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## Mitigation of target motion in scanned ion beam therapy

Wednesday 3 February 2010 17:30 (15 minutes)

Scanned ion beam therapy is an innovative technique for conformal treatment of tumors with high sparing of organs at risk in the vicinity of the target. Based on the positive experience of pilot studies in research centers several clinical facilities are currently constructed throughout Europe with the first patients already being treated at the Heidelberg Ion Beam Therapy Center.

Currently scanned ion beam therapy is limited to tumors that can be immobilized. In sites that move intra-fractionally such as the lung which is influenced by respiratory motion the interference of target motion and scanning process leads to inhomogeneous dose coverage of the clinical target volume even if margins are used. This interference is typically referred to as interplay.

The motion mitigation techniques rescanning, gating, and beam tracking have been proposed to allow treatment of intra-fractionally moving tumors. Rescanning breaks the interplay patterns by multiple irradiations of the planning target volume per fraction with proportionally less dose. Gating limits beam delivery to e.g. the end-exhale part of the breathing cycle resulting in reduced motion amplitudes at longer treatment times. Beam Tracking compensates target motion by adapting all beam parameters and thus does not require motion-related expansion of the clinical target volume.

At GSI, rescanning, gating, and beam tracking were implemented as experimental treatment delivery option. In addition, our treatment planning system TRiP was extended to 4D capability allowing dosimetric comparison between the different techniques. Within the contribution experimental results will be presented. In combination with data from treatment planning studies the pros and cons of the different motion will be discussed.

### Please submit a short bio (max 1500 characters)

1997 - 2002

University Erlangen-Nuremberg, 11/2002 diploma in physics

10/99-03/00

Imperial College, London

2003 - 2006

GSI and Technical University Darmstadt, 01/2006 Ph.D. on "Treatment planning for treatment of moving tumors with a scanned ion beam" supervised by Prof. Dr. G. Kraft

05/04-11/04

Research stay on 4DCT at Massachusetts General Hospital (Harvard Medical School), Boston (GTY Chen, Ph.D.) funded by a DAAD scholarship

2006-2009

PostDoc at GSI working on motion mitigation for scanned ion beam therapy

09/06-10/06

Research stay on Gating at NIRS, Chiba, Japan (S. Minohara, Ph.D.) funded by a DFG scholarship

since 2009

Staff position at GSI, Biophysics, Darmstadt with the current focus on 4D treatment options for scanned ion beam therapy

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