

Tumor Motion Assessment in Proton Therapy

Proton therapy allows a highly conformal target dose thanks to the well-defined proton range in tissue as well as to the characteristic depth dose curve of proton beams. Tumor motion occurring in between or within treatment fractions (inter- or intra-fraction), resulting from anatomical changes and/or breathing by patients may compromise these advantages. Therefore, to optimize the therapeutic outcomes of patients with tumors that are moving (e.g., lung, liver, etc.), an accurate spatio-temporal knowledge about the location of the tumor during the treatment is crucial.

Proton transmission imaging has been proposed as advanced motion management strategy for tumor tracking since it is capable of monitoring target location in real-time as well as reducing the patient imaging dose.

Your tasks:

- Review recent works in integration-based proton radiography
- Familiarize with the existing Monte Carlo frameworks to simulate Proton Radiography.
- Develop a time-resolved Proton radiography as a tool for tumor tracking during proton treatment of lung tumors.
- Investigate the impact of the imaging latency on the accuracy of the tumor tracking

Required skills:

- Good python programming skills
- Self-management

