

Master theses in Medical Physics

dkfz.

GERMAN
CANCER RESEARCH CENTER
IN THE HELMHOLTZ ASSOCIATION

Research for a Life without Cancer

Cancer patient imaging by ion beams using particle physics detectors

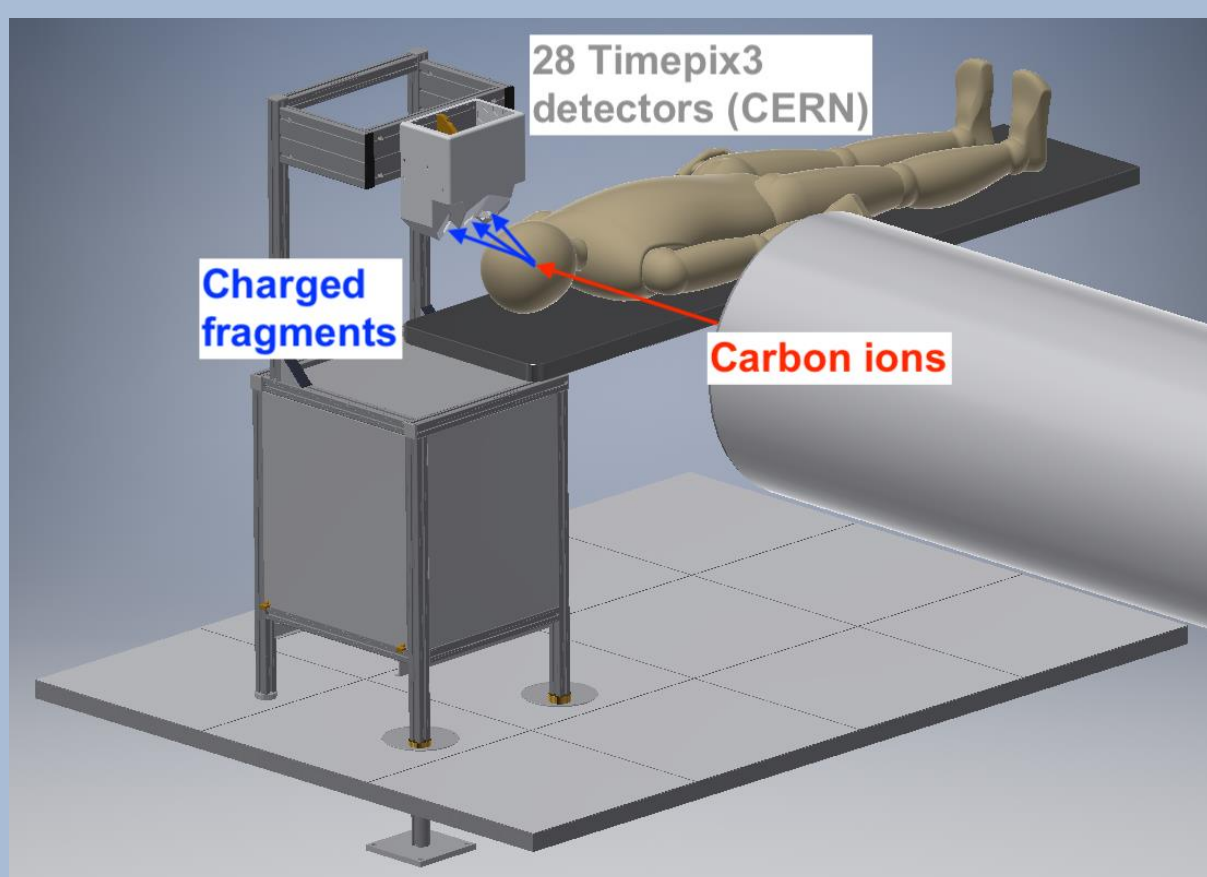
Ion beam radiotherapy is a highly precise treatment modality for tumors close to critical organs like brainstem or eye nerves. Consequently, imaging of the patient and the radiation inside of the patient

during therapy are crucial for the success of such treatments. **Our group develops novel patient imaging methods based on ions**, instead of the widely used photons. The research field is located between radiotherapy,

