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### Title

Design of HD2: A 14 tesla Nb<sub>3</sub>Sn dipole with a 35 mm bore

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**Design of HD2: A 14 Tesla Nb<sub>3</sub>Sn Dipole with a 35 mm Bore**

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The Nb<sub>3</sub>Sn dipole HD1, recently fabricated and tested at LBNL, pushes the limits of accelerator magnet technology into the 16 Tesla field range, and opens the way to a new generation of high-field colliders. HD1 is based on a flat racetrack coil configuration and has a 10 mm bore. These features are consistent with the HD1 goals: exploring the Nb<sub>3</sub>Sn conductor performance limits at the maximum fields and under high stress. However, in order to further develop the block-coil geometry for future high-field accelerators, the bore size has to be increased to 30-50 mm. The main R&D issues involved are: (a) the design of the coil ends, to allow a magnetically efficient cross-section without obstructing the beam path; (b) the design of the bore plate, to support the coils against the large pre-load force; (c) the correction of the geometric field errors. HD2 represents a first step in addressing these issues, with a target central dipole field of 14 Tesla, a 35 mm clear bore, and nominal field harmonics within several units. This paper describes the HD2 magnet design concept and its main features, as well as further steps required to develop a cost-effective block-coil design for future high-field, accelerator-quality dipoles.

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