

High-Temperature Superconductor Coating for the FCC Beam Screen

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The baseline design of the FCC-hh beam screen is based on a 1 mm thick octagonal shaped stainless steel tube coated with a 300 μ m layer of copper. In the foreseen operating temperature of 40K to 60K the intended coating provides an impedance already close to the acceptable limit for a stable beam. In order to reduce the coupling impedance, we investigate High-Temperature Superconductor (HTS) thin films in the form of stripes. It promises a lower impedance by screening the beam induced radio frequency currents. The effect of different coatings will be estimated as well as the impact of the applied 16T dipole field on the material properties. The characteristics of HTS under temperature, frequencies and magnetic fields are discussed. Numerical results for the beam screen impedance obtained by the two-dimensional finite element solver BeamImpedance2D [1] are presented.

[1] U. Niedermayer, O. Boine-Frankenheim, and H. De Gersem, Phys. Rev. Special Topics –Accelerators and Beams 18, 032001, (2015)

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