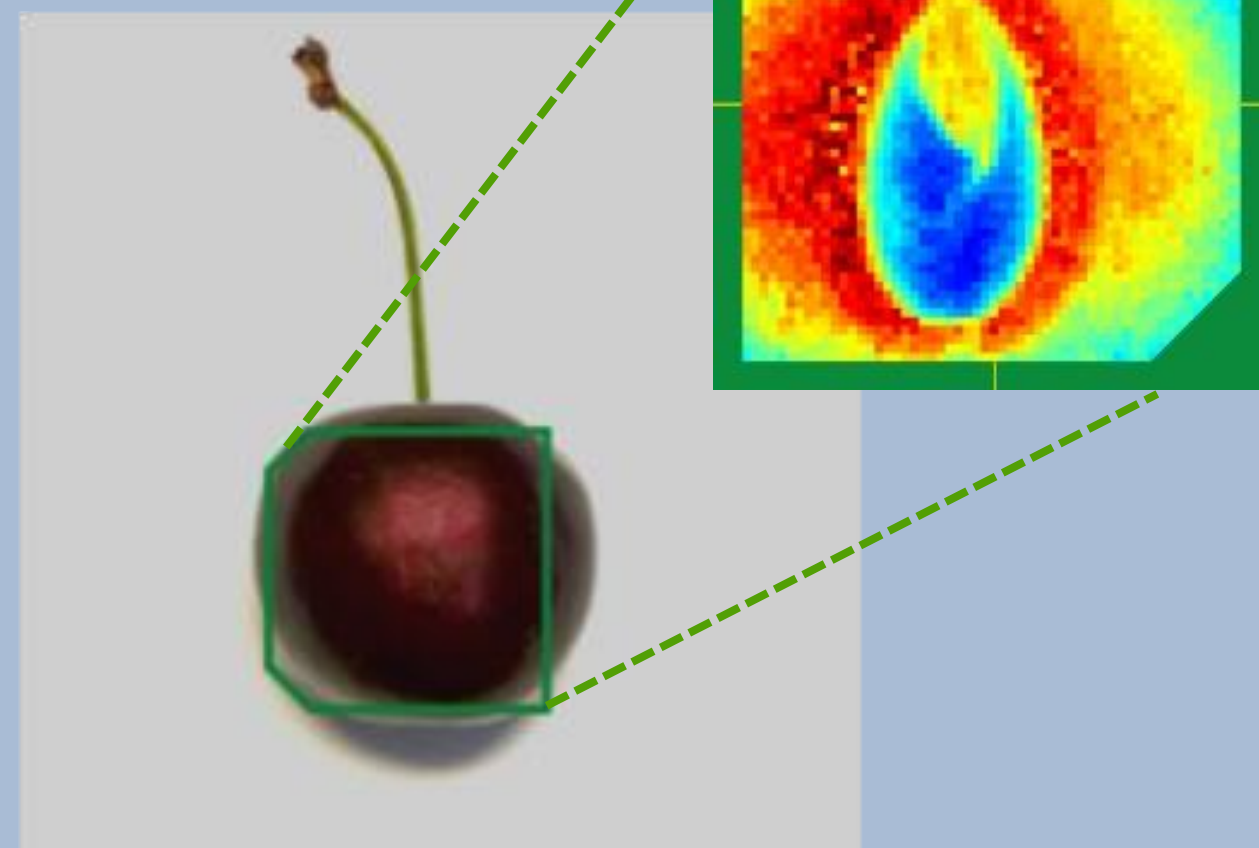
medical imaging, nuclear and particle physics. For ion tracking and identification we use our own systems based on the **Timepix technology developed at CERN**.

Currently we work on the following topics:

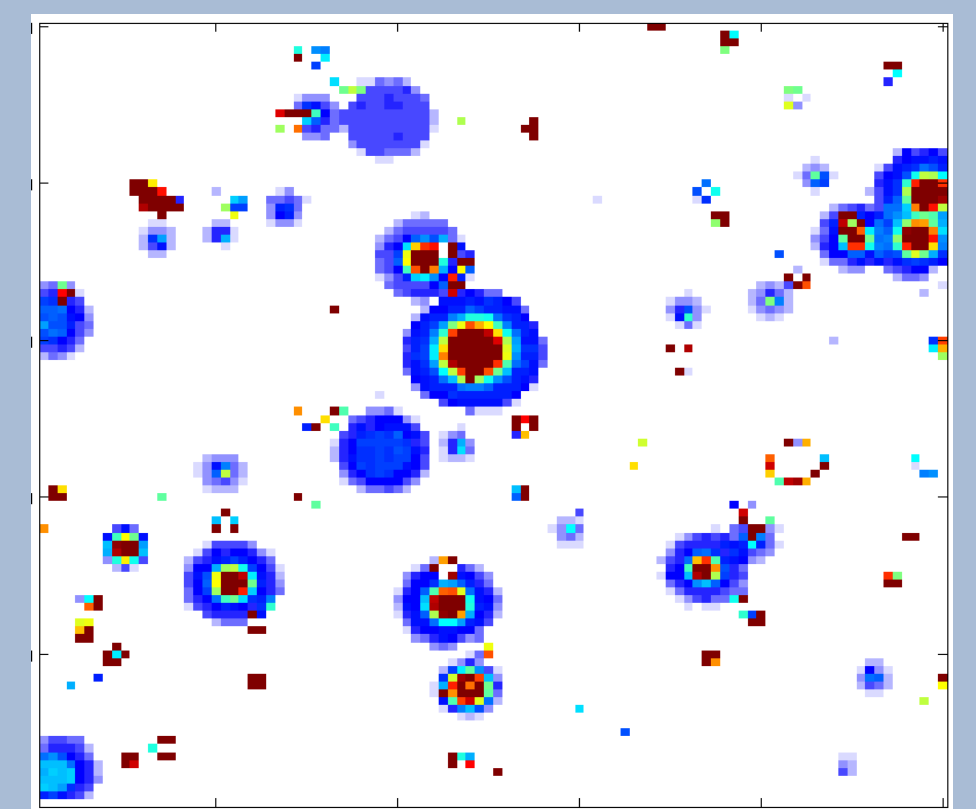
Visualization of the radiation inside of the patient during the treatment. We exploit solely secondary radiation (nuclear fragments) leaving the patient as a by-product of the treatment.



High resolution imaging of the patient anatomy with the unique helium ion beams available only at the HIT treatment facility in Heidelberg.



Determination of the composition of the complex radiation fields inside of the patient crucial for the calculation of biological effects of the radiation in the patient tissues.



Our master theses include:

- Design of own experiments and building of experimental setups
- Measurements at the Heidelberg Ion Beam Therapy Center (HIT)
- Analysis of the measured data
- Interpretation of the data up to the final results



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www.dkfz.de/en/medphys/novel_detectors_ionbeams/E0406.html

