[*C6.* S.V. Kozhevnikov] **Magnetic neutron waveguides**

In order to produce submicron neutron beams, we are developing neutron waveguides (NWG). The large magnetic neutron cross section allows to fabricate guides in which the optical index can be dynamically modulated. We produced NWG with the tri-layer structure: Py(10-20nm)/Ti(10-70nm)/Py(10-50nm)//glass. The top Py layer acts as the coupling layer with the incident beam, the Ti layer acts as the guiding layer and the bottom layer acts as the reflecting layer (see Fig. 1). We have characterized our systems by polarized neutron reflectometry (specular and off-specular) in order to probe the effect of the different imperfections (interface roughness, magnetic non-collinearity, dispersion of the layers thickness) on the reflectivity. We show that it is possible to guide up to 30% of the incident neutrons. This corresponds to a flux density of 10^8 n/cm^2/s at the waveguide exit.

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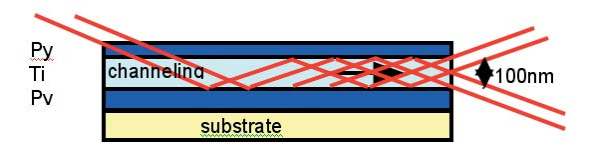
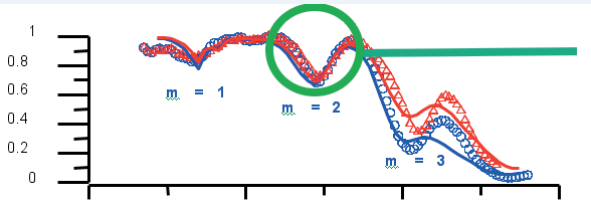
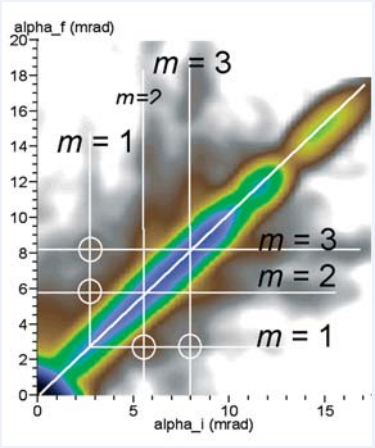


Localization of the wavefunction in the NWG.



Diffuse off-specular scattering on a waveguide structure.
The resonance modes in grey.
(measured on HADAS)



Specular reflectivity
up to 30% of the incident neutrons are trapped in the guide