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The New Small-Angle Neutron Scattering Instrument SANS-1 at MLZ –Features and First Results

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We present the features of the instrument SANS-1 at MLZ, a joint project of Technische Universität München and Helmholtz Zentrum Geesthacht [1]. Measurements of the beam profile, divergence, flux and polarization are given for various positions along the instrument and agree well with simulations. SANS-1 features two interchangeable velocity selectors with 10% and 6% $\Delta\lambda/\lambda$ and a TISANE 14-window double-disc chopper. This combination allows tuning flux, resolution, duty cycle and frame overlap, including time resolved measurements with repetition rates up to 10 kHz. A key feature is the large accessible Q-range facilitated by the sideways movement of the detector. Particular attention is paid to effects like tube shadowing, finite tube wall thickness and anisotropic solid angle corrections, that arise due to large scattering angles on an array of single 3He tubes, where a standard cos3 solid angle correction is no longer valid.
Dedicated to hard matter, materials science and magnetism, SANS-1 features a flexible, spacious sample area with a heavy duty goniometer and unique sample environment like a set of magnets, ovens and a bespoke dilatometer. We show some extreme examples and prospects for future experiments, e.g. to investigate the onset of crystallization in magnetic materials and a future high field magnet project. Finally we present the polarization analysis option that combines a new compensated MEOP and an integrated RF-flipper together with a 2.2 T magnet.

[1] S. Mühlbauer et al., NIMA 832, 297-305, (2016)

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