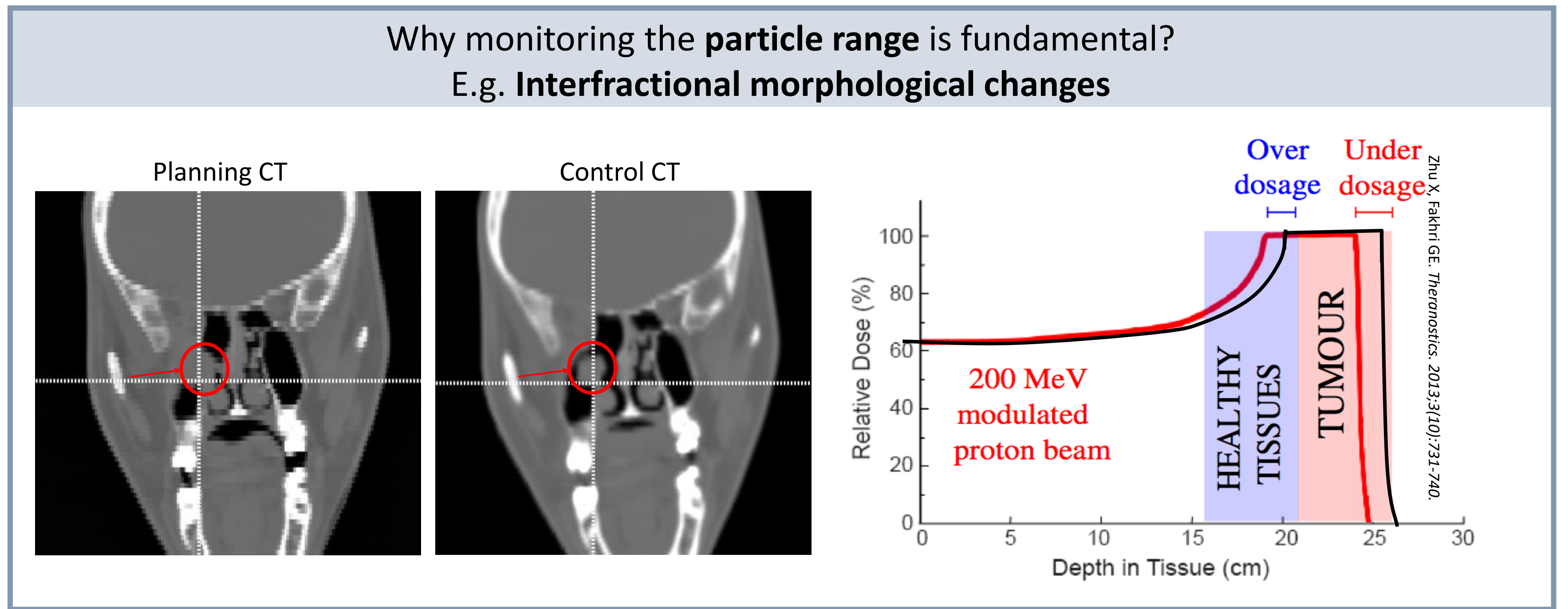
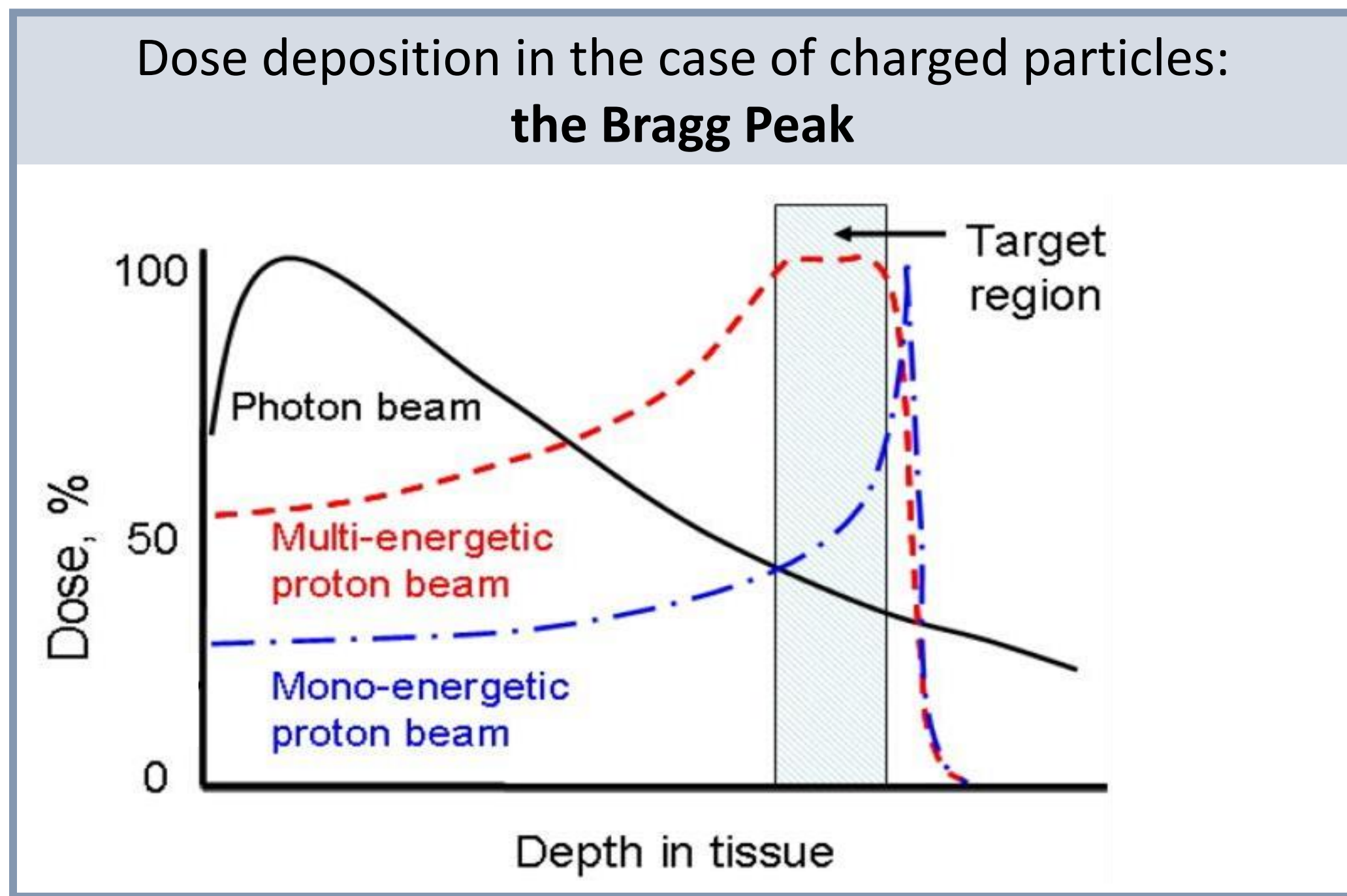
