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Innovative image-guidance solutions for ion beam therapy

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Since the establishment of the first few hospital-based facilities in the 1990s, ion beam therapy has rapidly emerged as a promising radiation therapy modality, due to its superior ability to concentrate the beam energy to the tumour while better sparing normal tissue and critical organs in comparison to the widely established photon therapy. However, to enable full clinical exploitation of its advantageous ballistic precision and advanced beam delivery strategies, novel solutions of in-room image guidance are warranted to provide accurate information of the patient position and tissue properties prior to treatment for adaptive therapy schemes, along with in-vivo range verification during or after treatment toward the final goal of dose-guided radiation therapy. This talk will review latest imaging innovations in ion beam therapy, which are just entering the clinic or are being investigated for possible clinical use in the near future, with special focus on new instrumentation largely exploiting technologies well established in high-energy physics, nuclear physics and acoustics.

Primary author: PARODI, Katia (Ludwig Maximilian University of Munich, Germany)

Presenter: PARODI, Katia (Ludwig Maximilian University of Munich, Germany)

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