RCNP EXPERIMENT E304

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:
Systematic measurements for the ^{1}H(d, pp) breakup reaction in the off-plane star configurations at E_d =26 MeV.

SPOKESPERSON:

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RUNNING TIME:	Development of device with beam	1 days
	Data runs	5 days
BEAM LINE:	AVF : EN course (East experimental hall)	
BEAM REQUIREMENTS:	Type of particle	deuteron
	Beam energy	26 MeV
	Beam intensity	200 nA
	Energy resolution	$\leq$ 20 keV
BUDGET:	Experimental expenses	3,300,000 yen
	Travel plans - 6 participants should be supported by RCNP	

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SUMMARY OF THE PROPOSAL

One of the hot topics in the nuclear physics is the study of the nucleon-nucleon (NN) force and the three-nucleon force (3NF) by the three-nucleon scattering. Highly precise data of the nucleon-deuteron (Nd) reactions have been compared with the rigorous results of the Faddeev calculations based on the modern nuclear forces. The data of the differential cross sections for the *pd* elastic scattering at low energy region are well reproduced by the predictions with NN forces only, on the other hand these data at the intermediate energy region are reproduced by the predictions including 3NFs. The study of the 3NF effects is carried out by the Nd reactions mainly at the intermediate energies on the assumption that the NN forces used in the Faddeev calculations are clearly understood.

Recently the data of the differential cross sections for the *dp* breakup reactions in the off-plane star configurations at E_d =19 MeV are reported from Cologne FN tandem Van de Graaff accelerator facility. The comparison of the data with the Faddeev calculations with modern NN forces showed large discrepancies up to 40%. These discrepancies can not be explained by neither the 3NF effects nor the Coulomb interactions. To clarify the cause of this anomaly is very important for the few- and many-body physics based on the first principle.

In this proposal, we offer the study of this off-plane star anomaly by the measurements of the differential cross sections for the ^{1}H(d,pp) breakup reactions at E_d =26 MeV. By covering the kinematical configurations widely, this work allows us to conclude whether the off-plane star anomaly is existent or not.