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Design and test results of the Nb₃Sn Canted-Cosine-Theta dipole magnet CCT4

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The U.S. Magnet Development Program is developing Canted-Cosine-Theta (CCT) magnet technology for future high field accelerator magnets. The CCT concept prevents Lorentz force accumulation by placing turns within precision-machined grooves that are separated by ribs and a spar that intercept forces, sustainably reducing the stress in the conductor. With other non-stress managed coils, now approaching the 200 MPa limit, some form of force interception like the CCT will eventually be required in future high field magnets. CCT4 is the fourth in a series of CCT dipole magnets that have been designed, built, and tested at the Lawrence Berkeley National Laboratory. The design of this two layer, 1 m long, 90 mm bore, Nb₃Sn dipole is to demonstrate achieving a 10 T bore field plateau. The methods used in fabricating and assembling this magnet will be described and test results presented.

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