

Cryocooler Technology for Electron Particle Accelerators

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Particle accelerator technology is ubiquitous in modern discovery science. Accelerators are no longer limited to the more well-known high energy physics applications. They are of vital importance to many diverse fields as far reaching as biology, chemistry, condensed matter physics, medicine, and industrial manufacturing procedures. It has then of the utmost importance to develop better understanding of the physics and engineering principles necessary for advanced particle accelerator design. The Particle Beam Physics Laboratory (PBPL) at the University of California, Los Angeles (UCLA) is uniquely equipped to handle these problems and is on the forefront of these studies. One major thrust in accelerator physics in general and PBPL in particular is the application of cryogenic technology to accelerators. The presentation will focus on the use of cryogenic technology in general accelerator R&D research as well as particular developments taking place at UCLA. Discussion will involve studies into normal conducting cryogenic copper accelerating structures for high gradient electron acceleration and in particular the effects of cryogenic temperatures on the reduction of harmful electrical breakdown rates in accelerating structures. A general overview of cryostat design and cryocooler integration into an electron photoinjector will further be presented.