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[Invited] Superconducting thin films and multilayers for particle accelerators

Monday 10 July 2017 11:00 (30 minutes)

Recent advances in the Nb technology have resulted in the development of superconducting radio-frequency (SRF) resonant cavities capable of producing accelerating fields up to 50 MV/m and achieving very high quality factors exceeding 1010 @ 1-2 GHz and 2K. At such strong RF fields, the density of screening currents flowing at the inner surface of the Nb cavities approaches the fundamental depairing limit, so any further increase of accelerating gradients requires materials with thermodynamic critical fields and superconducting transition temperatures higher than those of Nb. In this talk I will give an overview of basic physics and materials mechanisms which limit the performance of SRF cavities and discuss new opportunities to increase the accelerating gradients by surface nanostructuring using Nb3Sn, NbN, MgB2 or iron-based superconductors in the form of thin films and multilayers deposited on the inner surface of the Nb cavities.

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