



Contribution ID: 656

Type: talk

Strategy for Superconducting Magnet Development for a Future Hadron-Hadron Circular Collider at CERN

Saturday, July 25, 2015 11:30 AM (20 minutes)

Following the recommendation of the European Strategy Group for Particle Physics, a study on options for a Future Circular Collider (FCC) with centre-of-mass energy of 100 TeV, a luminosity of $5\text{--}10 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ and a circumference in the range of 100 km was started. The study integrates ongoing accelerator and technology initiatives at CERN and in partner institutes and universities. A key technology for the FCC are high-field superconducting accelerator magnets. The FCC arc magnets need an aperture of 50 mm, with dipole fields with a target of 16 T and quadrupole gradients with a target in excess of 400 T/m. Based on these preliminary parameters, we discuss in this paper the challenges for the main magnetic elements of such a collider, and outline a strategy for the development of the required technology.

additional information

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