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Compact Superconducting RF Electron Accelerating Systems¹

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Superconducting RF (SRF) technology is at the threshold of a radical change enabled by recent progress in the performance of Nb₃Sn SRF cavities. Next-generation Nb₃Sn cavities will enable a new class of simple, robust, power efficient, and compact accelerating sections with turn-key style operation. Higher temperature operation of Nb₃Sn cavities avoids the complexity and cost of superfluid cryogenic LHe refrigerators and significantly reduces energy consumption of the cryogenic cooling plant. For compact accelerators, Nb₃Sn based SRF modules can even be operated cryogen-free via conduction cooling by cryocoolers, thereby greatly simplifying the complexity of SRF technology. These changes will make powerful SRF technology accessible to a wide range of future applications, including compact nuclear physics accelerators. In this talk, I will give an overview of these exciting Nb₃Sn SRF developments at Cornell University, the Center for Bright Beams, and elsewhere, and will discuss state-of-the-art performance.

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