



Contribution ID: 207

Type: **Talk (17 + 3 min)**

Simulation of complex neutron detectors using new features in the McStas Union components

Tuesday 21 March 2023 12:10 (20 minutes)

The field of Neutron Scattering relies heavily on computer simulations for design of our instruments. Simulations can however be used in a broader scope, including preparation of beamtimes, training and understanding of spurious. To realize this broader scope, simulation packages must be able to include the details necessary to describe the experiment, run sufficiently fast and be easy to use. In recent years the McStas simulation package was expanded with the Union components, capable of simulating multiple scattering in complex samples and sample environments in a modular manner for both geometry and underlying scattering processes. These components increased the achievable fidelity to new levels and support logging of scattering during the simulation, providing important insight. In this presentation we introduce a new feature in the Union components that allow logging of neutron absorption, which enables simulation of advanced detector systems in McStas. Many modern detector systems have multiple layers of 3D voxels and can have a complex response due to scattering within the detector system. Several ESS instruments will use such detector systems. Writing the description of such detectors can be repetitive, but can be significantly simplified with McStasScript. With these exciting new possibilities, McStas and the McStas Union components cover a significantly broader scope and will hopefully find many more applications that help the neutron scattering community at large.

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Session Classification: Data Evaluation & Software 1

Track Classification: Neutron Instrumentation, Optics, Sample Environment, Detectors, and Software