

# Enhancing Dose Uniformity in Passive Scattering Proton Therapy for Small Tumors via Beam Current Modulation

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Proton therapy reduces radiation dose to normal tissues compared to X-ray therapy, thanks to the Bragg peak's physical properties, thereby minimizing radiotherapy side effects. However, in passive scattering proton therapy, using small apertures to treat small tumors leads to deterioration of dose uniformity within the spread-out Bragg peak (SOBP) region. This study aims to improve dose uniformity in the compromised SOBP when employing small-diameter proton beams. We investigated the characteristics of small-diameter scattering beams using multiple small-diameter blocks and developed new beam current modulation (BCM) parameters to compensate for SOBP degradation. By modifying the beam intensity data in the BCM file, we successfully enhanced dose uniformity in the SOBP for small fields. Our results demonstrate that the modified BCM effectively optimizes dose distribution in small fields. This novel approach shows promise for treating small tumors and enhancing the precision of proton radiosurgery, potentially improving patient outcomes.

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## Paper submission Plan

Yes

## Best Presentation

No

## Contribution track

ICABU WG4. Applications of Particle Beams

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