LABORATÓRIO DE INSTRUMENTAÇÃO
E FÍSICA EXPERIMENTAL DE PARTÍCULAS
partículas e tecnologia

RADART

RAdiation **D**osimetry to **A**dvance **R**adio**T**herapy

Total FTE=10.8 (Researchers=1.4)

- **7** Researchers
- **8** PhD students
- **4** MSc students
- **4** Undergraduate students/Trainees
- **7** External collaborators

- **5+1** Articles in int. journals
- **1** LIP students note
- **4** Int. Oral presentations
- **5** Int. Poster presentations
- **7** Student presentations
- **1** PhD + **3** MSc thesis finished

SPOF array for high-res. dosimetry

- Prototype built and tested
- D. Guerreiro **Ph.D. finished** (14.03.2025)
- **3 papers published**

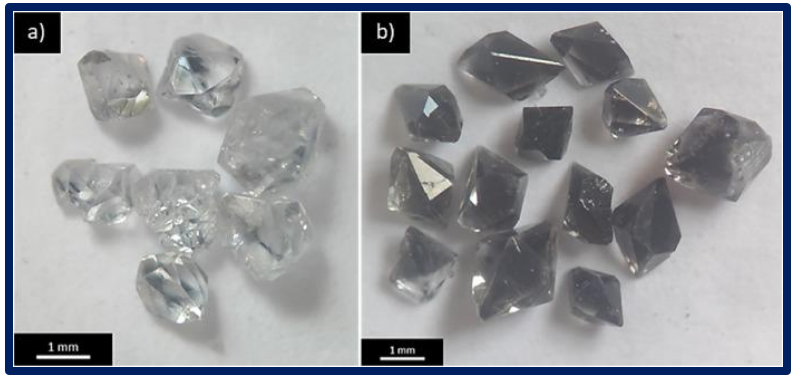
Next steps

- DAQ for high-rate events
- Apllication to MBRT

} **PEX SciMint** (submitted FCT)

Materials for micro- and nanodosimetry

- Extensive production otimization of Al_2O_3 crystals: **New paper published in SSS (2025).**
- Irradiation tests conducted with Sr-90/Y-90 sources (Riso setup at CTN) and the **carbon ion beam at HiT** (collab. with DKFZ)
- **PEX LUMIDOS** approved (49 942 Euros)



