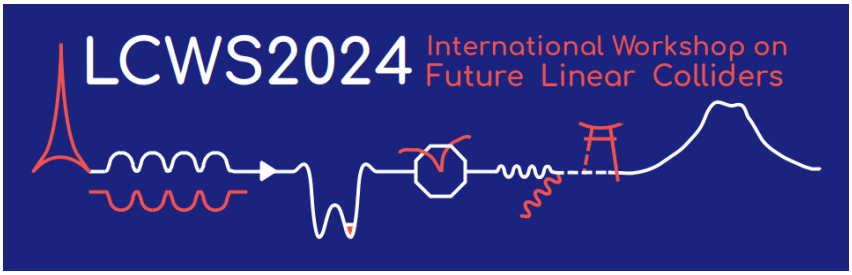

Contribution ID: **300** Type: **Oral presentation (remote)**

Oxide dissolution and oxygen diffusion scenarios in niobium and implications on the Bean–Livingston barrier in superconducting cavities

Tuesday 9 July 2024 09:00 (20 minutes)

We generalize a native Nb2O5 dissolution model [G. Ciovati, Appl. Phys. Lett. 89, 022507 (2006)] to sequential overlayer dissolutions, multilayer dissolution, and realistic temperature profiles, which may be applicable to other materials. The model is applied to secondary ion mass spectrometry depth profile measurements for varying temperature profiles and two-step oxide dissolution in Nb and found to agree well. In the context of the Meissner screening response due to impurity profiles on the length scale of the London penetration depth, the shallow diffusion of O impurities results in a substantial decrease in the peak supercurrent density near the surface. In this framework, oxide dissolution and oxygen diffusion can account for a rise in peak supportable magnetic field in SRF cavities with baking time and a suppression after the optimal baking time is reached, in good agreement with peak-field baking temperatures and times as well as recent quench field measurements.

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