

## PROPOSAL FOR EXPERIMENT AT RCNP

21 July 2005

**TITLE:**

Study of three-nucleon force effects via the measurements of  $A_y$  and  $K_y^{y'}$  for the  $p + d$  breakup reaction at 250 MeV.

**SPOKESPERSON:**

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**EXPERIMENTAL GROUP:**

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**RUNNING TIME:** Development of device 1 days  
 Test running time for experiment 1 days  
 Data runs 9 days

**BEAM LINE:** Ring : WS course, GR + LAS

**BEAM REQUIREMENTS:** Type of particle polarized p  
 Beam energy 250 MeV  
 Beam intensity  $\leq 500$  nA  
 Energy resplution  $\leq 300$  keV  
 Beam polarization  $\geq 0.7$

**BUDGET:** Experimental expenses 0 yen  
 Travel plans - 13 participants should be supported by RCNP

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**Study of three-nucleon force effects via the measurements of  $A_y$  and  $K_y^{y'}$  for the  $p + d$  breakup reaction at 250 MeV.**

**SPOKESPERSON:** Yukie Maeda

### SUMMARY OF THE PROPOSAL

Three-nucleon force (3NF) effect is one of the hot topics in nuclear physics. From the recent study at RIKEN, it has been found that differential cross sections of the elastic  $p + d$  scattering in the intermediate energy region can be well reproduced by incorporating the 3NF in the Faddeev calculation based on modern nucleon-nucleon (NN) interaction. In addition to the highly precise data of cross sections, many kinds of spin observables are measured and compared with rigorous Faddeev calculations with and without the 3NF. From these results, it became clear that the spin dependent part of present 3NF model are not sufficient to reproduce spin observables. Recently,  $n + d$  and  $p + d$  measurements were carried out at 250 MeV at RCNP. Faddeev calculations with 3NF underestimate the cross section data. It indicates the presence of the missing features of the three nucleon system at this energy region. For the next step of the 3NF study, breakup reactions are considered to play important role because the breakup cross sections become larger at higher energy.

In this proposal, we measure the vector analysing power  $A_y$  and the spin transfer coefficient  $K_y^{y'(p)}$  for  $p + d \rightarrow p + n + p$  breakup reaction. These data provide important information on the 3NF effects and make a discrimination between 3NF models.