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Tue-Mo-Or7-02: First field quality measurements of a 15 T Nb₃Sn Dipole Demonstrator

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Within the US Magnet Development Program (MDP) a 15 T Nb₃Sn dipole was developed, to demonstrate a magnet design for a post-LHC pp Collider. The magnet design is based on 60 mm aperture 4-layer shell-type coils, graded between the inner and outer layers to maximize the magnet performance. The cable in the two innermost layers has 28 strands 1.0 mm in diameter and the cable in the two outermost layers has 40 strands 0.7 mm in diameter. Both cables use RRP Nb₃Sn wires produced by Bruker-OST. Magnet coils are surrounded by vertically-split thick iron laminations, connected by aluminum I-clamps, and a thick stainless-steel skin. The magnet was tested at the Vertical Magnet Test Facility (VMTF) at Fermilab. This paper reports the first results of magnetic measurements of the 15 T Nb₃Sn dipole demonstrator including geometrical harmonics, coil magnetization and iron saturation effects. The experimental data are compared with the magnetic calculations.

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Primary author: STRAUSS, Thomas (Fermi National Accelerator Laboratory)

Co-authors: Dr ZLOBIN, Alexander (Fermi National Accelerator Laboratory); OROZCO, Charles (Fermi National Accelerator Laboratory); TURRIONI, Daniele (Fermi National Accelerator Laboratory); BARZI, Emanuela (Fermi National Accelerator Laboratory); VELEV, Gueorgui (Fermi National Accelerator Laboratory); NOVITSKI, Igor (Fermi National Accelerator Laboratory); DIMARCO, Joseph (Fermi National Accelerator Laboratory); KRAVE, Steve (Fermi National Accelerator Laboratory); STOYNEV, Stoyan (Fermi National Accelerator Laboratory); KASHIKHIN, Vadim (Fermi National Accelerator Laboratory)

Presenter: STRAUSS, Thomas (Fermi National Accelerator Laboratory)

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