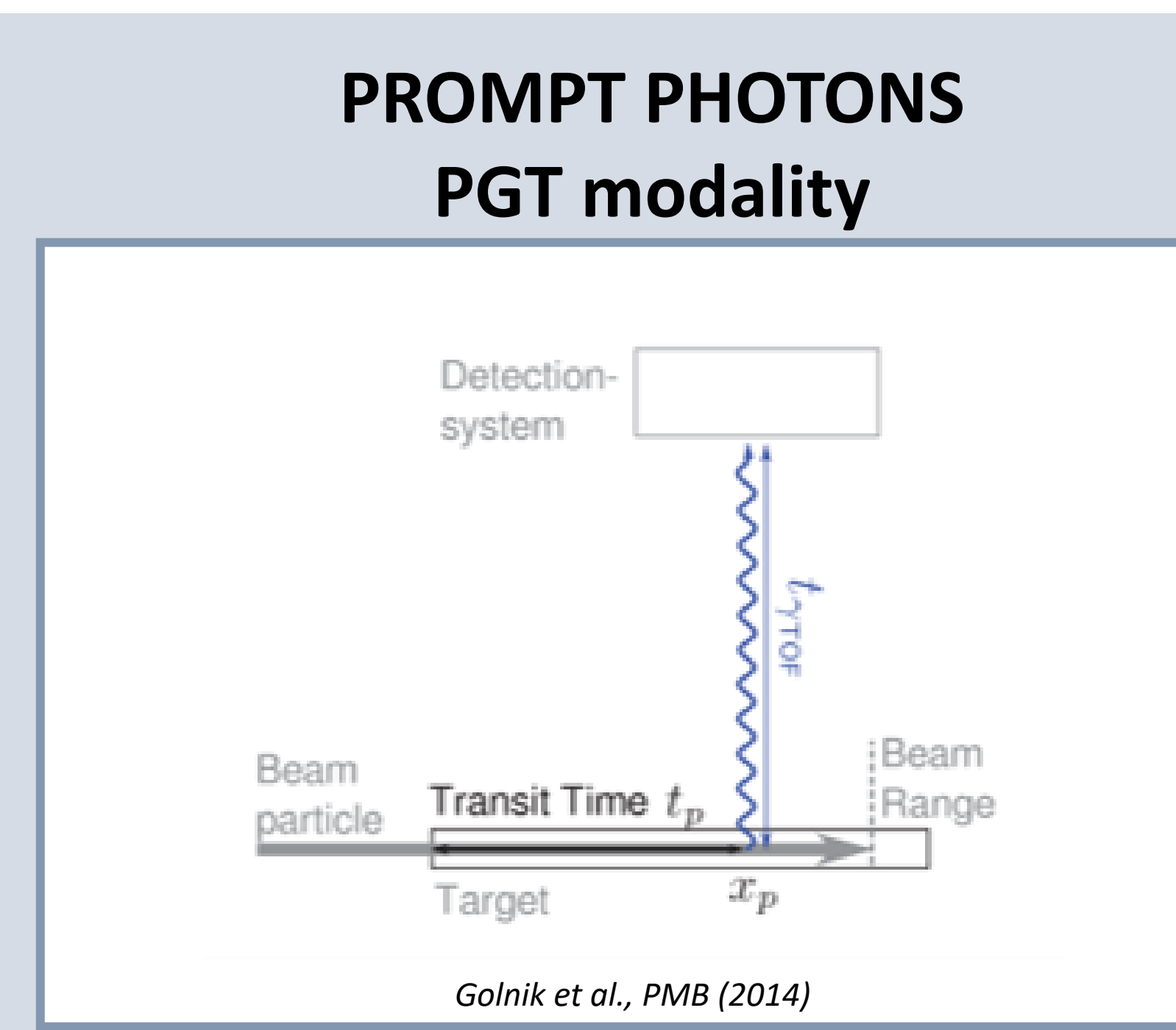
