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Beta-SRF - A New Facility to Characterize SRF Materials near Fundamental Limits (student talk)

Thursday, 15 February 2018 19:45 (15 minutes)

CW high-power LINACs require SRF cavities operating at the frontier of high accelerating gradient and low RF power dissipation, i.e. high quality factor (Q0). This requirement poses a challenge for standard surface treatment recipes of SRF cavities and new treatments including doping and layered structures are being developed and proposed. Understanding the fundamental mechanisms behind the success of Nb doping and the potential for new materials and layered structures to push beyond Nb is key for advancing the SRF field. At the TRIUMF beta NMR facility, a unique experimental apparatus, beta-SRF, is currently being developed to address these issues. This facility will enable studies of the local surface magnetic field through the London Penetration Depth (several nm) via β-decay detection of a low-energy radioactive ion-beam. This will allow depth-resolution and layer-by-layer measurement of magnetic field shielding effectiveness of doped materials, dirty/clean layers, coatings and new layered SRF materials at high-parallel field (up to 200 mT). Design and current development of this facility will be presented here, as well as measurement strategies for new SRF materials.

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