Contribution ID: **69** Type: **Talk (20 min + 5 min discussion)**

# Multiple scattering in polarized neutron diffraction

*Thursday 5 December 2024 17:10 (25 minutes)*

Polarized neutron diffraction is proven to be a powerful tool for studies of magnetic structure and microscopic dynamics of matter. This is assured by the success of the XYZ-polarization analysis technique, which lays the basis for separation of coherent, incoherent, and magnetic contributions to the scattering cross section. Even though polarized diffraction can provide a more robust information about the sample, it is characterized by a reduced neutron count rate as compared to unpolarized measurements. As a result, scientists may prefer to use thicker samples in order to achieve sufficient statistics with the shortest possible measurement time. It is also often the case that even for moderate sample thickness multiple scattering (MS) cannot be avoided when strongly scattering samples are investigated. Additionally, a prior knowledge of significance of MS can be used to choose an optimal sample geometry. All in all, effect of MS is usually significant enough and must be considered when analyzing the diffraction data.

In our work, we review existing approaches in handling MS in polarized neutron diffraction and investigate the possibility of a data-driven extraction of the respective contribution. We use McStas simulations, in which multiple scattering can be precisely estimated, as a baseline for comparison. We plan to incorporate the most suitable approach into the data reduction software used for processing polarized diffraction data at the DNS instrument.

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**Session Classification:** Neutron Methods

**Track Classification:** Neutron Methods