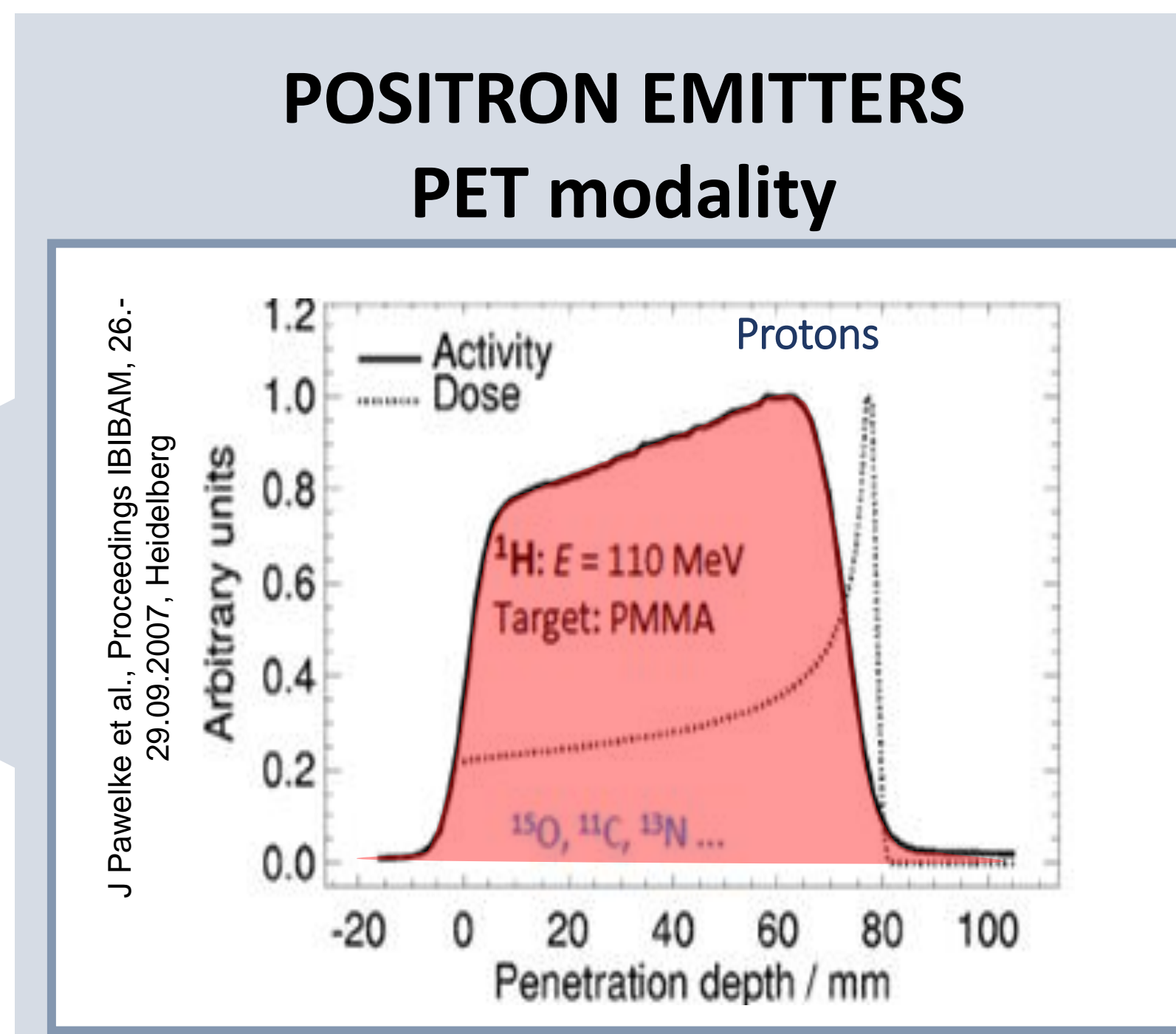
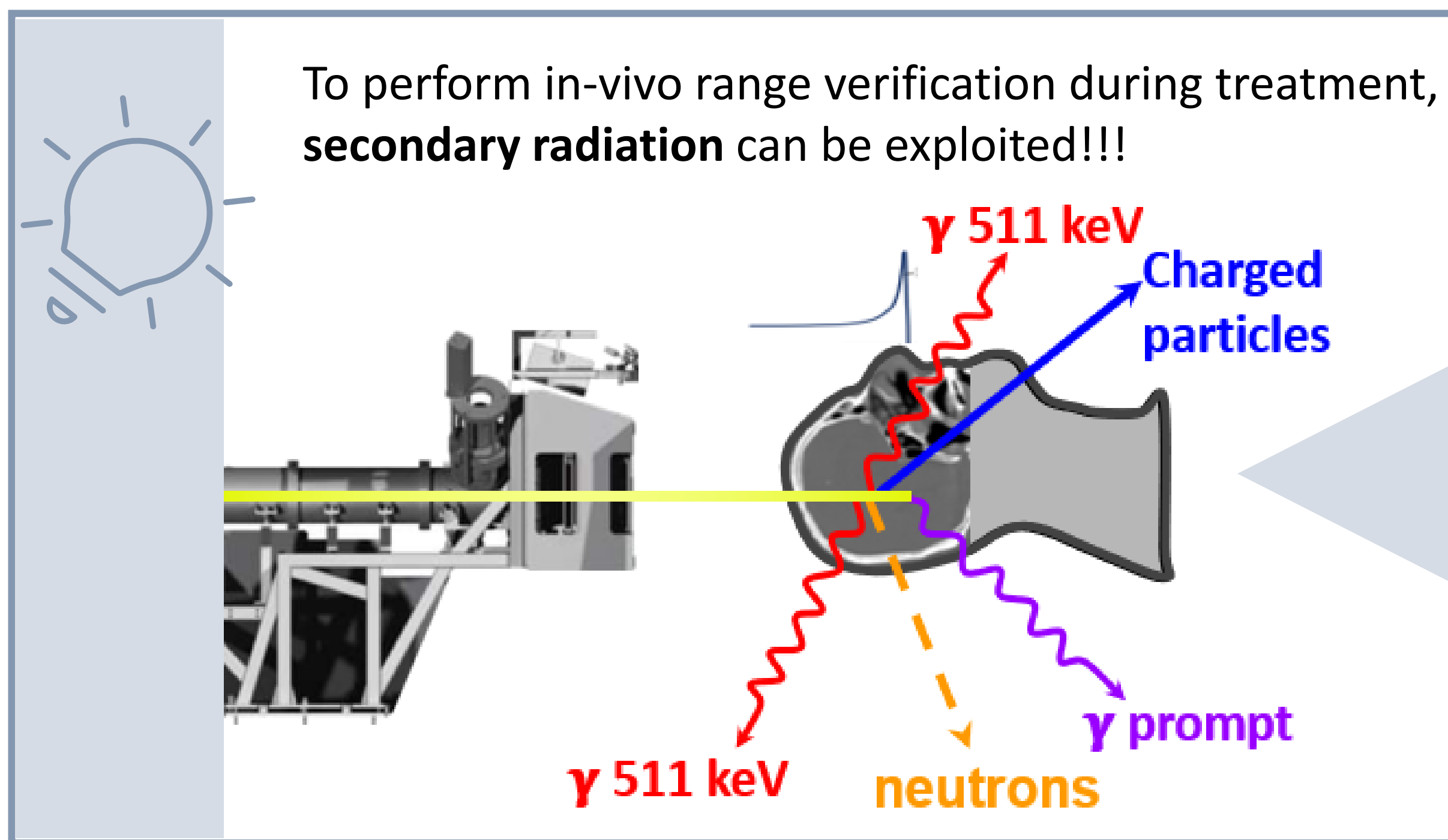


