The need for lower surface impedance than copper under the operating conditions of the FCC motivates the exploration of high-temperature superconducting coated conductor (HTS-CC) tapes as an alternative coating approach for the beam screen (Fig. 1).

As a first assessment for the feasibility of this approach, the surface resistance of YBCO is estimated with the classical rigid-fusion model based on published electrical transport data at the operating conditions of the FCC (Fig. 2).

For frequencies < 1 GHz, the surface resistance of YBCO is lower than for Cu, thus allowing potentially better performance over most of the frequency spectrum of interest.

Now, we are investigating the capabilities of commercially available HTS-CCs as a beam screen under the extreme conditions of FCC-hh. The specific objectives are:
1. Evaluation of surface resistance using classical rigid-fusion model
2. Measurement of SEY
3. Examine SC properties after synchrotron irradiation
4. Characterise strain distribution of HTS-CC when welded to vacuum chamber

References:

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