OR-Imag Group

Group leader:

Paulo Crespo (on medical leave in 2024) Researchers:

Andrey Morozov (40% FTE share)

Hugo Simoes (contract expired in June 2024)

PhD Students:

Maria Pires (employee of ZAP-X company)

Master students:

Marta Simões (ongoing), Gegimma José (ongoing)

Research area:

Instruments and methods for beam range verification in radiation therapy

- Positron Emission Tomography
- Prompt gamma imaging



LIP Advisory Committee meeting, 23 April 2025

1. Continuation of the TPPT collaboration

- PET scanner constructed by the TPPT collaboration is installed at the MD Anderson Cancer Center
- LIP participates in several studies initiated by UT at Austin
- All Monte Carlo simulations are "outsourced" to LIP

Highlights of 2024:

- Several experimental campaigns to characterize the scanner were conducted with the regular and FLASH beams
- First steps were made towards prompt gamma imaging with collimator inserts
- Confirmed the possibility to detect ortho-positronium decay

Ongoing work:

- Designing a flat-panel multipurpose PET/PGI imaging system
- Experimental and simulation study to maximize Depth-of-Interaction readout capabilities
- Searching for funding together with the Austin team





2. Prompt Gamma Imaging with multi-slat collimator (OPGI)

- Small-scale prototype was constructed in 2023 in internal collaboration with the Detector lab
- First time on the proton beam of HollandPTC same year

Highlights of 2024:

- Data collected at HollandPTC were analysed
- Bragg peak position is not clear
 - Detector shielding is not sufficient
 - Beam bunch broader than expected

Future plans:

- New round of simulations using the beam time structure measured at HollandPTC to improve background rejection
- Improve detector shielding and apply for a new experimental campaign at HollandPTC with lower beam energy
- Investigate the implementation of the OPGI in irradiations with ⁴He beams, look for funding opportunities



SWOT

Strengths

- Deep understanding and practical knowledge of Monte Carlo simulation methods
- Strong expertise in simulations for health applications
- Well developed suit of custom software tools for simulation, optimization and data processing
- Access to the LIP workshops and Detector lab for prototype development

Weaknesses

- Very small team with little of the FTE of the senior staff allocated to research
- Absence of a proton therapy facility in Portugal

Opportunities

- More than ten Charged Particle Therapy facilities to be constructed in Spain in the next 3 to 5 years
- Agreement is reached to build a Proton Therapy center in Portugal (IPO-Porto)
- Potential synergies to exploit with other LIP groups (RPC R&D, RADART)

Threats

- Fixed time work contract of the key researcher expired
- Lack of consecutive funding