

Development of a neutron polarizing system for VIN ROSE at BL06 at J-PARC/MLF

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KEK and Kyoto University have constructed two beam lines at BL06 at J-PARC/MLF for the VIN ROSE (Village of Neutron ResOnance Spin Echo spectrometers). The VIN ROSE consists of NRSE (Neutron Resonance Spin Echo) [1] and MIEZE (Modulated Intensity by Zero Effort) [2] in order to cover wide energy range with various sample environments. Both spectrometers measure directly intermediate scattering function $S(q,t)$ with very high neutron energy resolution by controlling precisely the phase difference of neutron spin. They require polarized neutron and neutron polarizing systems were placed at the exits of each neutron guide tubes at the BL06. The polarizing system consists of Fe/SiGe₃(Si) magnetic supermirrors with permanent magnet, four-quadrant slits and long wavelength cutting filter.

The polarizing supermirrors and four-quadrant slits were installed to the shielding box in which consisted of 50 wt% B₄C-containing rubber and lead to stop scattered neutrons and gamma rays. We have to keep the rules of MLF concerning the prevention of radiation hazards. The limit value of dose rate is 12.5 μ Sv/h in the areas where experimenters can enter during beam operation. The beam sizes at exit of the polarizing system for MIEZE and NRSE were limited to 5×20 , 10×10 mm² by the four-quadrant slits, respectively. Because we have to adjust many optical components precisely in commissioning phase before the fully-equipped common use of the VIN ROSE. There are two kinds of polarizing mirrors to switch wavelength band. These supermirrors were fabricated by ion beam sputtering machine at KURRI.

In this study, we will show the detailed design of polarizing system for the VIN ROSE and its current performance.

References

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