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Progress on the Design of the 15 T Magnet of the EDIPO Test Facility

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EDIPO 2 (the upgraded EDIPO test facility) will provide a unique testbed for superconducting cables for fusion magnets, accelerators, and other applications. Compared to the previous magnet assembly, the magnetic field is enhanced from 12.35 T to 15 T, the aperture is enlarged from $90 \times 141 \text{ mm}^2$ to $144 \times 144 \text{ mm}^2$ and the uniform field length is increased from 680 mm to 1000 mm (assuming a 1% drop of the field along the sample axis). A number of magnet designs have been proposed for EDIPO 2 since the conceptual design activities started in 2017. The designs have converged into a flared-end block-coil dipole design with a purely rectangular cross-section (coil windings aligned in the high and the low field side). The use of a two-stage cable design is considered in order to increase the operating current, reduce the coil inductance, and consequently limit the discharge voltage. The magnet structural design keeps the pre-compression applied to the coil winding pack to a minimum and allows a gap to open between the coils and the test well during operation. Progress on the magnet design activities will be reported including the results of magnetic and mechanical analyses, as well as quench protection studies. The design of the helium vessel required to contain the liquid helium bath for magnet cooling will be presented.

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