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【181】 Instrumentation and experimental techniques for high magnetic field research at the European Magnetic Field Laboratory

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Strong magnetic fields are an extremely powerful tool for investigating, modifying and controlling different states of matter on microscopic and macroscopic length scales. Whereas commercial superconducting magnets reach magnetic fields up to 28.3 T, stronger fields are only available at specialized large-scale facilities. Due to very high acquisition and operating costs, such facilities currently only exist in a few places in the world (Europe, USA, China and Japan). The four sites of the EMFL at Dresden (Germany), Grenoble (France), Nijmegen (The Netherlands) and Toulouse (France) offer the scientific and industrial community continuous fields in variable geometry, from 10 T at 376 mm diameter to 38 T at 32 mm, as well as pulsed fields up to almost 100 T during 20 milliseconds and up to 200 T during a few microseconds. Moreover, the magnetic fields can be combined with very low temperatures, high pressure as well as with neutrons, X-rays and free-electron lasers. A large number of macroscopic and microscopic experimental techniques have been developed, with the required instrumentation adapted to the particular constraints of the high magnetic field environment. In the presentation, the potential of the EMFL will be reviewed using selected projects from basic and applied research.

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