



Contribution ID: 2

Type: **Poster**

Focusing with a nested mirror optic on the thermal triple-axis spectrometer PUMA at MLZ

Friday 6 December 2024 13:45 (3 hours)

A persistent challenge for inelastic neutron scattering is the low scattering cross-section of neutrons, necessitating larger sample sizes compared to other techniques. Focusing the neutron beam is a viable method to increase the flux and the nested mirror optic (NMO) is an ideal solution, providing a small, well-behaved beam at the sample position while maintaining space for sample environment equipment. At the thermal TAS PUMA at MLZ, the new NMO will decrease the beam size from about 20mm x20mm to 5mm x 5mm at the sample position while preserving 50% of the incoming neutrons, resulting in an 8-fold increase in flux on small samples. The McStas neutron simulation package offers a general tool for Monte Carlo simulations of neutron scattering instruments and experiments. We have built a user-friendly GUI for simulating the PUMA instrument with McStas, including the new NMO optics, enabling the simulation of neutron scattering experiments on a virtual PUMA instrument. The virtual instrument is useful for staff and users (testing optics, simulating experiments to test instrument parameters and acquire resolution functions) as well as for students (learning platform for neutron scattering, practice alignment). We will discuss the NMO setup for PUMA, along with the scientific case for this device, highlighting several planned use cases. Additionally, we will showcase the progress on the McStasScript-PUMA integration and discuss the planned features and capabilities.

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Session Classification: Poster Session

Track Classification: Neutron Methods