

# HTS Superconductors for the CERN Future Circular Collider

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CERN has recently started a Design Study for a possible next-generation high-energy hadron-hadron collider (Future Circular Collider – FCC-hh). The FCC-hh calls for an unprecedented center-of-mass collision energy of 100 TeV, colliding proton beams of 50 TeV steered in a 100-km circumference tunnel by 16 T superconducting magnets. The beams emit synchrotron radiation at high power which, to optimize cryogenic efficiency, is absorbed by a beam-facing copper-coated screen held at 50 K. The surface impedance of this screen has a strong impact on the beam, and copper at 50 K does not allow sufficiently beam stability margins.

This motivates investigating the possibility of High-Temperature Superconductors (HTS) coatings on the beam screen internal surface, as a possible solution. In this frame simple calculations of the surface resistance of HTS in high field, low frequency regimes are presented and discussed, in order to identify materials parameters that would allow a reasonable advantage in respect to copper. Analysis of the system thermal stability is also introduced.

Preliminary tests on HTS (YBCO) samples at high field and low frequency are also presented and discussed.

## **Short biography**

Ruggero Vaglio started his scientific and academic career as a Physicist at the University of Salerno in 1974. In 1980-1981 he was Visiting Researcher at Argonne National Laboratory, USA. In 1992 he took a sabbatical at CERN and soon after that he became Full Professor of Physics at the University of Naples “Federico II”. He was Director of the Physics Department of the University of Salerno (1989-91), of the INFN Center “Coherentia” in Naples (2001-2009) and of the CNR SPIN Institute in Genova (2010-2012). He has authored over 250 publications on the Physics of innovative materials (superconductors, oxides and organic materials) and related applications.