Contribution ID: **1833** Contribution code: **TUPB038** Type: **Poster Presentation**

Advancing heavy ion therapy via particle-in-cell simulations: insights into the interactions between an ion beam with realistic human body-like materials

Tuesday 3 June 2025 16:00 (2 hours)

Heavy ion therapy (HIT) is a transformative approach to cancer treatment offering precision to target tumors minimizing damage to surrounding normal tissue cells. This study explores the feasibility of applying the particle-in-cell (PIC) method to evaluate and optimize the clinical therapy of HIT. The PIC models ion beams & dynamics by tracking their motion with electromagnetic interaction and ion-fluid interactions at the nanoscale. PIC can accurately capture ion energy deposition patterns, ionization processes, and the generation of secondary particles that ion beams traverse in patient-specific body tissues and organs. The results reveal key insights into how ion beams interact with similarly constructed human tissue, influencing dose distribution, and therapeutic outcomes, involving key factors that may affect clinical procedures, such as specific tissue composition, and beam delivery parameters. The outcome would refine HIT protocols, supporting advancements in medical therapy, and enhancing surgical precision. This study also bridges computational modeling with clinical practice, providing actionable insights for improving HIT efficacy and safety.

Footnotes

Paper preparation format

Word

Region represented

Asia

Funding Agency

Author: LIN, M.C. (Hanyang University)

Co-authors: YEH, ChengCheng (National Cheng Kung University); CHEN, Chih-Hsuan (National Cheng Kung University); ARANGANADIN, Kaviya (Hanyang University); LAN, Yung-Chiang (National Cheng Kung University)

Presenter: LIN, M.C. (Hanyang University)

Session Classification: Tuesday Poster Session

Track Classification: MC8: Applications of Accelerators, and Engagement for Industry and Society: MC8.U01 Health & Biology