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Trapped flux sensitivity in the low amplitude radio-frequency regime

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In this study, the radio-frequency complex response of trapped vortices in superconductors calculated for small values of applied radio-frequency field, will be presented. In agreement with experimental data on bulk niobium radio-frequency cavities, the calculated surface resistance shows a non-monotonic trend as a function of the mean-free-path and a sigmoidal-like trend as a function of the frequency. These two trends are shown to be generated by the interplay of two different dissipation regimes - pinning and flux-flow - which can be tuned either by acting on the material parameters (mean-free-path, pinning sites configuration, pinning strength, coherence length and penetration depth) or on the resonator frequency. Important perspective on the trapped flux surface resistance for thin films and innovative materials at low RF field values will be also discussed.

Primary author: Dr CHECCHIN, Mattia (Fermilab)

Presenter: Dr CHECCHIN, Mattia (Fermilab)

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