Range Verification in Particle Therapy

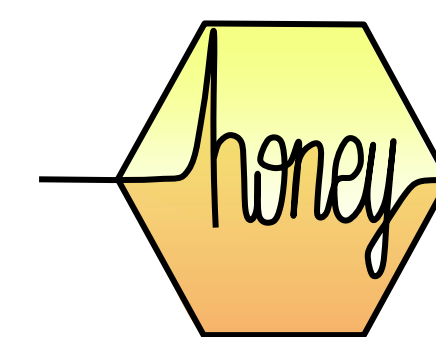
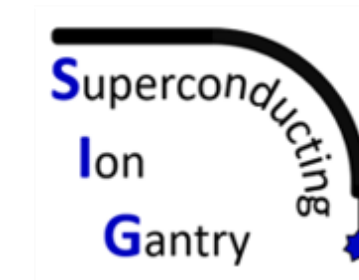
goals



methods



experiments



PET for hadrontherapy treatment verification: in-vivo Data Analysis

Italian collaboration: INFN Torino, INFN Milano, Università La Sapienza di Roma, Università di Pisa, CNAO

The **INSIDE** system is installed at CNAO in Pavia. It consists of a planar PET scanner and a charged particle tracer.

Objective: to **verify the quality of in-vivo treatments during irradiation** and to provide the **medical team** with reliable information about possible morphological changes in the patient during therapy. The INSIDE system is undergoing a clinical trial at CNAO. The second part of the trial will be in 2024.

Thesis proposals:

- Clinical trial data analysis
- Development of data and image processing algorithms
- Comparison with Monte Carlo simulations

