

# Measurement of the ${}^2\text{H}(p, n)$ breakup reaction at 170MeV and the three-nucleon force effects

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The effects of 3NF has been actively studied by using the nucleon-deuteron ( $Nd$ ) scattering states. The differential cross sections of the elastic  $Nd$  scattering at the energy below 150 MeV can be well reproduced by the Faddeev calculation based on modern nucleon-nucleon (NN) interactions and 3NF [1]. On the other hand, the data of  $Nd$  elastic and inelastic scatterings at 250 MeV show large discrepancies between the data and the Faddeev calculations with 3NF [2]. And this large discrepancy between the data and the theory was also shown in the  ${}^2\text{H}(p, p)pn$  inclusive breakup reaction at  $E_p = 250$  MeV [3]. For the systematic study to understand the three-body breakup reactions in the intermediate energy region, we measured the differential cross sections and the vector analyzing power  $A_y$  for the  ${}^2\text{H}(p, n)$  inclusive breakup reaction at 170 MeV.

The experiment was carried out at RCNP, Osaka University. The polarized proton beam of 170MeV was injected to the deuterated polyethylene ( $\text{CD}_2$ ) target and scattered neutrons were detected by using the neutron detector NPOL3. The data was compared with the results of the Faddeev calculations with and without the 3NF [4-5]. Concerning about the differential cross sections, we can see large discrepancies between the data and the calculations in the low neutron energy regions, which is similar to the results of the  ${}^2\text{H}(p, p)$  inclusive breakup reaction at 250 MeV.

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