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The 16 T Dipole Development Program for FCC

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Abstract



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Abstract: A key challenge for a future circular collider (FCC) with centre-of-mass energy of 100 TeV and a circumference in the range of 100 km is the development of high-field superconducting accelerator magnets, capable of providing a 16 T dipolar field of accelerator quality in a 50 mm aperture. This paper summarizes the strategy and actions being undertaken in the framework of the FCC 16 T Magnet Technology Program and the Work Package 5 of the EuroCirCol.

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I. Introduction

The FCC study was approved in 2013 by the CERN Council [1] within the European Strategy for Particle Physics. The study is based on the use of 16 T bending magnets, with an aperture of 50 mm, for which a conceptual design has to be ready to be integrated in the FCC Conceptual Design Report in 2018. Such a field level is almost twice that of the Nb-Ti magnets presently installed in the LHC. It is also more than 4 T higher than the field in the Nb₃Sn magnets being developed for the High Luminosity LHC (HL-LHC) [2], [3], which will be the first high field Nb₃Sn magnets ever operating in a particle accelerator. A higher field amplitude (13 T operational, with a potential of exceeding 15 T at short sample) Nb₃Sn dipole magnet presently under development in the framework of the FP7



European project EuCARD is Fresca2 [4] –[5]: the magnet, which also features a large 100 mm bore, is planned to be assembled by the end of 2016.

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