki	Institute of Particle and Nuclear Studies	P
S. Jeong	Institute of Particle and Nuclear Studies	AP
Y. Watanabe	Institute of Particle and Nuclear Studies	RA
K. Hatanaka	RCNP, Osaka Univ.	P
K. Matsuta	Dept. of Physics, Osaka Univ.	AP
R. Matsumiya	Dept. of Physics, Osaka Univ.	D1

RUNNING TIME:

Installation time without beam	3 months
Data runs	20 days

BEAM LINE:

Ring:	ES course

BEAM REQUIREMENTS:

Type of particle	p
Beam energy	400 MeV
Beam intensity	as high as possible

BUDGET:

UCN storage bottle	1,200,000 yen
UCN valve and controller	1,600,000 yen
Vacuum chamber	800,000 yen
UCN detector	600,000 yen
liquid helium	4,000 liter

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SUMMARY OF THE PROPOSAL

We have been producing spallation ultracold neutrons (UCN) in super fluid helium (He-II). In June 2006, the UCN density become 15 UCN/cm3 in an experimental volume for UCN energies less than 90 neV at a proton beam power of 390 W and a He-II temperature lower than 1 K. This UCN density is higher than ILL (Grenoble), and world competitive. We will apply our UCN source to neutron β-decay experiments, an electric dipole moment measurement and a gravity experiment. Our UCN source in the only one He-II spallation UCN source in the world. In the present proposal, we plan to study basic parameters of UCN source and bottle. We will study a UCN energy spectrum and a space distribution in an experimental bottle, and then carry out UCN Ramsey resonance. We will also measure an UCN angular distribution from a UCN guide for the study of gravity. Our UCN source is the first UCN source in Japan, which can be applied to experiments. We will foster a new field of physics via the fundamental studies.