MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **1557** Type: **Contributed Oral Presentation**

Wed-Af-Or13-05: Integration for testing HTS Feather M2 in the FRESCA2 magnet

Wednesday, 25 September 2019 17:30 (15 minutes)

In 2018, FRESCA2 dipole magnet, developed within a collaboration between CEA Saclay and CERN to provide a background field for tests of cables and small coils, reached a field of 14.6 T. This represents a new world record field for dipole magnets with a clear aperture. As a continuity of the European project EUCARD-2, CERN aims at exploring accelerator magnet technology up to a 20 T operating field level. For that aim, Feather-M2.3-4 magnet utilizing REBCO Roebel cable is inserted in FRESCA2 in order to reach a higher field.
The integrated design has to be capable to deal with several challenges as the electromagnetic forces, generated in the coils of the insert magnet. The stiff external tube, made of 3D printed Ni-base alloy, of Feather-M2.3-4 is specifically designed to deal with these forces. The tube has a different thermal contraction with respect to the inner pole of FRESCA2 what can provoke mechanical interference at 4.2 K. As a result, the thickness of the shell of Feather-M2 needs to be maximized to maximize mechanical stiffness of the Feather M2, while simultaneously enabling the integration with FRESCA2 without interference. The effects of a misalignment, both radial and axial, on the stresses in both magnets are studied by using Finite Element Analysis (FEA).
The field, generated by Feather-M2.3-4, changes the field shape generated by FRESCA2. A field quality study regarding integration is presented.

Primary authors: MARTINS ARAUJO, Douglas (CERN); VAN NUGTEREN, Jeroen (CERN); MURTOMAKI, Jaakko Samuel (Tampere University of Technology (FI)); FERRACIN, Paolo (CERN); DE RIJK, Gijs (CERN); KIRBY, Glyn (CERN); PEREZ, Juan Carlos (CERN); WILLERING, Gerard (CERN); CANALE, Matthieu (Universite de Savoie Mont-Blanc (FR))

Presenter: MARTINS ARAUJO, Douglas (CERN)

Session Classification: Wed-Af-Or13 - High Field HTS/Hybrid Magnets for Accelerators