Precise NMR measurement and stabilization system of magnetic field of superconducting 7 Tesla WLS.

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The system of measurement and stabilization of magnetic field in superconducting 7 Tesla WLS, designed at Budker Institute of Nuclear Physics are described. The measurements are performed by NMR magnetometer at two points of WLS magnetic field. Stabilization of the field is provided by the current pumping system. The stabilization system is based on precise NMR measurement of magnetic field as a feedback signal for computer code which control currents inside the superconducting coils. The problem of the magnetic field measurements with NMR method consists in wide spread of field in the measured area (up to 50 Gs/mm), wide temperature range of WLS operating, small space for probe and influence of iron hysteresis. Special solid-state probes were designed to satisfy this requirements. The accuracy of magnetic field measurements at probe locations is not worse than 20 ppm. For the wiggler field of 7 Tesla the reproducibility of the magnetic field of 30 ppm has been achieved.

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CONTROL AND DATA ACQUISITION SYSTEMS FOR HIGH FIELD SUPERCONDUCTING WIGGLERS

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Paper describes the Control and DAQ System of superconducting wigglers with magnetic field range up to 10.3 Tesla. First version of system controls 7 Tesla superconducting wiggler prepared for installation at Bessy-II (Germany). Second one controls 10 Tesla wiggler which is under testing now in SPring-8 (Japan).

Both systems are based on VME apparatus. The set of specialized VME modules are elaborated to arrange wiggler power supply control, full time wiggler monitoring (temperature, pressure, LHe level, currents, on/off state) and magnetic field high accuracy measurement and field stabilization. Short form descriptions of these modules and principles of low temperature sensors operation are given in paper.

Software for control the wigglers are written on the C language for VxWorks operation system for Motorola-162 VME controller. Software contains some different modules for the different aims: power supply controls, slow processes control, field measurements and stabilization. Task initialization, stops and achieving the data can be doing from the nearest personal computer (FTP host for VME) or from the remote system as well. Full set of the software modules for control and DAQ system of superconducting wigglers are successfully tested in the Bessy-II and SPring-8 SR sources.

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