Beitrag ID: **111** Typ: **Poster**

KWS-1: Polarisation analysis on a high-flux SANS instrument

Dienstag, 17. September 2024 22:40 (20 Minuten)

KWS-1 is a small-angle scattering instrument with variable wavelength resolution dedicated to experiments with polarised neutrons and polarisation analysis [1].
The instrument commences with a velocity selector positioned in the middle of the "S-shaped" neutron guide, approximately 16 meters away from the collimation line. The neutron flux is monitored both before and after the selector. Upon reaching the end of the "S-shaped" neutron guide, the neutrons enter the chopper chamber, where their continuous flux can be shaped to pulses. Subsequently, they pass through the neutron polarizer chamber. A radio-frequency spin flipper, situated immediately after the polarizer chamber, allows flipping of the neutron polarization. Finally, the neutrons proceed to the collimation line, where the beam shape is configured. As the neutrons traverse the neutron lens chamber at the end of the 18-meter-long collimation line, they scatter on the sample and are then detected by a detector housed in a 20-meter-long evacuated detector tube.
During the autumn of 2018, a state-of-the-art ^{3}He detector, designed by Reuter-Stokes, was integrated. This advanced detector boasts an impressive counting rate capability, handling several MHz of scattered neutrons. Additionally, the active detection area has been expanded to approximately 1 m^2, encompassing nearly the entire inner diameter of the detector tube.
The neutron polarisation analysis setup integrated into KWS-1 is compatible with 3 T HTS magnet, thanks to its remarkably low stray fields. This compatibility is achieved using in-house manufactured ^{3}He cells made from GE180 glass, specifically optimized for the wavelength and scattering angle used. Positioned directly in front of the detector tube, the analyser allows the measurement of all four spin-flip and non-spin-flip channels (I^{++}, I^{+-}, I^{-+}, I^{--}). Recently, the polarisation analysis setup has been equipped with an in-situ pumping of the ^{3}He cell, eliminating the need for time-dependent corrections in the analysis of neutron experiments conducted using this method.
In collaboration with the IT and Sample Environment groups, we designed and put into operation an automated sample changer tailored for the 3 T magnet. Rigorous testing conducted at the sample position demonstrated the robotic arm's ability to independently retrieve samples from storage, position them in the beam for measurement, and subsequently return them. This guarantees that samples susceptible to alterations in magnetic fields remain within a non-magnetic environment both prior to and following the measurements.

[1] A. Feoktystov, H. Frielinghaus, Z. Di, et al., J. Appl. Cryst., 48, 61 (2015).

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Instrumentation & Data Management