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Neutron scattering in high magnetic fields using HFM/EXED facility at HZB

Tuesday, 10 December 2019 15:00 (45 minutes)

The application of high magnetic fields is a powerful method for revealing the complex behavior in modern materials. In combination with microscopic probe such as neutrons it provides a direct access to static and dynamic correlations in matter. Helmholtz-Zentrum Berlin (HZB) hosts a unique high field facility for neutron scattering. The facility combines neutron scattering with continuous magnetic fields as high as 26 T and temperatures down to 0.1 K. Magnetic field is generated by means of horizontal solenoid High Field Magnet (HFM). The magnet utilizes hybrid technology and reaches 26 T at full power of 4 MW. The tapered inner coil allows neutron-scattering to detectors up to $\pm 15^\circ$ off the beam axis. Neutron scattering in high fields is performed using the dedicated multi-purpose Extreme Environment Diffractometer (EXED). EXED uses time-of-flight (TOF) polychromatic technique. Combined with 15° magnet rotation it provides a gapless coverage of Q-range from 0.1 up to 12 \AA^{-1} for diffraction experiments. The low-Q range can be extended beyond 10^{-2} \AA^{-1} using a pin-hole TOF Small Angle Scattering mode. A direct TOF spectrometer mode enables inelastic neutron scattering experiments over a limited Q-range $< 1.8 \text{ \AA}^{-1}$ with an energy resolution of a few percent and incident energies below 25 meV. In this talk I will give an overview of the HFM/EXED facility with main focus on science which has been done using it in the last years.

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