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Progress toward TURBO: a novel beam delivery system for charged particle therapy

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TURBO –Technology for Ultra Rapid Beam Operation –is a novel beam delivery system (BDS) in development at the University of Melbourne. The BDS determines several aspects of treatment delivery, where a bottleneck is the deadtime associated with beam energy variation. Beamlines at treatment facilities have a $\pm 1\%$ momentum acceptance range, requiring all the magnetic fields to adjust to deliver beams of different energies at multiple depths along the tumour volume. A BDS using Fixed Field Alternating Gradient optics could reduce the energy layer switching time by enabling the transport of a large range of beam energies within the same fixed fields. We present recent progress and ongoing developments with TURBO, a proof-of-concept demonstrator adapted for low energy protons. Characterisation measurements were performed to determine realistic parameters for beam transport and particle tracking modelling. Initial simulation and design studies are shown for an energy degrader, prototype magnets constructed using 3D-printed holders and considerations of canted-cosine-theta magnets for a scaled-up BDS. Future plans further explore the clinical feasibility of TURBO for charged particle therapy.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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