RCNP EXPERIMENT E323

PROPOSAL FOR EXPERIMENT AT RCNP

10 July 2008

TITLE:

Experimental study on neutron transport in shielding materials using RCNP mono-energetic incident neutrons

SPOKESPERSON:

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EXPERIMENTAL GROUP:

Full Name	Institution	Title or Position
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Masayuki HAGIWARA	KEK	(Assistant Professor)
Norikazu KINOSHITA	KEK	(Postdoc.)
Syuichi BAN	KEK	(Prof., Radiation science division leader)
Hideo HIRAYAMA	KEK	(Prof., Applied research labo. director)
Hiroshi YASHIMA	Research Reactor Institute, Kyoto Univ.	(Assistant Professor)
Takashi NAKAMURA	CYRIC, Tohoku Univ.	(Professor Emeritus)
Yoichi KIRIHARA	SOKENDAI	(Graduate Student)
Yosuke IWAMOTO	JAEA	(Researcher)
Daiki SATOH	JAEA	(Researcher)
Norihiro MATSUDA	JAEA	(Researcher)
Yoshihiro NAKANE	JAEA	(Principal Researcher)
Yukio SAKAMOTO	JAEA	(Applied rad. phys. Gr. leader)
Hiroshi NAKASHIMA	JAEA	(Safety deputy division leader)
Shingo TANIGUCHI	SPring-8	(Researcher)
Toshihiro ITOGA	SPring-8	(Researcher)
Koji OISHI	Shimizu Corporation	(Senior Research Engineer)
Yoshitomo UWAMINO	RIKEN	(Group Director)
Atsushi TAMII	RCNP, Osaka Univ.	(Associate Professor)
Kichiji HATANAKA	RCNP, Osaka Univ.	(Professor)

RUNNING TIME:	Installation time without beam	1 day (for each beam time)
	Data runs	4 days $\times$ 2 times = 8 Days
BEAM LINE:		Ring : N0 course
BEAM REQUIREMENTS:	Type of particle	p
	Beam energy	250, 400 MeV
	Beam intensity	$\leq$ 100 nA
	Any other requirements halo-free, small emittance, beam pulsing	

BUDGET:

Traveling expenses	335,000 yen
Accommodation	96,000 yen
Total	431,000 yen

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SUMMARY OF THE PROPOSAL

This proposal has a plan to perform a shielding experiment using RCNP quasi-monoenergetic neutrons produced by p-Li reaction at proton incident energies of 250 and 400 MeV. This proposal is the further extension of the recently carried out experiment (E269) of neutron transport through shielding materials.

Neutrons are counted behind shielding materials using a NE213 scintillator and the pulse height of the NE213 output signal is converted to neutron energies by an unfolding method. In the study Time-Of-Flights of the neutrons are also scored for the energy determination for high energy neutrons. The combination analysis of TOF and an unfolding in the deep penetration problem was newly developed in the last experiment (E269) and the method won a prize in the conference of the 11th International Conference on Radiation Shielding ICRS-11.

The measurement is performed for different thick shieldings and number of penetrating neutrons and these energies are measured as a function of the shielding thickness. There was no other data available using mono-energetic neutrons above 100 MeV except this project. The data we are going to measure in this proposal is absolutely necessary to evaluate present nuclear data and to accelerate neutron transport studies especially high energy accelerator shielding and radiation protection in space.