

IEEE Transactions on Radiation & Plasma Medical Sciences

Special issue on Advanced topics in particle radiotherapy

Extended submission deadline: 10 December 2020

Guest Editors

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In the field of particle radiotherapy, research and developments (R&D) continue to enhance its clinical efficacy in treating cancers. It is well acknowledged that the field has rapidly expanded and evolved by taking interdisciplinary approaches to solve clinical or technical challenges. What we observe in recent R&D efforts is no exception. The efforts are wide, ranging from new discoveries of fundamental radiobiology (e.g., FLASH therapy) to new advancements in beam delivery technologies with a compact footprint.

Increasing demands for highly-conformal or hypo-fractionated dose deliveries drive the need to ensure what is being prescribed is what is being delivered. New developments in radiation detectors or imaging modalities promise direct assessments of delivered dose, particle range, and tumor motion in-vivo and real-time. Biological effectiveness that is unique to particle therapies are being studied with functional imaging modalities. Undoubtedly, these new imaging data will open possibilities of applying advanced algorithms for precise targeting, on-line adaptive, and individualized treatments.

In addition, a greater need to make the particle radiotherapy more accessible will be met by the next generation of accelerator technologies that will bring compact particle radiotherapy systems into the clinic. We will also gain a deeper understanding of radiobiological benefits of treating patients with ultrahigh dose rates with new technical advances in the delivery system.

Authors are invited to submit review or original research papers to this special issue on topics that include, but are not limited to, the following:

- Design, modelling and development of new detector or imaging technology for improved estimates/assessments of relative stopping power, deposited dose and range in-vivo.
- Design, modelling and development of fast imaging, including MR imaging and others, for real-time guidance of particle therapy
- Software/algorithm developments related to the exploitation of detector technologies in particle dosimetry and all clinical applications
- Novel applications of imaging to estimate the radiobiological effectiveness of absorbed doses

- Translational efforts or technical developments of bringing on-line adaptive therapy into the clinical practice
- Design, modelling and development of compact accelerator or system technologies.
- Design, modelling and development of new instrumentations for delivering particle beams at ultrahigh dose rates, enabling FLASH RT.

Authors must submit papers digitally to <https://mc.manuscriptcentral.com/trpms>, using standard IEEE Transactions format, indicating in their cover letter that the submission is aimed for this special issue. Authors are encouraged to contact the guest editors to determine suitability of their submission for this special issue.

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