A NEW HIGH MAGNETIC FIELD FACILITY FOR NEUTRON SCATTERING PROVIDING FIELDS UP TO 26T AT THE HELMHOLTZ ZENTRUM BERLIN

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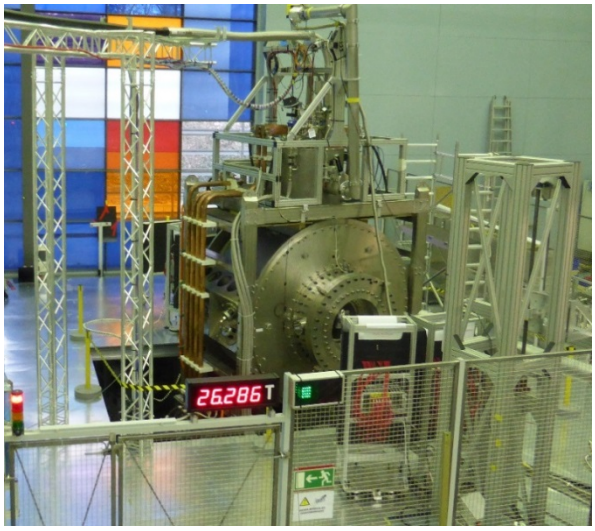
The Helmholtz-Zentrum Berlin (HZB), Germany, has recently launched a high field facility for neutron scattering enabling elastic neutron scattering experiments in continuous magnetic fields up to 26 T and temperatures down to 0.5 K. Its main components are the High Field Magnet (HFM) and the Extreme Environment Diffractometer (EXED).



HFM is a hybrid magnet, designed and constructed in collaboration with the National High Magnetic Field Laboratory (Tallahassee, USA). It enables not only novel experiments but is itself at the forefront of development in magnet technology. By combining both a superconducting cable-in-conduit outsert coil with resistive insert coils, a maximum field of 26 T can be achieved using electrical power of 4 MW. The magnetic field is horizontal and the sample lies at the center of the conical room temperature bore which allows neutron-scattering to detectors up to angles of +/-15° from the beam axis. Furthermore the magnet can be rotated by an additional 15° to access a larger reciprocal space region. At the end of 2014, after 7.5 years of design and construction, the High Field Magnet reached the maximum current of 20 kA and full field of 26.2 T. The magnet is equipped with a dedicated ^{3}He cryostat that enables samples as large as 13x13 mm^2 to be cooled down to 0.5 K. The sample cryostat was adapted to the special constraints of the horizontal magnet and was developed in-house at HZB.

The EXED instrument, where the magnet is permanently installed, is a multi-purpose time-of-flight (TOF) instrument optimized for operation within the angular limitations imposed by the HFM. Due to its variable time resolution and wide wavelength band, the primary instrument is very flexible and can be optimized for specific science problems. The TOF technique combined with the available 15° magnet rotation, enables gapless coverage with wavevector (Q)-range from 0.1 up to 12 Å^{-1} for diffraction experiments. The low-Q range can be extended beyond 10^{-2} Å^{-1} using a pin-hole TOF Small-Angle-Neutron-Scattering mode. In the near future, the instrument will be upgraded to enable inelastic neutron scattering experiments over a limited Q-range $\leq$ 1.8 Å^{-1} with an energy resolution of a few percent and $E_i \leq 25$ meV.

In this talk the capabilities of the HFM-EXED user facility along with the first experimental results will be presented. The procedures for planning experiments and applying for the beamtime will also be discussed.

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