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KWS-1 SANS instrument with polarization analysis

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The KWS-1 small-angle neutron scattering instrument is operated by JCNS at MLZ [1]. The instrument covers a q -range from 0.0007 to 0.5 \AA^{-1} with a selectable wavelength span from 4.7 to 20 \AA . The maximum neutron flux on the sample is $1 \times 10^8 \text{ cm}^{-2} \text{ s}^{-1}$, making it one of the most intense SANS instruments in the world.

The instrument is equipped with transmission supermirror polarizer, adiabatic radio-frequency spin flipper and a recently obtained dedicated magnet and polarization analyzer. The three-channel V-cavity polarizer with Fe/Si coated supermirrors ($m=3.6$) has an average polarization $>93\%$ and is positioned in a custom designed changer of revolver type. The flipper provides a high flipping efficiency of more than 99.9% for all neutron wavelengths. A custom designed hexapod allows heavy loads and precise sample positioning in beam (also for grazing incidence SANS under an applied magnetic field). For the experiments with the polarization analysis a ^3He analyzer is utilized. The new sample magnet allows close positioning of the ^3He cell to the magnet. The magnet has two orthogonal horizontal accesses. For the maximum field of 3 T (parallel to the beam) the decay time, T_1 , of the ^3He cell approximately 50 cm away from the center of the magnet constituted 90 hours. The maximum analyzed q is 0.06 \AA^{-1} .

All instrument components are running under a flexible instrument control system (NICOS).

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

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