

**E392**

## PROPOSAL FOR EXPERIMENT AT RCNP

23 February 2012

**TITLE:****Development of a Next-generation Neutron Detector Array HIME****SPOKESPERSON:**

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**EXPERIMENTAL GROUP:**

Full Name	Institution	Title or Position
N. Aoi	RCNP, Osaka University	Professor
Y. Kondo	Department of Physics, Tokyo Institute of Technology	Assistant Professor
N. Kobayashi	Department of Physics, Tokyo Institute of Technology	D2
R. Minakata	Department of Physics, Tokyo Institute of Technology	B4
S. Nishi	Department of Physics, Tokyo Institute of Technology	B4
H. Otsu	RIKEN, Nishina Center	Senior Researcher
T. Sako	Department of Physics, Tokyo Institute of Technology	M2
T. Shima	RCNP, Osaka University	Assistant Professor
A. Tamii	RCNP, Osaka University	Associate Professor
R. Tanaka	Department of Physics, Tokyo Institute of Technology	M1

**RUNNING TIME:** Installation time without beam 7 days  
 Test running time for experiment 0.5 days  
 Data runs 1.5 days

**BEAM LINE:** Ring : N0 course

**BEAM REQUIREMENTS:** Type of particle p  
 Beam energy 100 MeV, 250 MeV  
 Beam intensity faint beam and  $\leq 30$  nA  
 Any other requirements halo-free, small emittance,  
 beam pulsing

**BUDGET:** Travel expenses 700,000 yen  
 Transportation expenses 250,000 yen  
 $^7\text{Li}$  target 100,000 yen

**TITLE:****Development of a Next-generation Neutron Detector Array HIME****SPOKESPERSON:** Takashi Nakamura**SUMMARY OF THE PROPOSAL**

We propose to make a test experiment to investigate the performance of a newly developed high-resolution neutron detector array HIME (High resolution detector array for Multi-neutron Events). The HIME which is composed of 100 rods of  $2 \times 4 \times 100 \text{ cm}^3$  plastic scintillators, makes use of a new scheme of fast neutron detection using a tracking of recoiled protons. With this new scheme, momentum resolution and capability of multi-neutron detection is expected to significantly improve. Here, we use the quasi-monoenergetic neutron beam produced by the  ${}^7\text{Li}(p, n){}^7\text{Be}(\text{g.s.} + 0.43 \text{ MeV})$  reaction at 100 MeV and 250 MeV to determine the timing resolution, energy dependence of the neutron efficiency, and the angular resolution of the recoiled proton at HIME, installed at the N0-course. We request 2-day machine time for this experiment.