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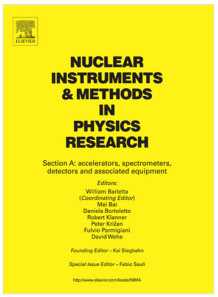

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High-Temperature Superconductor Coating for Coupling Impedance Reduction in the FCC-hh Beam Screen

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Abstract

The international Future Circular Collider study develops a conceptual design for a post Large Hadron Collider particle accelerator using 16 T superconducting dipoles for achieving p-p centre-of-mass collision energies up to 100 TeV. One concern for this project is the beam coupling impedance especially at injection energy. A copper coated beam screen as in the LHC is planned, but preliminary studies indicate that copper at the high operating temperature of 50 K might not provide a sufficiently low impedance for a stable beam. In order to reduce the coupling impedance, we investigate high-temperature superconductors as a possible coating material in combination with copper as a hybrid system. The effect of different coating combinations are estimated through numerical calculations to identify the best hybrid beam screen coating system.

Keywords: Beam pipe, Coupling impedance, FCC, HTS

1. Introduction

The Future Circular Collider (FCC) design study, hosted by CERN, aims at a conceptual design for a post Large Hadron Collider (LHC) particle accelerator using 16 T superconducting Nb_3Sn dipole magnets to achieve p-p centre-of-mass

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