

Electromagnetic and stability design of CEPC detector Superconducting magnet

The CEPC detector requires a superconducting magnet to provide a deflection magnetic field for secondary particles. The central field strength of the superconducting magnet is 3 T. The inner diameter of the magnet is 7.07 m, its length is 8.5 m, and its thickness is approximately 0.75 m. Based on the low-temperature superconducting cable scheme, this paper calculates the magnetic field distribution of the detector and the magnetic field uniformity in the central track region, and comprehensively considers the influence of the anti-solenoid and quadrupole focusing magnet on the magnetic field quality of the detection area. To enhance the stability of the magnet, aluminum stabilizers and aluminum alloy reinforcing bodies are set up in the structural design of the coil cable. By comparing the mechanical and thermal performance differences of different cable structures, the appropriate cable structure is selected. The overloading protection scheme of the detector magnet mainly relies on the quenchback effect of the dump resistor and the support cylinder.

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Session Classification: Poster

Track Classification: Accelerator: 02: Accelerator technology