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Safest: a compact VHEE Linac for FLASH radiotherapy

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Recent advancements in radiotherapy have demonstrated that Very High Energy Electron (VHEE) beams with energies of 100 MeV or higher are effective for treating deep-seated tumors, achieving therapeutic outcomes comparable to conventional radiation. This efficacy is further enhanced when electron beam parameters enable Ultra High Dose Rate delivery, operating in the FLASH regime, which significantly spares healthy tissues while maintaining tumor control equivalent to standard radiotherapy. Concurrently, the development of High-Gradient accelerating structures has paved the way for compact and cost-effective VHEE linear accelerators (Linacs) suitable for hospital environments. This work outlines the electron beam parameters required for FLASH radiotherapy and reviews the current RF technologies under consideration. Additionally, we present the design and features of a compact C-band VHEE Linac, highlighting its potential as a practical solution for next-generation radiotherapy.

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