

GSI - SEMINAR

Im Theorieseminarraum, SB3 Raum 3.170a

Darmstadt, Planckstraße 1

Donnerstag, den 25.06.2015, 14:00 Uhr

Prof. Dr. Günther Dollinger
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Angewandte Physik und Messtechnik LRT2

“Radiation biophysics and medical research at the Munich ion microprobe SNAKE”

SNAKE (Superconducting Nanoscope for Applied nuclear (Kern-) physics Experiments) consists of a superconducting multipole lens that focuses any kind of ion from the Munich tandem accelerator, e.g. 20 MeV protons with low LET = 2.6 keV (in water) or 55 MeV carbon with high LET = 310 keV/ μm , to submicrometer spot sizes. I will give an overview on the main characteristics of SNAKE and show the different ion application modes of pattern-wise or targeted irradiation. Then I will show several examples of research in the fields of radiation biology and medicine performed at SNAKE: (i) We study the kinetics of DNA double strand break (DSB) repair factors after low and high LET irradiation. We also study the spatial distribution of different DSB repair factors, especially their correlation or anticorrelation on the nanometer scale. (ii) By using laterally bunched protons we artificially mimic the micro dose distribution of high LET carbon ions but not reaching the ultra high doses in the nanometer core of the carbon ions. Thus we are able to disentangle the influence of dose distributions on the micrometer and the nanometer scale, and thus prove the local effect model (LEM) or Monte Carlo models like PARTRAC when comparing measured and predicted RBE values for cell survival or dicentric induction. (iii) As a third topic I will discuss prospects of a mini proton (or heavy ion) beam therapy that reduces side effects in tumor therapy while keeping the tumor control as usual due to the ions' lateral spread resulting in a still homogenous dose distribution within the tumor. We have proven the reduced side effects for micronuclei induction in an artificial skin tissue as well as the reduced inflammatory response in a mouse ear model.

Einladender: Prof. Dr. Gerhard Kraft

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