E361

PROPOSAL FOR EXPERIMENT AT RCNP

July 11, 2010

TITLE:

Measurement of High-Energy Neutron Cross Sections for Cosmic Ray Produced Nuclides and Nuclear Chemistry.

SPOKESPERSON:

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EXPERIMENTAL GROUP:

Full Name	Institution	Title or Position
Marc W. Caffee	Dept. of Physics, Purdue University	Professor
Masayuki Hagiwara	High Energy Accelerator Research Organization	Associate Professor
Mineo Imamura	National Museum of Japanese History	Professor
Yosuke Iwamoto	Japan Atomic Energy Agency	Researcher
Yoshitaka Kasamatsu	Dept. of Chemistry, Osaka University	Res. Associate
Hiroshi Matsumura	High Energy Accelerator Research Organization	Associate Professor
Keisuke Nagao	Geochemical Research Center, University of Tokyo	Professor
Kazuhiko Ninomiya	Japan Atomic Energy Agency	Researcher
Robert C. Reedy	Planetary Science Institute, Arizona	Professor
Daiki Satoh	Japan Atomic Energy Agency	Researcher
Shun Sekimoto	Research Reactor Institute, Kyoto University	Assistant Professor
Seiichi Shibata	Research Reactor Institute, Kyoto University	Professor
Tatsushi Shima	RCNP, Osaka University	Res. Associate
Atsushi Shinohara	Dept. of Chemistry, Osaka University	Professor
Naruto Takahashi	Dept. of Chemistry, Osaka University	Res. Associate
Kees C. Welten	Space Sciences Lab., University of California, Berkeley	Associate Res.
Hiroshi Yashima	Research Reactor Institute, Kyoto University	Assistant Professor

RUNNING TIME:

Installation time without beam	1 day (for each beam time)
Development of device	
Data (Spectrum analysis and target bombardments)	4 days (for each beam time)

BEAM LINE: Ring: N0 course

BEAM REQUIREMENTS:

Type of particle	p, n
Beam energy	90, 140, and 200 MeV
Beam intensity	1 μA
Any other requirements	none

BUDGET:

^{7}Li target	100,000 yen
Mixed γ-ray standard source	300,000 yen
High purity target materials	300,000 yen

RCNP EXPERIMENT

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Measurement of High-Energy Neutron Cross Sections for Cosmic Ray Produced Nuclides and Nuclear Chemistry.

SPOKESPERSON: Kunihiko Nishiizumi

SUMMARY OF THE PROPOSAL

Cosmic-ray-produced (cosmogenic) nuclides are used to reconstruct the evolutionary history of solar system materials, including earth and planetary surface materials, and to study the history of cosmic rays. Monte Carlo neutron transport codes are essential tools in the reconstruction of cosmic ray exposure scenarios. However, even if the fundamental physics of neutron transport within planetary materials is modeled properly, the reliability of the results is still limited by the lack of or the accuracy of measured pertinent cross sections. At the present time, the largest uncertainty in reconstructing cosmic ray exposure scenarios is the uncertainty in the high-energy neutron excitation functions. A number of the nuclear reactions of interest have not been measured. We propose to measure the high-energy neutron excitation functions not only for cosmogenic nuclides but also for medium to heavy nuclei in order to understand nuclear reaction systematics. We will expose target materials to neutron beams at the Neutron Experimental Hall and measure products by low-level γ-ray counting and accelerator mass spectrometry (AMS). We performed exposure of various targets at neutron energies of 287 and 370 MeV under E298 project. We now propose to expose the same target materials to neutron energies of 90, 140, and 200 MeV.