



Contribution ID: 381 Contribution code: THPR59

Type: **Poster Presentation**

Using octupoles to create uniform electron beam produced by irradiation accelerators

Thursday, 23 May 2024 16:00 (2 hours)

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

Funding Agency

Paper preparation format

Region represented

Asia

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Session Classification: Thursday Poster Session

Track Classification: MC8: Application of Accelerators, Technology Transfer, Industrial Relations, and Outreach: MC8.A28 Medical Applications