

# The Developments of Neutron Guide System for the Special Environment Powder Diffractometer, SPICA in J-PARC

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Special Environment Powder Diffractometer (BL09, SPICA) in J-PARC, is based on the time-of-flight neutron powder diffractometer with the flight path of 54m. The highest resolution of  $\Delta d/d = 0.08\%$  is attained at the back scattering bank for  $d$  range from  $0.2 < d(\text{\AA}) < 8$  (5Hz mode). The detectors are located (i) from  $175$  to  $150^\circ$  for the back scattering bank, (ii) from  $140$  to  $10^\circ$  for the multi purpose bank, and (iii) from  $13$  to  $1^\circ$  for the small angle bank. Since high flux with low beam divergence neutron beams are required for in-situ measurements with special environments, the various designs of non-parallel guides tubes including elliptical ones have been compared with the linear tapered straight ones using the McStas simulation.

Fig.1 shows the wavelength dependence of neutron intensities at 52m: sample position. The design of elliptical guides shows almost 5 times larger gain in intensity than tapered straight guides while the divergence are 2 times wider than the straight guides.(Fig.2) These results indicate that the elliptical geometry can focused neutrons of wide divergence to enter to the sample area. The focus effects are shown on Fig.3. The focused neutrons make spatial distributions at the sample positions. More detail of comparison will be discussed.

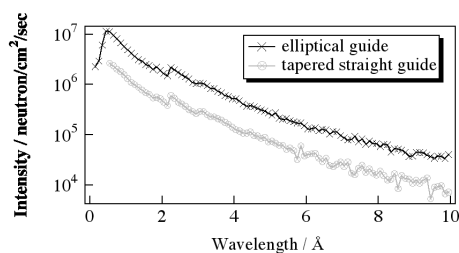


Fig.1 Neutron intensity dependences of wavelength: (a) the straight and (b) elliptical guides.

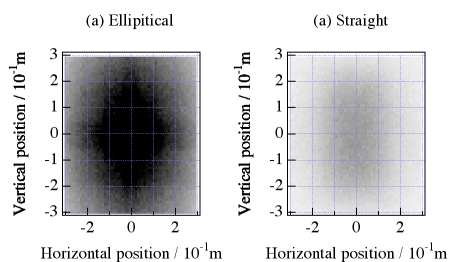


Fig.3 Spatial intensity distributions of (a) the straight and (b) elliptical guides.

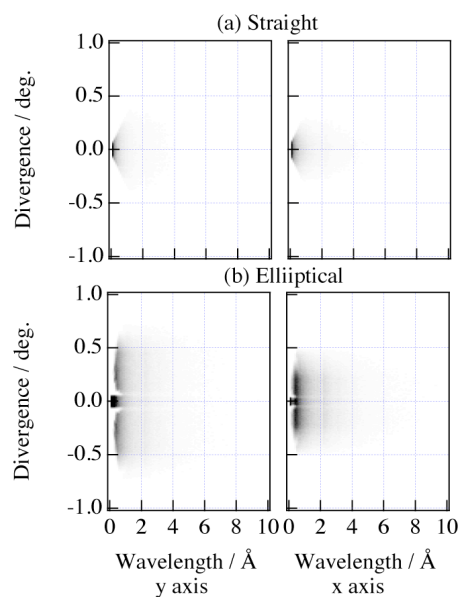


Fig.2 Divergence of neutron beams dependence of wavelength: (a) the straight and (b) elliptical guide