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Performance of 7 T dry solenoid for THz spectroscopy

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This solenoid will be used in new spectroscopy method in less researched THz range. The method is founded on using of a free electron laser with high spectral power radiation which can be smoothly tuned in desirable range of spectrum. The objects of research of this method are fast processes in physics, chemical and biological reactions. Uniform magnetic field of ~ 6 T value in the research area can considerably increase possibilities of this method. The magnetic field will modulate free induction decay radiation of molecules on characteristic frequencies of the Zeeman splitting that gives more possibilities of identification of molecules having even weak magnetic momentum.

The superconducting solenoid was designed to have 6.5 T in with diameter of 102 mm and with length of 0.5 m. The warm access diameter is 80 mm. The SC wire with Cu/NbTi = 1.4 was used. The passive quench protection methods were realized in the design. The uniformity of the field was obtained by using the iron yoke and by additional side windings. The cryogenics of the solenoid is based on two Sumitomo HI cryocoolers. It is a dry design.

The solenoid was tested up to 7.5 T in the cryostat. The result is higher due to 3.6 K operating temperature. Magnetic field was measured as in bath cryostat as in the design cryostat –the results were according design calculations. The more details will be presented in the poster.

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