

**E406**

## PROPOSAL FOR EXPERIMENT AT RCNP

18 July 2012

**TITLE:**

**Search for a double Gamow–Teller giant resonance in  $^{48}\text{Ti}$  via the heavy-ion double charge exchange  $^{48}\text{Ca}(^{12}\text{C}, ^{12}\text{Be}(0_2^+))$  reaction**

**SPOKESPERSON:**

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**RUNNING TIME:**

Installation time without beam	5 days(for each beam time)
Detector setup for the test experiment	2 days
Test for ( $^{12}\text{C}$ , $^{12}\text{Be}(0_2^+)$ ) probe	2 days
Detector setup for the DGTGR measurement	1 day
Data runs	12 days
TOTAL	17 days

**BEAM LINE:** Ring : WS course

**BEAM REQUIREMENTS:**

Type of particle	$^{12}\text{C}$
Beam energy	100 MeV/nucleon
Beam intensity	$\leq 100$ pA
Any other requirements	energy spread $\leq 200$ keV, halo-free, small emittance

**BUDGET:** Experimental expenses 1,700 kyen

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**SPOKESPERSON:** Motonobu Takaki and Hiroaki Matsubara

**SUMMARY OF THE PROPOSAL**

We propose to measure cross sections for the heavy-ion double charge exchange (HIDCX)  $^{48}\text{Ca}(^{12}\text{C}, ^{12}\text{Be}(0_2^+))$  reaction at 100 MeV/nucleon with the high-resolution GRAND RAIDEN spectrometer for searching the Double Gamow-Teller Giant Resonance (DGTGR) in the  $^{48}\text{Ti}$  nucleus. Observation of the DGTGR will provide better understanding of the higher harmonics in the spin-isospin channel and the information on the nuclear structures involved in the  $\beta\beta$ -decay process. For tagging the transition in the projectile from the initial  $^{12}\text{C}(0_{\text{g.s.}}^+)$  to final isomeric  $^{12}\text{Be}(0_2^+)$  state,  $\gamma$ -rays from the  $^{12}\text{Be}(0_2^+)$  state will be identified using a  $\gamma$ -ray detection system at the focal plane of GRAND RAIDEN. To calibrate the experimental equipments, the  $^{18}\text{O}(^{12}\text{C}, ^{12}\text{Be}(0_2^+))^{18}\text{Ne}$  reaction is also proposed to measure.