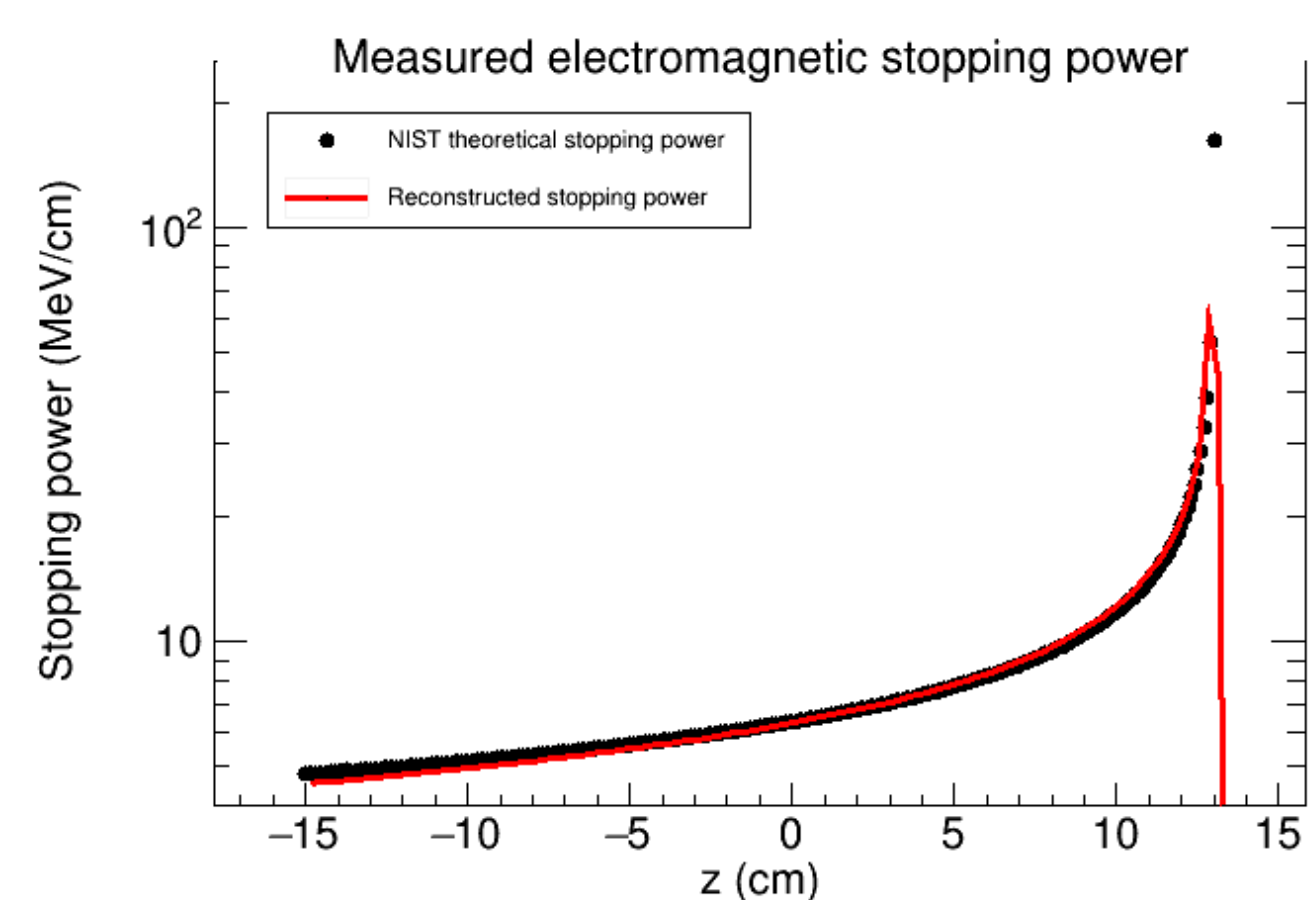


Time of flight of prompt photons for treatment verification: data analysis and algorithm development

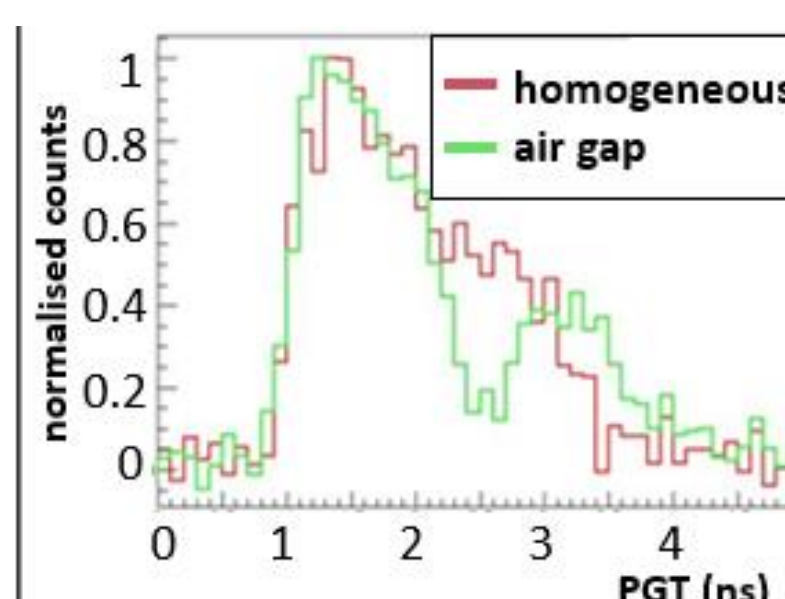
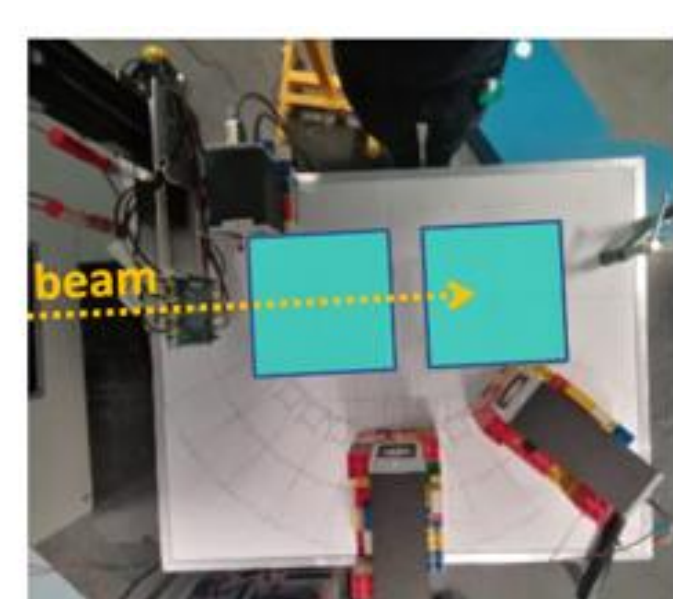
Goal: R&D of a system for prompt photons detection in hadrontherapy. Development and optimization of *original reconstruction algorithm*

Thesis:

- Monte Carlo simulations
- Experimental data analysis
- Development of algorithms dedicated to **stopping power reconstruction** (cooperation with University of Lubeck)



First experimental reconstruction of the stopping power!!!



