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EuroCirCol 16 T Common-Coil Dipole Option for the FCC

Publisher: IEEE

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Abstract:

EuroCirCol is a conceptual design study for a post-LHC research infrastructure based on an energy-frontier 100 TeV circular hadron collider. In the frame of the high-field accelerator magnet design work package of this study, three different options for dipole magnets providing a field of 16 T in a 50 mm aperture are being considered: block-coil, common-coil, and cosine-theta. All options are being explored and will be compared based on the same assumptions, in particular for what regards the conductor performance, operating temperature and margin. This paper details the common-coil option under development at CIEMAT, with special attention to the electromagnetic calculations and quench simulation.

Published in: IEEE Transactions on Applied Superconductivity (Volume: 27 , Issue: 4, June 2017)

Article Sequence Number: 4001105

DOI: 10.1109/TASC.2016.2641483

Date of Publication: 19 December 2016

Publisher: IEEE

► ISSN Information:

► Funding Agency:

Contents

I. Introduction

The Future Circular Collider (FCC) study aims to design a machine with a centre-of-mass energy of 100 TeV and a circumference in the range of 100 km. The study is based on the use of 16 T bending magnets with an aperture of 50 mm. In practice, these high field magnets can be made by winding Nb₃Sn coils. At this stage, there are two active programs working on the development of those magnets: the 16 T Magnets Technology Program established at CERN [1] and the Work Package 5 (WP5) of the European Circular Collider (EuroCirCol) research project [2].



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