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## **Tue-Mo-Or7-01: Assembly and First Test of a 15 T Nb<sub>3</sub>Sn Dipole Demonstrator**

*Tuesday 24 September 2019 10:45 (30 minutes)*

U.S. Magnet Development Program (MDP) has developed a 15 T Nb<sub>3</sub>Sn dipole demonstrator 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 have been developed and fabricated at Fermilab in long lengths using RRP Nb<sub>3</sub>Sn wires produced by Bruker-OST. An innovative mechanical structure based on aluminum I-clamps and a thick stainless steel skin is used to preload brittle Nb<sub>3</sub>Sn coils and support large Lorentz forces at high fields. The maximum field for this design is limited by 15 T due to mechanical considerations. The first magnet assembly was done with lower coil pre-load to minimize the risk of coil damage during assembly. This paper describes the design of the 15 T dipole demonstrator and the details of the magnet assembly procedure. First results of magnet cold tests including quench performance and strain gauge measurements in the temperature range of 1.9-4.5 K are presented and discussed.

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