

On the quest for high Q0 & high Eacc for SRF

Dr. Marc Wenskat,
Institut für Experimentalphysik, Uni Hamburg

[CHyN, Rm.-301, 23. April 2024, 13.15h,
 hybrid: Zoom-999-4554-8884, 894-335-73]

Niobium is the workhorse for modern superconducting radio-frequency (SRF) accelerators, and new procedures of dedicated surface tailoring have in fact produced cavities which achieve unprecedented quality factors up to 10^{11} and accelerating fields over 50 MV/m at 1-2 GHz and 1.5-2 K, although the reproducibility and stability varies for the recipes. Hence, we are approaching the theoretical limits of bulk niobium and long-term solutions for SRF performance enhancement need to be pursued.

The greatest potential for significant performance enhancements lies with methods and materials, which deliberately produce the sub-micron-thick critical surface layer in a controlled way. One of the most promising research directions is the so-called SIS or multilayer approach, in which the inner surface of Nb cavities is coated by alternating Superconducting - Insulator - Superconductor (SIS) films.

The talk will introduce the idea of SIS, an overview of the current world-wide research effort and in more detail the research pursued at University Hamburg. Our ultimate goal: build a cavity which achieves 70 MV/m and 1×10^{10} at 4K.

