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Sat-Mo-Po.07-06: Double Aperture HTS Dipole Magnet Model for the Persistent Current Operation

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Magnet systems of particle accelerators consist of many various types of magnets. There is an interest in replacing rather low-field conventional resistive magnets with high-temperature superconducting (HTS) magnets. The main goal is to reduce operational expenses which is critical during the continuously increasing cost of electricity. At Fermilab were built and successfully tested several HTS accelerator magnets. The paper described the variant of double aperture dipole magnet which could be suitable for future Lepton Colliders. A single short-circuited HTS coil of 3.8 kA generates a homogeneous magnetic field of 57 mT in both magnet gaps of 84 mm. The peak field in Lepton Colliders is limited by synchrotron radiation. The short model magnet was designed, built, and successfully tested at liquid nitrogen temperature. This magnet works in a persistent current mode, providing additional cost savings when used in particle storage rings operated at a stable magnetic field, presented and discussed results of design, fabrication, and tests. The magnet demonstrated a high magnetic field stability in both apertures, efficiency of correction coils, and primary powering circuit.

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