



Leonhard Karsch

¹University of Dresden, Germany

²HZDR, Germany

Laser plasma accelerated particle beams for radiation therapy and radio biological characterization

The long-term aim of developing laser based particle acceleration towards clinical application requires substantial technological progress as well as comprehensive research on the radiobiological consequences of ultra-short radiation pulses with high pulse dose rate. Within the joint research project “on COOPTics” extensive *in vitro* studies with several human tumor and normal tissue cells were already performed revealing comparable radiobiological effects of laser driven and conventional electron and proton beams. In a second translational step, *in vivo* experiments were established. Although the experiments were motivated by future proton therapy, first attempts were performed with electrons at the laser system JETI for simplification and establishing the experimental setup and procedure. A full scale animal experiment was realized for the HNSCC FaDu grown on nude mice ear. The radiation induced tumor growth delay was determined and compared to those obtained after similar treatment at a conventional clinical LINAC. Again, no significant difference in the radiation response to both radiation qualities was revealed, whereas the successful performance of such a comprehensive experiment campaign underlines the stability and reproducibility of all implemented methods. During this experiment campaign, the changing tumor take rate and a high rate of secondary tumors were identified as limitations of the model that have to be improved before proton experiments and tumor control studies can be performed. An overview of the experiments as well as the results of this optimization process and the status of the animal experiments with laser driven protons at the laser system DRACO will be presented.

Biography

Leonhard Karsch has completed his PhD in Physics from Technical University in Dresden. Since ten years, he has been working in the Medical Faculty in translation of laser plasma accelerators to radiation therapy with protons. He has published more than 40 papers in reputed journals.

Leonhard.Karsch@oncoray.de