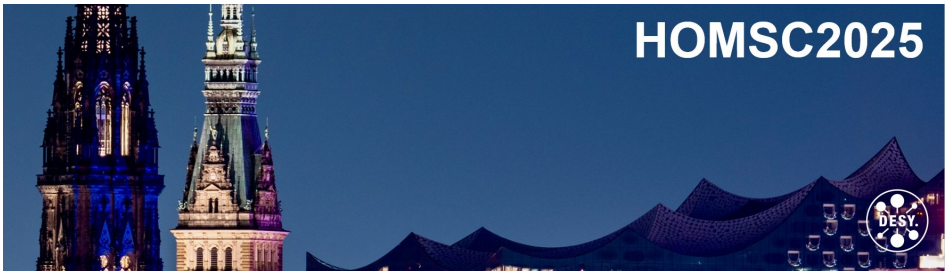

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Surface Impedance of Multilayered Superconducting Cavities

Monday 6 October 2025 15:00 (30 minutes)

Bulk niobium (Nb) is the standard material for superconducting RF (SRF) cavities, due to its high critical temperature and magnetic field compared to other pure metals. However, Nb is costly, challenging to manufacture, and has relatively poor thermal conductivity. The superconductor-insulator-superconductor multilayer geometry offers an alternative, using a sputtered superconducting film to shield the bulk from accelerating fields, and enabling cheaper, more malleable, and thermally conductive bulk material such as copper or aluminium. With appropriate materials, higher accelerating fields are also achievable. We model such multilayer structure as a first order surface impedance boundary condition compatible with standard finite element methods, and discuss the reduction of a general $\mathrm{S(IS)}^n$ structure to this impedance form.

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