

Section 5: Biofisica e Fisica Medica

Title:

The RIDOS-INFN project: an on-line GPU forward planning integrated into a dose delivery system for hadrontherapy with scanning ion beams

Authors:

A. Vignati^{*,1}, V. Monaco^{1,2}, A. Attili¹, R. Cirio^{1,2}, F. Marchetto¹, G. Russo³, R. Sacchi^{1,2}, M. Varasteh^{1,2}, S. Giordanengo¹

*vignati@to.infn.it

¹ Istituto Nazionale di Fisica Nucleare (INFN), Via Pietro Giuria 1, 10125 Torino, Italy

² University of Torino, Italy

³ I-see s.r.l. Torino, Italy

RIDOS is an INFN project towards adaptive particle therapy. It evaluates on-line the dose distribution of scanning ion beams to assess intra-fractional target movements and beam uncertainties. A GPU-based forward planning is being developed using Compute Unified Device Architecture (CUDA) and integrated into a dose delivery system, receiving on-line as inputs the measured spot properties, the patient CT, and the respiratory phase in case of 4D-imaging. The delivered and planned doses could be compared on-line (spill by spill or every few seconds) and at the end of the irradiation. The system is being benchmarked against validated algorithms for treatment planning.