

## **Motion models for 4D Monte Carlo simulation of the impact of respiratory motion in radiation therapy**

Radiotherapy treatments seek to deliver a tightly conformal dose of radiation to a tumour, while sparing nearby healthy organs. Tumour and organ motion due to respiration can cause a blurring of the delivered dose which decreases the dose to the tumour and increases dose to healthy tissues.

Our group has developed and experimentally validated a Monte Carlo simulation tool which models the transport of ionizing radiation in a dynamic patient geometry, thus enabling the calculation of dose to a breathing patient. The proposed summer project would work on extending the motion models in our 4D Monte Carlo simulation tool to improve the modelling of internal-external motion correlation as well as incorporating information from different image modalities (CT, cone-beam CT). Programming experience is required.

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