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## **Mon-Mo-Po1.04-05 [39]: Quench protection study for F2D2, the Flared-end Block Dipole Demonstrator for the Future Circular Collider**

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The forecast hadronic synchrotron studied in the FCC-hh program aims to reach 100 TeV center-of-mass collision energy using 16 T bending dipole magnets along a 100 km long ring. Gaining such magnetic field occupying a reasonable volume requires new technologies to be tested and validated on demonstrators. In collaboration with CERN, CEA is developing F2D2, the FCC Flared-end Dipole Demonstrator based on the block-coil option proposed in the EuroCirCol study. This single aperture 1.4 m long magnet is designed to reach at least 15 T with 14% margin at 1.9 K using two different Nb<sub>3</sub>Sn cables. The energy density per unit length is 1.4 MJ/m, about 3 times the energy density per unit length of the LHC dipoles. The combination of the high energy density and the graded coils makes the quench protection of this magnet one of the most challenging. A study considering the state-of-the-art of active quench protection technologies such as heaters and CLIQ is here presented, completed with multi-physics models to accurately describe the quench evolution, the hotspot temperature and the voltages between and at the end of the coils.

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