PROPOSAL FOR EXPERIMENT AT RCNP

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$\vec{p}d$ elastic scattering at 250 and 400 MeV

SPOKESPERSON:

Name	Kichiji Hatanaka
Institution	RCNP, Osaka University
Title	Professor
Address	10-1, Mihogaoka, Ibaraki, Osaka 567-0047
Phone number	+81-6-6879-8928
FAX number	+81-6-6879-8899
E-mail	hatanaka@rcnp.osaka-u.ac.jp

EXPERIMENTAL GROUP:

Name	Institution	Title or Position
T. Noro	RCNP, Osaka University	AP
T. Wakasa	RCNP, Osaka University	RA
H. Yoshida	RCNP, Osaka University	D2
E. Obayashi	RCNP, Osaka University	D1
J. Kamiya	RCNP, Osaka University	M2
D. Hirooka	RCNP, Osaka University	M1
H. Sakai	Department of Physics, U. of Tokyo	P
A. Tamii	Department of Physics, U. of Tokyo	RA
K. Sekiguchi	Department of Physics, U. of Tokyo	D1
K. Yako	Department of Physics, U. of Tokyo	D1
Y. Maeda	Department of Physics, U. of Tokyo	M1

RUNNING TIME: 10 days
BEAM LINE: Ring: WS course, Grand Raiden & LAS

BEAM REQUIREMENTS:

Type of Particle	Polarized proton
Beam Energy	250, 400 MeV
Beam Intensity	1 - 300 nA
Energy Resolution	$\leq$ 300 keV

BUDGET:

Experimental expenses	None

TITLE: $\vec{p}d$ **elastic scattering at 250 and 400 MeV**

SPOKESPERSON: Kichiji Hatanaka

SUMMARY OF THE PROPOSAL

Three-nucleon scattering based on modern NN forces has matured in recent years, and computationally accurate solutions of the three-nucleon (3N) Faddeev equation can be achieved. The nucleon-nucleon (NN) system is very intensively investigated and the increased data set provides a sound foundation for reliable modern phase-shift analysis. For elastic *pd* scattering, the data are scarce at energies higher than 150 MeV and not at all comparable with that for NN. Elastic *pd* scattering represents a well-defined three nucleon problem and of general interest to investigate the reaction mechanism. Fully converged Faddeev calculations based on the modern NN forces and three-nucleon (3N) forces reproduce the *pd* elastic cross section near the minimum of the angular distribution between 50 and 200 MeV. However, the same calculation gives too large an effect on the proton analyzing powers.

Precise measurements of the spin observables give an opportunity to consider further the spin dependence of the 3N models. At high energies, relativistic effects are expected to be more important as well as 3N forces.

In this proposal, we measure the differential cross sections, analyzing powers and all of the spin transfer coefficients for the *pd* elastic scattering at 250 and 400 MeV. The beam line polarimeter is calibrated to a level close to 1 %. The second focal plane polarimeter is used to measure the polarization of the scattered protons at lower energies than 100 MeV.