Experimental Study of Three Nucleon Forces via Few Nucleon System  
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One current interest for the investigations of few-nucleon system focuses on the study of three-nucleon force (3NF) properties in the nucleon–deuteron ($Nd$) scattering. The existence of the 3NF has been predicted since Yukawa’s meson theory\(^1\). However up to now, there has been little knowledge with which to constrain the 3NFs. That is due to the fact that the 3NFs are relatively weak compared to nucleon–nucleon ($NN$) interactions and therefore it is hard to approach and also to find evidences for them experimentally. Indeed, except for the binding energies for the three-nucleon system, namely $^3$H and $^3$He, the 3NF properties have not been well known until recently. Indication of 3NF for the three-nucleon scattering was first pointed out in the cross section minima for $Nd$ elastic scattering at intermediate energies ($E/A \sim 100$ MeV) by Witala et al.\(^2\). Since then experimental studies of elastic proton–deuteron ($pd$) and neutron–deuteron ($nd$) scattering at intermediate energies have been performed intensively at RIKEN, RCNP, KVI and IUCF and provided precise data of various observables. Cross section data for elastic $pd$ scattering have shown large disagreement between data and rigorous Faddeev calculations based on modern NN forces. Combination of these NN forces and $2\pi$–exchange type 3NFs removes this discrepancy and leads to a good description of the measured cross sections. However spin observables are not always explained by addition of the 3NFs.

In the presentation, an overview of recent advances of 3NF study via few-nucleon systems will be given. In particular, the results of $Nd$ scattering obtained at RIKEN will be discussed.