Poster Presentation

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The High Magnetic Field Magnet for Neutron Studies at Helmholtz Zentrum Berlin

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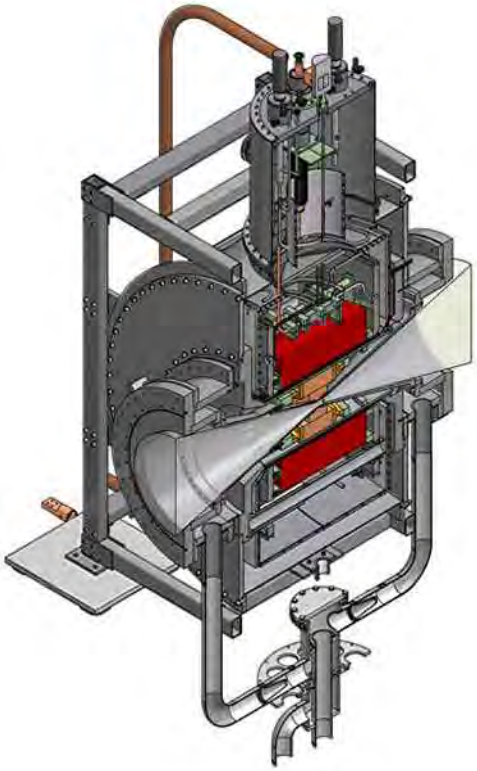
High magnetic fields can create exotic states which challenge our basic understanding of matter. This requires a deep and precise knowledge of the spatial ordering of atoms and associated magnetic moments. Particularly interesting would be to disclose magnetic field dependency of various fluctuations and collective modes. Such information can be obtained from neutron scattering experiments. The Helmholtz Zentrum Berlin (HZB) is known for its sample environment that is available for both internal and external users. Presently, a project that combines dedicated scattering instrument (EXED) with a horizontal hybrid solenoid magnet with tapered 30° cones is being finalized at HZB. To achieve an optimal performance, a 13 T superconducting Nb3Sn cable-in-conduit coil is combined with resistive insert coils of 12 T to 18 T (see figure), depending on electric power (between 4.4 and 8.0 MW), to give a maximum of 25 to 31 T. The magnet that has been developed in collaboration with the National High Magnetic Field Laboratory of Florida State University, Tallahassee, FL, USA [1] provides a 50 mm diameter room temperature bore. For sample cooling a 3He cryostat with a pulse tube precooling stage is being developed. The magnet will be permanently mounted at the dedicated time-of-flight instrument EXED at the end of a multispectral neutron guide NL4a, about 76 m away from the neutron source. The EXED instrument is optimized for diffraction under restricted geometrical conditions and is being upgraded to include inelastic option. This unique experimental setup is supposed to play a major role in high-field neutron studies and should be ready for use in early 2015. The contribution describes not only the most important design features of the system, the outline of the building for the technical infrastructure and the status of the installation and commissioning but also the scientific possibilities and limitations of the setup.

[1] *P. Smeibidl, M. Bird, H. Ehmler, et al.: Conf. Ser., 2012, 400, 052034*



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