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KWS-3 very small-angle neutron scattering focusing diffractometer at MLZ

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KWS-3 is a very small angle neutron scattering diffractometer operated by JCNS at Heinz Maier-Leibnitz Zentrum (MLZ) in Garching, Germany. The principle of this instrument is one-to-one imaging of an entrance aperture onto a 2D position sensitive detector by neutron reflection from a double-focusing toroidal mirror. In current state, KWS-3 is covering Q-range between $3 \cdot 10^{-5}$ and $2 \cdot 10^{-2} \text{ \AA}^{-1}$ and used for the analysis of structures between 30 nm and 20 μm for numerous materials from physics, chemistry, materials science and life science, such as alloys, diluted chemical solutions, hydrogels and membrane systems. Within the last few years we have finalized several big “evolutionary” projects; we have completely re-designed and commissioned the main components of the instrument: selector area, mirror positioning system, main sample station at 10m, beam-stop system; implemented new sample stations at 3.5 and 1.3m, second (very-high resolution) detector, polarization and polarization analysis systems; adapted the instrument to almost any existing/requested sample environment like 6-position Peltier furnace (-25°C to 140°C), high-temperature furnace ($< 1600^\circ\text{C}$), cryostats/inserts ($>20 \text{ mK}$), liquid pressure cell ($<5 \text{ kBar}/10\text{-}80^\circ\text{C}$), CO_2/CD_4 gas pressure cell ($<0.5 \text{ kBar}/10\text{-}80^\circ\text{C}$), humidity cell/generator ($5\text{-}95\%/10\text{-}90^\circ\text{C}$), magnets (horizontal $< 3\text{T}$, vertical $< 2.2\text{T}$), Bio-logic® multimixer stopped flow ($5\text{-}80^\circ\text{C}$), rheometer Anton paar (tangential/radial) etc.

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