

Study of three-nucleon force effects in p - ^3He elastic scattering

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One of the most important topics of the nuclear physics is to describe various nuclear phenomena based on the nucleon–nucleon (NN) interactions combined with the three-nucleon force (3NF). 3NF is the interactions acting among three nucleons. In order to study the properties of 3NF, we perform the experiment of few-nucleon scattering. Few-nucleon scattering is a good probe to investigate the dynamical aspects of 3NF, such as momentum, spin and iso-spin dependencies.

I have a strong interest in 3NF effects in p - ^3He scattering. In this system, one could study 3NF effects in 4-nucleon ($4N$) scattering, and also approach to 3NF with the iso-spin channels of $T=3/2$. Recently, rigorous numerical Faddeev-Yakubovsky calculations of the $4N$ scattering by using NN potentials have been available and made it possible to perform direct comparison to the experimental data.

In order to study 3NF effects in p - ^3He elastic scattering, we performed the measurement of the differential cross section ($d\sigma/d\Omega$) and the proton analyzing power (A_y^p) at 65 MeV with the polarized proton beams. Next we extended the measurement to a higher energy of 100 MeV using the polarized proton beams and the polarized ^3He target. Both experiments were performed at Research Center for Nuclear Physics (RCNP), Osaka University.

In my presentation, I will report on the overview of the conducted experiments and show the experimental results. I also refer to my present status of GP-PU program and academic activities.