27th International Conference on Magnet Technology (MT27)
Fukuoka, Japan / 2021

Contribution ID: **124** Contribution code: **TUE-PO1-113-03** Type: **Poster**

Design of a double aperture Canted-cosine-theta orbit corrector for the High Luminosity LHC

Tuesday, November 16, 2021 1:15 PM (20 minutes)

The High Luminosity LHC requires dipole orbit correctors grouped in double aperture magnet assemblies. They provide a field of 3.1 T at 100 A in an aperture of 70 mm. The current standard design is a classical cosine-theta layout made with ribbon cable. However, the electric insulation of the ribbon cable is however not radiation-resistant enough to withstand the radiation load expected in the coming years of LHC operation. A new design is needed based on a radiation-resistant polyimide insulated cable that can replace the existing orbit correctors when they reach their end-of-life due to radiation damage. The challenge is to design a magnet that simply plugs into the existing positions and re-uses bus-bars, passive quench protection, and power supplies. We propose a self-protected canted-cosine-theta (CCT) design. We take the opportunity to explore new concepts for the CCT design to produce a cost-effective and high-quality design with a more sustainable use of resources. The new orbit corrector's design must fit with tight field quality requirements while keeping within the same mechanical volume and maximum excitation current.

A collaboration of Swedish universities, Swedish industry, and CERN has started to develop a prototype following concurrent engineering (CE) methodology to reduce the time needed to deploy functional CCT magnet. The magnet will have a 1m long CCT dipole layout consisting of two coils. The superconductor is a commercially available 0.33mm strand with polyimide insulation in 6-around-1 cabling. The channels in the coil formers, that determine the CCT layout, allow for 2x5 cable-layers. A total of 70 windings makes that the coil current can be kept below 100 A. We will present the detailed design and quench simulations.

Primary authors: RUBER, Roger (Uppsala University (SE)); PEPITONE, Kevin (Uppsala University); KIRBY, Glyn (CERN); OLSSON, Anna (Scanditronix Magnet AB); AHL, Anton (Scanditronix Magnet AB); MATHIAS, Johansson (Vattenskärningsteknik i Vislanda AB); LINDSTRÖM, Jonathan (Ryd-Verken AB); Dr DUGIC, Izudin (Linneaus University); KARLSSON, Gustav (Linneaus University); KOVACIKOVA, Janka (Linneaus University); SVENSSON, Tony (Ryd-Verken AB)

Presenter: PEPITONE, Kevin (Uppsala University)

Session Classification: TUE-PO1-113 HL-LHC Accelerator Magnets III: NbTi