Experimental setup

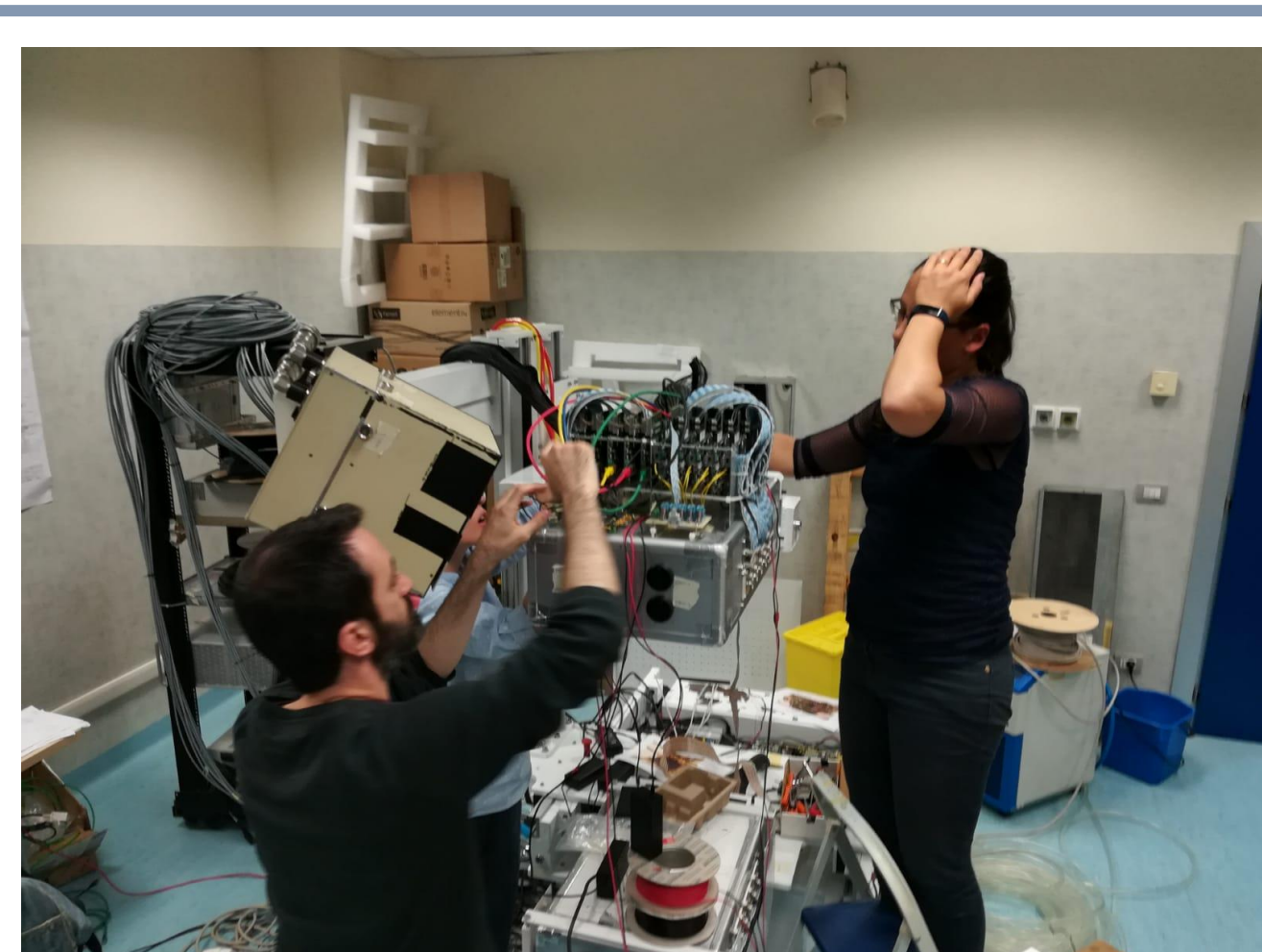
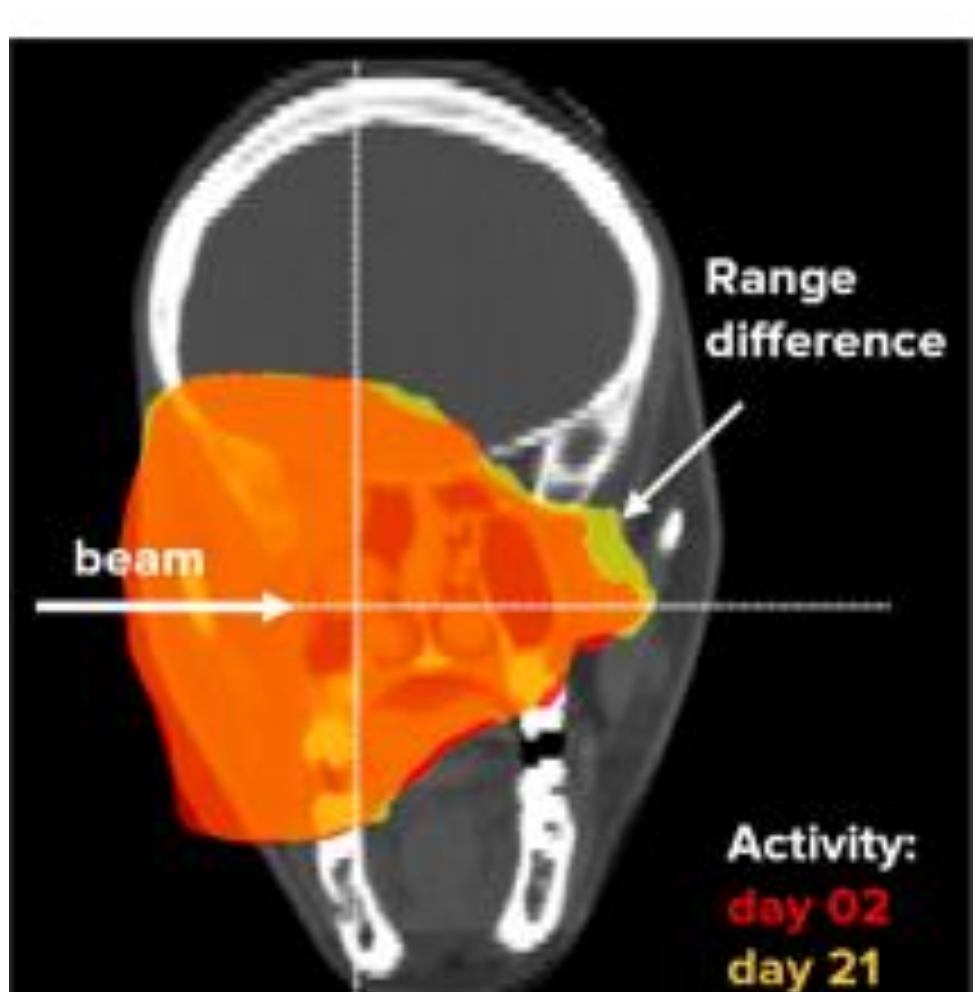
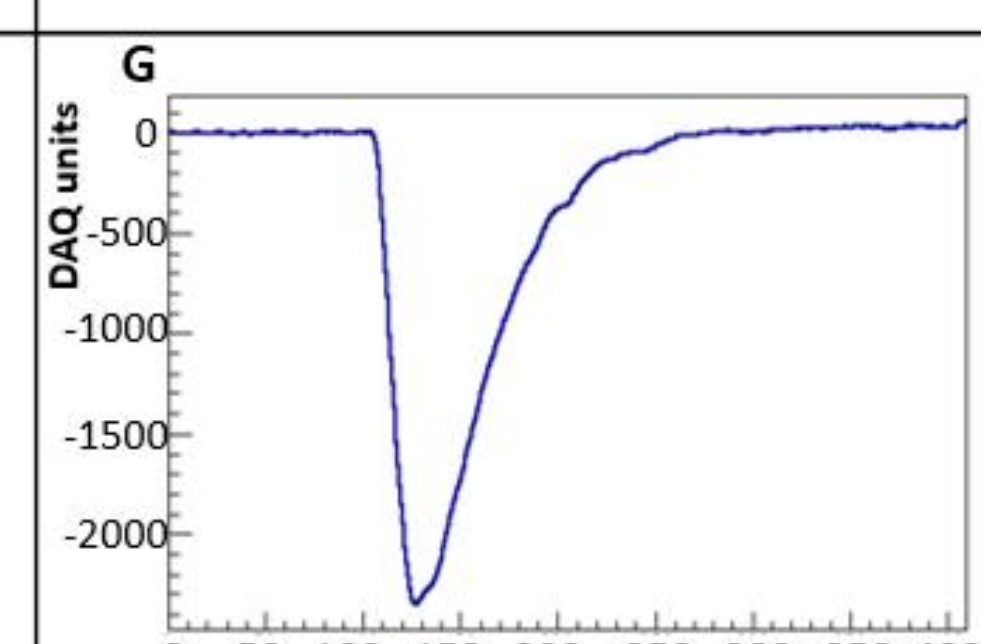
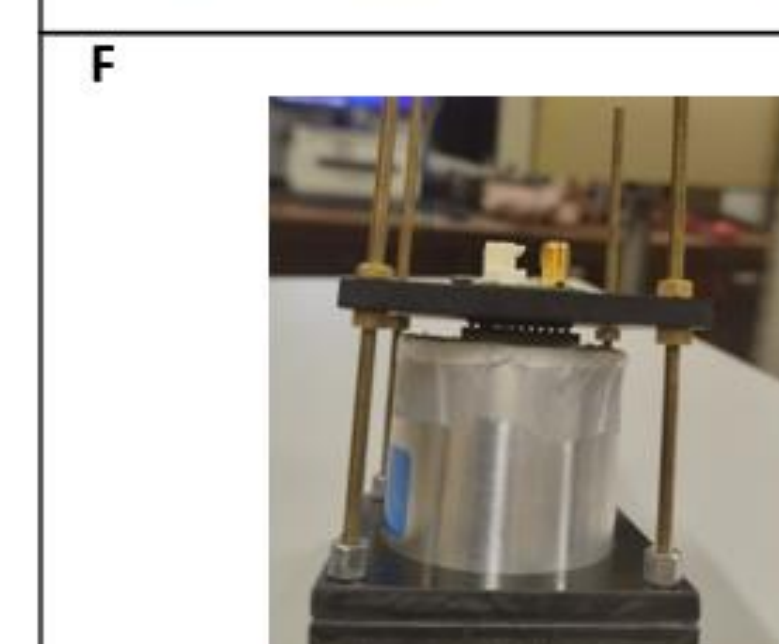
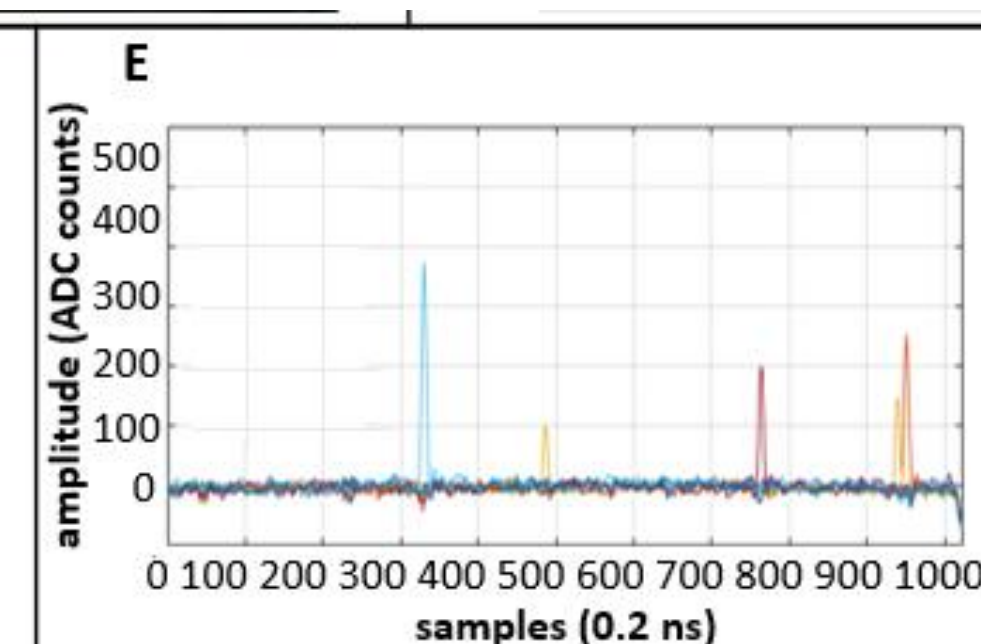
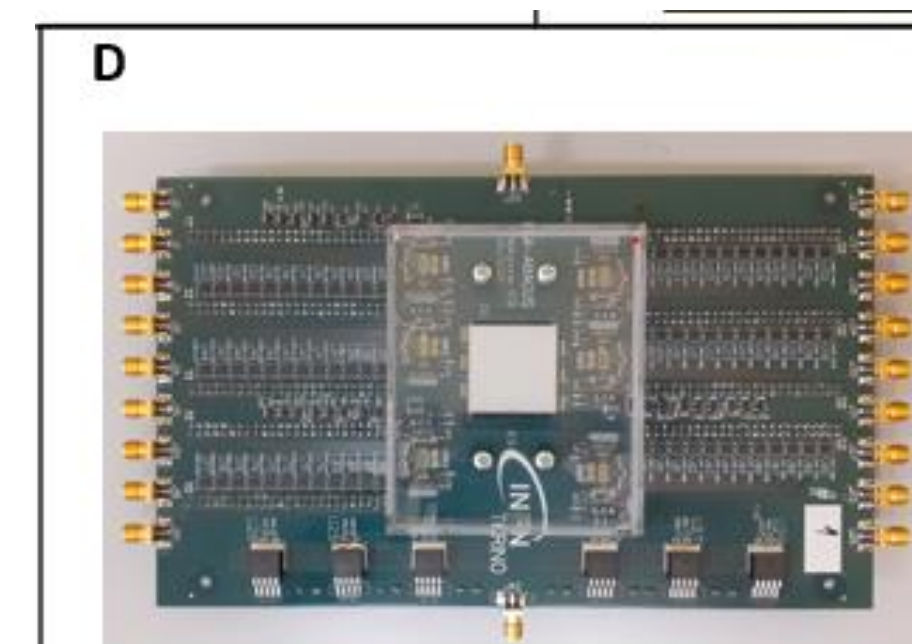
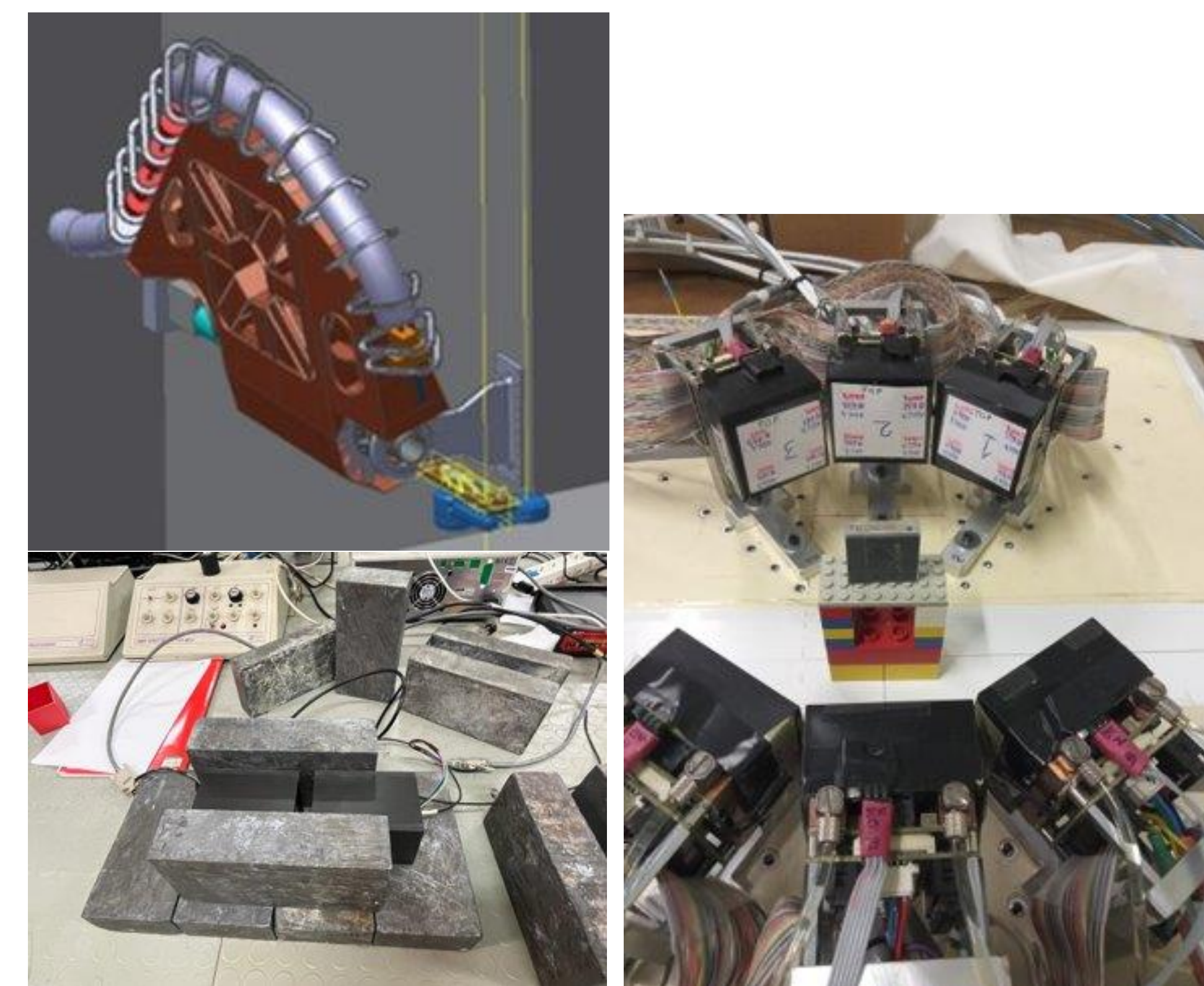
Prompt gamma measurement over time

PET and Prompt Photons detectors development

Goals: **Data Acquisition system tests and electronics characterization**
SIG (Super Ion Gantry): combined design of beam monitor and treatment monitor for Carbon Ion Therapy
HONEY (Hybrid ONLine tEchnology for particle therapy): detector characterization and data analysis
MET: Innovative PET detector, new chip (ALCOR) from high energy physics

Thesis:

- Detector characterization
- Electronics and detector characterization
- Experimental data analysis



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