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Sat-Mo-Po.07-01: Design of a Bi-2212 dipole insert for a high field hybrid magnet

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In the framework of the U.S. Magnet Development Program, LBNL is planning to fabricate a high field hybrid magnet combining Nb₃Sn and Bi-2212 dipole magnets. The Nb₃Sn outsert will be a four-coil canted cosine theta (CCT) dipole magnet, designed to generate 14 T in a 120 mm bore diameter. The Bi-2212 insert aims to achieve the highest field possible in a 40-45 mm diameter bore. Coil designs based on the CCT and the SMCT technologies are being considered for the Bi-2212 insert. However, winding a wide Rutherford cable in such a small radius presents significant challenges, primarily due to de-cabling issues caused by bending and twisting the cable during the winding process. To address these challenges, a tilted channel at the pole region is being considered for the CCT option in order to ease the hard-way bend of the cable. In addition, a new coil design approach, based on the uni-layer coil concept, is being explored. This work presents these modifications to the coil design, and discusses the results of winding tests conducted using these approaches.

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