(n,p) facility at RCNP

H. Sakai[a], A. Tamii[a], K. Yako[a], S. Sakoda[a], H. Okamura[b], K. Suda[b], K. Hatanaka[c], T. Wakasa[c], and J. Kamiya[c]

[a] *Department of Physics, University of Tokyo, Tokyo 113-0033 Japan*
[b] *Department of Physics, Saitama University, Saitama 338-8570, Japan*
[c] *Research Center for Nuclear Physics (RCNP), Osaka University, Osaka 567-0047, Japan*

The missing strength of the Gamow-Teller (GT) state (sometimes it is called as a quenching problem) has been one of the most interesting and intriguing phenomena since the discovery of the GT Giant Resonance (GTGR) in 1980. At the time only half of the total GT strength (Ikeda's sum rule value) was identified.

Recently we have identified 84 and 90% of the GT strength ($S_{\beta^-} - S_{\beta^+}$ value) in the continuum up to 50 MeV excitation in ^{27}Si and ^{90}Nb, respectively [1, 2]. These results are obtained by applying the multipole decomposition analysis technique to the precise (p,n) cross section data measured at the NTOF facility [3] at RCNP. Unfortunately these values are subject to a relatively large systematic uncertainty around 15–20% due to the uncertainties in $\hat{\sigma}$ and S_{β^+} values. Such uncertainty can be reduced largely, if one can obtain a precise (n,p) cross section data [4].

For this purpose we have started constructing a (n,p) facility. Our goal is to measure the (n,p) reaction at 300 MeV with the similar or comparable precision to the (p,n) data. A schematic layout of the facility is shown in Fig. 1. The scattered protons are detected by the Large Acceptance Spectrometer (LAS) in the WN-experimental hall.

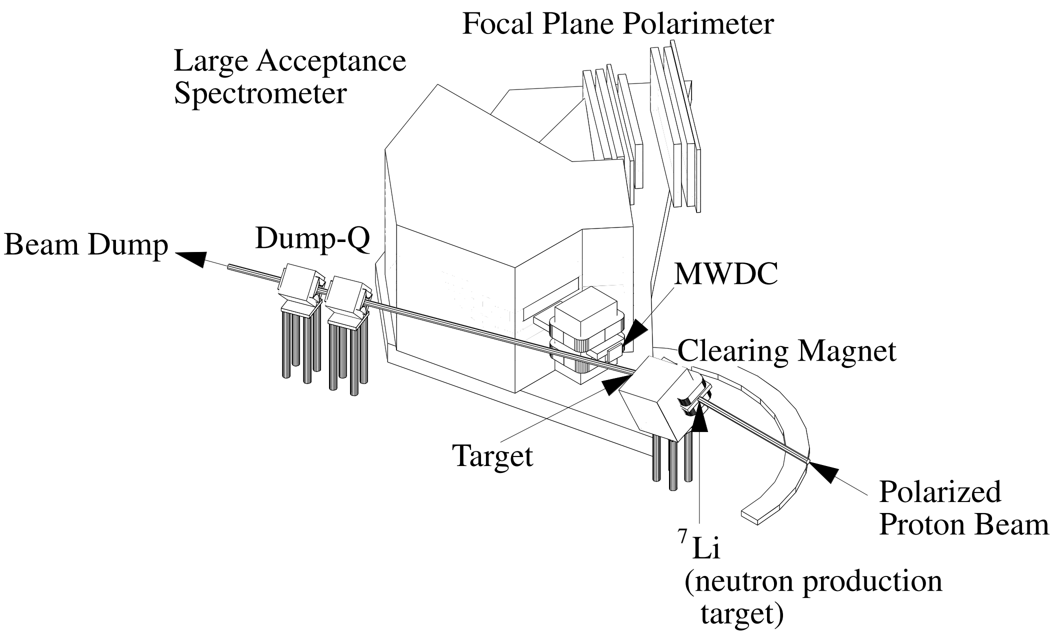

Figure 1: Schematic drawing of the (n,p) facility.

This year we have constructed the vacuum chamber for neutron production via the $^{7}\mathrm{Li}(p,n)$ reaction, the beam clearing magnet [5], and the wire chamber for the entrance of LAS.

We would like to start simple measurements such as np or nd scattering for the commissioning purpose during the next academic year.

This research program is in part supported financially by the Grants-in-Aid for Scientific Research Number 10304018 by the Ministry of Education, Science, Sports and Culture of Japan.

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