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McStas for Virtual Experiments on PUMA

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To increase neutron flux on small samples, we are developing a nested mirror optic (NMO) array for the PUMA thermal triple-axis spectrometer. This device is intended to reduce the beam size to 5 mm x 5 mm while preserving 50% of the incoming neutrons, resulting in an 8-fold increase in the flux available for small samples. However, the complex neutron flight paths generated from novel optics creates a new challenge in analyzing beam characteristics, such as the shape and the resolution function. We have integrated the McStas neutron simulation package with the McStasScript Python API to create a user-friendly GUI for simulating the PUMA instrument, including the new NMO optics. This combined program enables virtual neutron scattering experiments on PUMA. For staff, it facilitates testing optics, particularly NMO arrays. For users, it allows experiment simulations to optimize instrument parameters and acquire resolution functions. For students, it serves as a platform for learning neutron scattering techniques, offering practice in alignment and measurements without needing physical access to the instrument. We will discuss the progress of the NMO setup for PUMA and the McStasScript-PUMA integration, including planned features and capabilities.

Primary author: MERRITT, Adrian (Karlsruher Institut für Technologie)

Co-authors: WEBER, Frank (Karlsruhe Institute of Technology); PARK, Jitae (MLZ, TUM)

Presenter: MERRITT, Adrian (Karlsruher Institut für Technologie)

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