



June 2017

## Master Thesis

### **Accurate relative biological effectiveness modeling for ion therapy: Simulation of overkill / proximity effects within the context of the repair-misrepair-fixation (RMF) model**

Treatment planning for ion therapy must account for physical properties of the beam as well as differences in the relative biological effectiveness (RBE) of ions compared to photons. In the mechanistic RMF model reproductive cell death by mitotic catastrophe, apoptosis, or other cell death modes is explicitly linked to double-strand-break (DSB) induction and processing.

An updated version of the biological model input was recently suggested. This new approach accounts for proximity effects of DSB induction. The updated version of the RMF model should be evaluated and implemented in a Matlab-based research ion therapy treatment planning system. This facilitates the evaluation of the updated version in clinically relevant Carbon (and potentially Helium) ion therapy scenarios.

We offer a Master project in an interesting and growing part of Medical Physics. The student will gain insight into RBE modeling, treatment plan optimization and evaluation for (ion) radiotherapy.

The project will be carried out at the Department of Radiation Oncology of the Klinikum der Universität München (LMU) in Großhadern in close cooperation with the Yale University School of Medicine (Prof. David J. Carlson) and the Chair of Medical Physics at the LMU (Prof. Katia Parodi). A research visit in New Haven, Connecticut, USA, is possible, depending on the progress of the project. University supervision will be carried out by the Chair of Medical Physics (Prof. Katia Parodi).

We search for a highly motivated and dedicated master student to work with us on this project. Applicants should be fluent in English and be willing to work and discuss their progress in an international research team. Programming skills (preferable Matlab) are advantageous.

Please contact **Dr. Florian Kamp** ([florian.kamp@med.uni-muenchen.de](mailto:florian.kamp@med.uni-muenchen.de)) for further information.