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Thu-Af-Po.01-08: Progress in the Design and Fabrication of the Large-Aperture Nb3Sn Dipole Magnet CCT6

Thursday 3 July 2025 14:00 (2 hours)

We present progress in the design and fabrication of CCT6, a Canted Cosine Theta (CCT) Nb3Sn magnet considered as part of the general R&D program for high field superconducting magnets supported by the US Magnet Development Program (US-MDP). Future testing with HTS inserts in a hybrid configuration motivates the design's large clear aperture of 120 mm and target operating dipole field of 12-14 T. We present updates to the magnetic and mechanical design which leverage an existing cable design from the HiLumi project. We share layer fabrication studies, with machining, winding, and reaction tests motivating the change to the MQXF cable for the inner layers. A 3D magnetic design is then presented, where a grading is used in the outer layers for conductor efficiency and reducing the magnet OD. Finally, we show a 3D mechanical design coupling the layers to an external structure which meets stress criteria up to the 15 T short sample at 4.2 K.

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