MAR11-2011-020353

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Niobium and its Impact on Superconducting Radiofrequency Technology

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The Continuous Electron Beam Accelerator Facility at Jefferson Lab in Newport News, Virginia, was the first large-scale deployment of superconducting radiofrequency (RF) technology, and was optimized for nuclear/high energy physics research. The success of this technology led to the creation of a Free Electron Laser (FEL) facility at Jefferson Lab that has achieved world-record power, and is leading the way towards the next generation of FELs based on superconducting energy-recovery linacs. Superconducting RF technology has been adopted for other large accelerators (LEP, SNS) and is proposed for many of the future large accelerator facilities (ESS, FRIB, ILC, Project X, etc.). All these applications rely on the superconducting properties of niobium. While the performance of niobium accelerating cavities has been excellent, there are still improvements being developed, in particular, the new ingot niobium technology. This talk will provide a review of superconducting RF technology and the impact it has had, and will continue to have, on the accelerator field.