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Passive Transverse Beam Profiler for Real-Time Monitoring for FLASH radiotherapy

Tuesday 9 September 2025 16:00 (2 hours)

Real-time beam monitoring is essential for enhancing the efficacy and reliability of radiotherapy. FLASH radiotherapy has shown a strong potential in improving treatment effectiveness by delivering doses at ultrahigh dose rates (>40 Gy/s). Beam monitoring at FLASH is challenging, as existing devices like Ionization chambers face saturation. We are developing an all-optical monitor for real-time transverse beam profile measurements in the treatment beam delivery zone. As the therapeutic beam must inherently traverse the ambient air path from the nozzle to the patient, the monitor passively captures beam-induced fluorescence along its trajectory without affecting the beam. This contribution present proof-of-concept measurements with 10.8–28 MeV protons at MC40 Cyclotron at University of Birmingham for 1 to 25 nA beam current, achieving a temporal resolution of up to 10 ms, and compared with beam size measurements with RCF. The fluorescence intensity exhibits a linear response to beam current, suggesting its potential for dose prediction after calibration. This work also discusses the challenges and potential for improvement for FLASH radiotherapy systems.

Footnotes

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