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Applications of High Gradient Accelerator Research for Novel Medical Accelerator Technology

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Accelerator technology developed for future collider designs can form the basis for components in a broad range of medical accelerator applications, enabling new treatments like Very High Energy Electron (VHEE) therapy and new high-speed beam scanning systems for proton therapy. For example, the large aperture of the proposed C3 linac design is optimized to transport long and high charge bunches and, if adapted for a beam energy modulation system for protons or acceleration for VHEE, could increase transmission of the beam for therapeutic purposes. An RF-based approach to changing the proton beam energy would be significantly faster than current methods which typically rely on the beam passing through a range shifter controlled with mechanical motion. Techniques like cryogenic cooling, implemented for the C3 concept to improve RF efficiency, can be applied to novel medical accelerator designs to reduce the size and power consumption in a clinical facility. We discuss the synergistic design efforts for medical accelerator projects currently underway at SLAC funded by the DOE's Accelerator Stewardship program.

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