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Development of novel beam instrumentation for in vivo and in vitro end stations for Laser-hybrid Accelerator for Radiobiological Applications

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Radiotherapy is an effective, non-invasive, widely used treatment for cancerous tumors that uses x-ray photon, electron and ion beam sources. The Laser-hybrid Accelerator for Radiobiological Applications (LhARA) is a proposed novel laser-driven accelerator system under development that aims to deliver a multi-ion Particle Beam Therapy (PBT) technique. This study aims to develop a novel technique to deliver different light ion minibeam to the in vivo and in vitro end stations. A novel technique will produce the desired beams and minibeam by magnetically focusing the incoming proton and light ion beams, without collimation. This solution focuses the beam magnetically to the required 1 mm spot distribution with an energy of 15 MeV, for the low energy in vitro end station's experimental requirements. A novel spot-scanning beam delivery modality simulation is also being developed. This simulation allows the beam delivery system to deliver the beam to spots in the treatment field, through a dynamic rotational motion.

Footnotes

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