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Design, Manufacture and Testing of a Pair of Superconducting Solenoids for the Upgrade of the Neutron Spin-Echo Spectrometer J-NSE at the Research Reactor FRM II (Munich)

Wednesday, 30 August 2017 18:00 (15 minutes)

A Neutron Spin-Echo (NSE) -spectrometer measures small velocity changes that neutrons undergo upon scattering at a sample. The velocity changes are encoded/decoded by the neutrons spin precession in large magnetic field before and after the sample. In order to achieve maximum sensitivity and efficiency, both a high value and a high precision of the magnetic field integral before and after the sample, which determines the resolution of the instrument, are required. FZJ has decided to substitute the water-cooled copper coils of the J-NSE installed at the research reactor FRM II in Munich with a fully symmetric pair of large superconducting coil-systems to allow for a higher magnetic field integral. Each coil-system consists of 10 individual coils in a cryostat to achieve a field shape with minimal intrinsic field integral inhomogeneity over the beam cross section. Each system contains about 59 km of NbTi strand and a cold mass of 2 tons conduction cooled by two pulse tube cryocoolers. The resolution of the J-NSE will be extended significantly by the application of these new coils. This document presents the engineering results and design as well as manufacture and acceptance testing of the superconducting coil-systems.

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