

## Development of a Neutron Focusing Guide for High Q-Resolution Triple-Axis Spectrometer HQR (T1-1)

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For upgrading on inelastic neutron scattering in High Q-Resolution triple-axis spectrometer (HQR) at T1-1 port, a neutron focusing guide was designed to increase the neutron flux at sample position and its focusing effect was investigated. The shape and geometrical configuration of the focusing guide were optimized to increase the neutron intensity at the sample position by using the Monte Carlo program McStas, and the focusing guide was then determined to be a parabolic focusing mirror guide with vertical and horizontal reflection surfaces with the total length of 1000 mm. The focusing guide is composed of supermirrors with  $m=3$  and reflectivity over 85%. The neutron focusing effect was investigated by using a two dimensional position sensitive detector composed of ZnS(Ag)/6LiF scintillator and a CCD camera. The tilting and focusing angle of PG monochrometer and the positioning and tilting angle of the focusing guide were optimized to increase the neutron intensity at the sample position. As the result, the neutron intensity increased 4 times at the peak position and 3.3 times at the area of  $5 \times 5 \text{ mm}^2$  in comparison with the case without the focusing guide. The quality of the design was confirmed by the fact that the obtained intensity gain was consistent with the values obtained by the simulation. Furthermore, in an inelastic neutron scattering experiment, we observed a gain of 2.7~2.8 in the scattering intensity by the focusing effect as shown in Fig.1. In conclusion, a neutron focusing guide was a very powerful tool for upgrading the inelastic neutron scattering experiments.

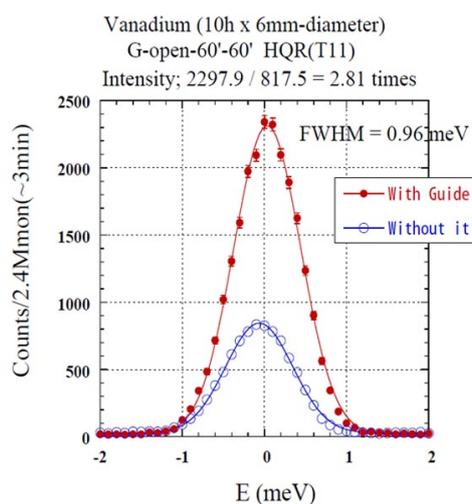


Fig. 1. The measured results of vanadium standard sample in inelastic neutron-scattering configuration with and without the neutron focusing guide.