Particle dose calculation for lung cancer

Background
Before cancer patients undergo radiation treatments, the therapy is virtually simulated and optimized. This includes the calculation of the radiation dose to be delivered into the patient’s body. For lung treatments with charged particles, however, there is currently no clinically reliable dose calculation model available. On the one side, inevitable organ motion requires a time-dependent implementation. On the other side, the heterogeneous structure of lung parenchyma has a non-trivial degrading influence on the sharp distal fall-off of particle beams.

Master project
Building on previous work at the German Cancer Research Center and the Heidelberg Ion-Beam Therapy Center (HIT), you will implement an improved dose model for lung treatments with charged particles into our research treatment planning system matRad. This computational framework will be the basis to assess the clinical feasibility of lung treatments at HIT.

The thesis requires conceptual research with a clear connection to clinical application. It provides a unique learning opportunity regarding physical and numerical models in radiation oncology as well as scientific programming. The project will be carried out in close collaboration with the clinical medical physics staff at HIT.

Your profile
We are looking for a student with a genuine interest in computational medical physics in radiation therapy. Experience in scientific programming (e.g. Matlab or C++) would be an advantage. Are you interested? Do you have more questions? Do not hesitate and get in touch!

References