[C2. S. Desert] A double super-mirror monochromator for the new Very Small Angle Neutron Scattering spectrometer (TPA, Très Petits Angles)

On TPA, the very small scattering vector $2.10^{-4}Å^{-1}$ is accessible by using a very high resolution (pixels of 150 µm) image plate detector located only 6 m far from the sample. Due to the high sensitivity to γ radiation of such detector, a conventional velocity selector cannot be used as monochromator because its neutron absorber, Gd, is a strong γ emitter. Instead, a new monochromator (figure 1) composed of two super mirror monochromators (critical angle m=3, Δm/m=0.15) is now installed on TPA. The wavelength selection is achieved with the mirrors angle θ, according to $\lambda = \theta/(m\theta_c)$, where θ_c is the critical angle for ordinary Ni. Both mirrors are mounted on rotations, the second one being also mounted on a translation stage in order to keep the outgoing monochromatic beam at a fixed position when changing the wavelength. This monochromator has a good transmission (~70%) while avoiding the strong γ emission and a direct view of the guide. Figure 2 shows Time of Flight measurements of various wavelengths obtained with this new kind of monochromator. The resolution is constant: Δλ/λ=0.11.

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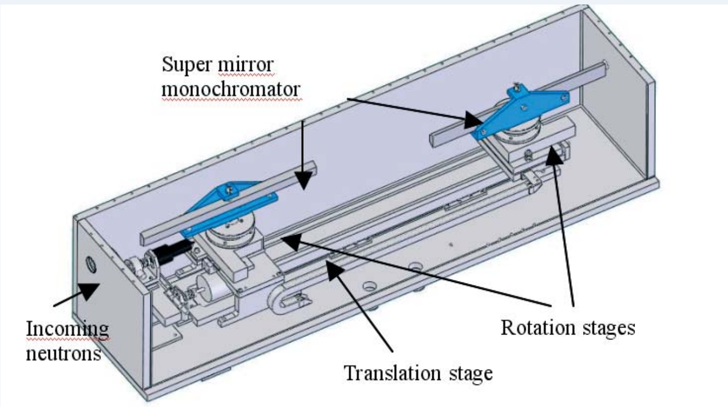

Figure 1. Drawing of the monochromator

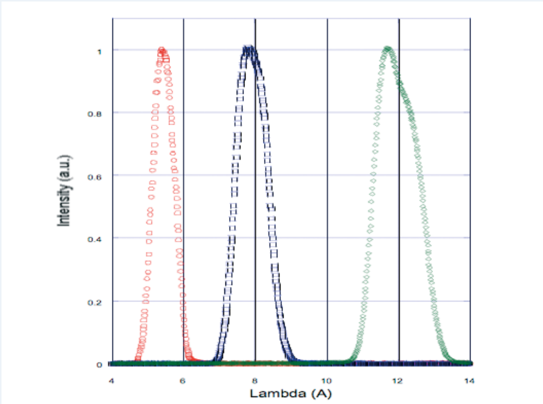

Figure 2. Raw TOF measurements of monochromated beams

[C3. S. Desert] Multi beam collimator prototype for the new Very Small Angle Neutron Scattering spectrometer (TPA, Très Petits Angles)

The very small scattering vector expected for TPA, $q_{min}=2.10^{-4}Å^{-1}$, will be achieved by using a tiny collimation. Indeed, the collimation for TPA requires 1.8 mm and 1mm diameter pinholes at the collimator entrance and exit. The drawback of the latter is the huge loss of neutrons. In order to enhance the effective neutron beam used, a multi beam prototype collimator has been built and successfully tested. It features 7 individual masks (figure 1), made from ^{6}Li in an epoxy matrix, with 51 pinholes per mask. These masks are defining 51 beams converging on the detector while absorbing the unwanted neutrons (i.e. not focusing on the detector). Measurements comparing a simple collimation and the multi beam prototype with 16 pinholes show a gain in flux of 12.The advantage of such a setup is its flexibility regarding the wavelengths. Indeed, the fall of neutron due to gravity is not negligible compared to the pinhole diameter of 1 mm at the collimator exit (20 Å neutrons fall 2 mm after 4m path). The masks are mounted on translation stages to take into account for the gravity and thus only one setup is required for all the wavelengths. A multi slit prototype (used for isotropic scattering samples) is currently being manufactured and should improve the gain by a factor of 60 compared to the pinhole multi beam prototype. Deconvolution should then be achieved to get the true scattering curve.

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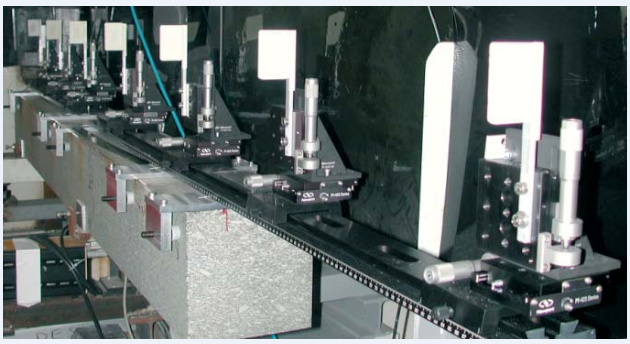
Figure 1. Picture of the prototype multi beam collimator with 7 masks