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[Invited] Commissioning of the 36 T Series-Connected Hybrid Magnet at the NHMFL

Monday 28 August 2017 11:30 (30 minutes)

The National High Magnetic Field Laboratory (NHMFL) has commissioned a 36.1 T magnet with homogeneity and stability of 1 ppm over a 10 mm diameter spherical volume to be used for solid state NMR. Most NMR magnets use single strands of superconducting wire carrying a few hundred amps and persistent joints and switches. This magnet uses a 20 kA superconducting cable in a steel conduit for the outer part of the magnet and copper-alloy sheet metal for the inner part of the magnet.
While >15 hybrid magnets have been built worldwide, they typically have a field uniformity of ˜250 ppm/cm DSV and stability might be no better than 10 ppm. To attain 1 ppm uniformity, current density grading was employed in the resistive coils to cancel the z2 term. In addition coils were shifted after the first map to reduce the z1 term. Ferroshims and resistive shims were installed in the bore to attain 1 ppm over 10 mm. The large inductance of the superconducting coil reduced the ripple 5-fold compared with all-resistive magnets. A pick-up coil based stabilization system reduced the high frequency ripple and an NMR lock reduced the low-frequency drift to attain 1 ppm stability.

Submitters Country

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