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Using octupoles to create uniform electron beam produced by irradiation accelerators

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In contemporary radiotherapy, most accelerators employ the scatter technique to achieve a relatively uniform dose distribution of electron beams. However, this method often results in the loss of a substantial number of particles, leading to suboptimal efficiency. This paper proposes a method utilizing permanent magnet components to homogenize the beam, achieving both beam spreading and uniformity within a short distance without particle loss. The proposed homogenization beamline comprises two quadrupole magnets and two octupole magnets, ultimately yielding a square field with a side length of approximately 20 cm. The manuscript includes theoretical derivations and simulation validations, with the physical prototype currently under fabrication. Experimental results will be provided in future work.

Footnotes

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Paper preparation format

Region represented

Asia

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