

# Development of 60-mm aperture Nb<sub>3</sub>Sn dipole demonstrator for FCC at Fermilab

*Wednesday, 13 April 2016 13:30 (20 minutes)*

A 100 TeV scale Hadron Collider (HC) with a nominal operation field of 16 T is being considered for the post-LHC era, which requires using the Nb<sub>3</sub>Sn technology. Practical demonstration of this field level in an accelerator-quality magnet and substantial reduction of the magnet costs are important requirements for realization of such a machine. Fermilab has started the development of a 15-T-class Nb<sub>3</sub>Sn dipole demonstrator for a Future Circular Collider (FCC). The magnet design is based on optimized 60-mm aperture 4-layer shell-type coils, graded between the inner and outer layers to maximize the performance and reduce the cost. This paper describes magnetic and structural designs and parameters of the 15 T Nb<sub>3</sub>Sn dipole demonstrator. Coil magnetization and iron saturation effects as well as magnet quench protection are presented. Magnet cost reduction strategy is also discussed.

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**Session Classification:** 16T dipole development: Protection

**Track Classification:** Superconducting Magnets