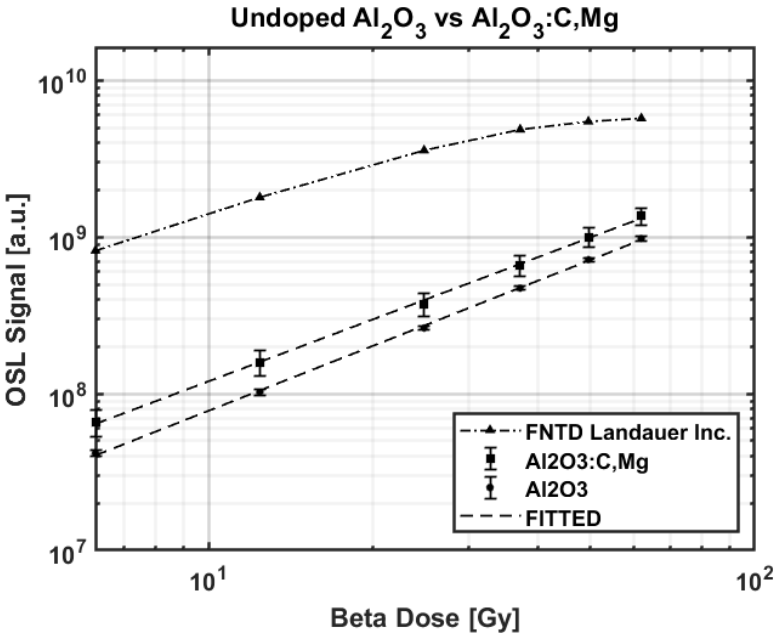
Next steps

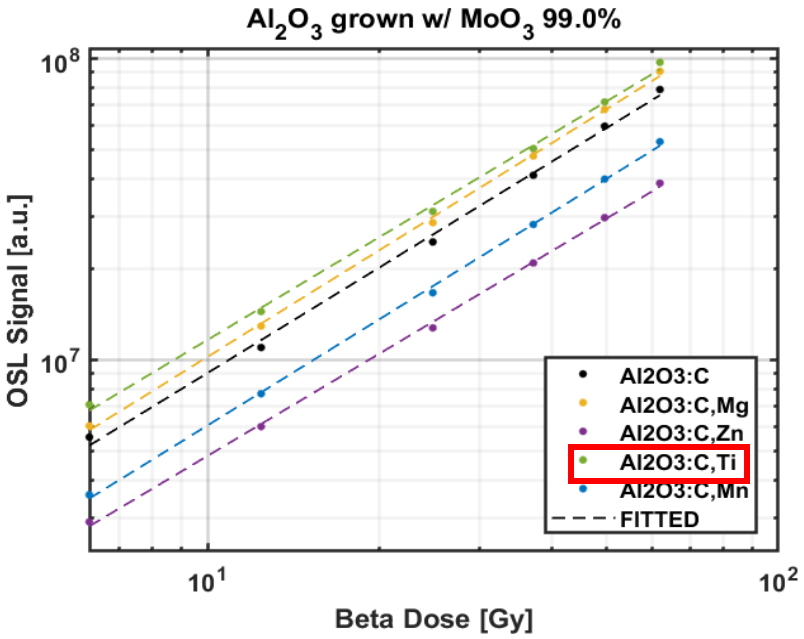
- Improve crystrals dopping protocol and new irradiation tests
- Nanofibers for large area OSL dosimetry (collab. CF-UM-UP and C2TN)

} **PEX SHIELD** (submitted FCT)

Materials for micro- and nanodosimetry

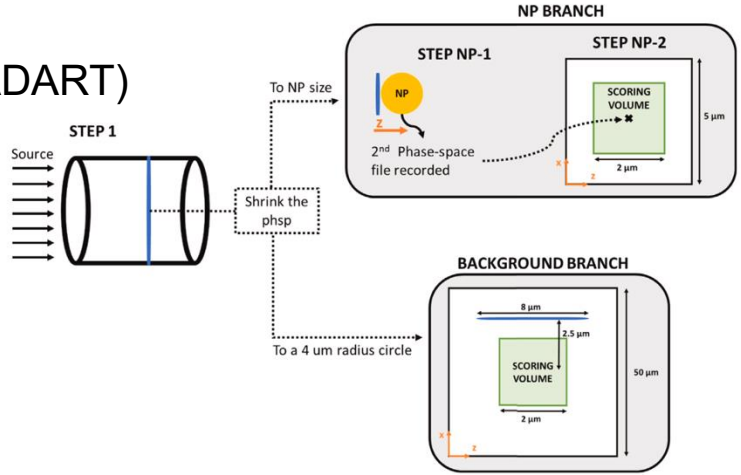
OSL response of the crystals with a Sr-90/Y-90 source





Modelling radiobiological effects of NPs

- Completion of the multistep simulation overflow. Study of the lateral beam profile CPE (collab. with H. Rabus from PTB)
- Study of the ROS production for different beam qualities (Co-60, kV X-rays and 13 MeV proton beam): **New paper published in RPC (2025)**
- **IC&DT Cell.DOT approved**
  (249 872.40 Euros, 69 120.00 for LIP/RADART)

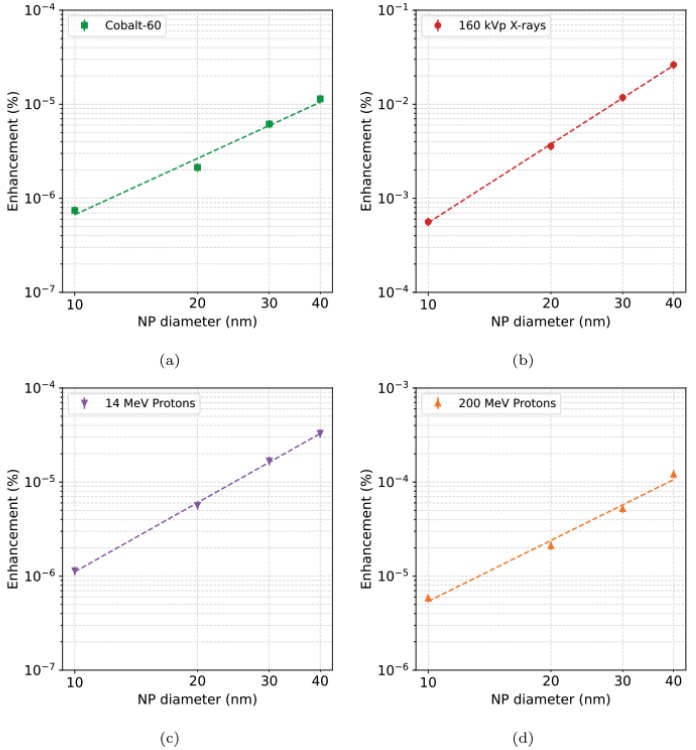


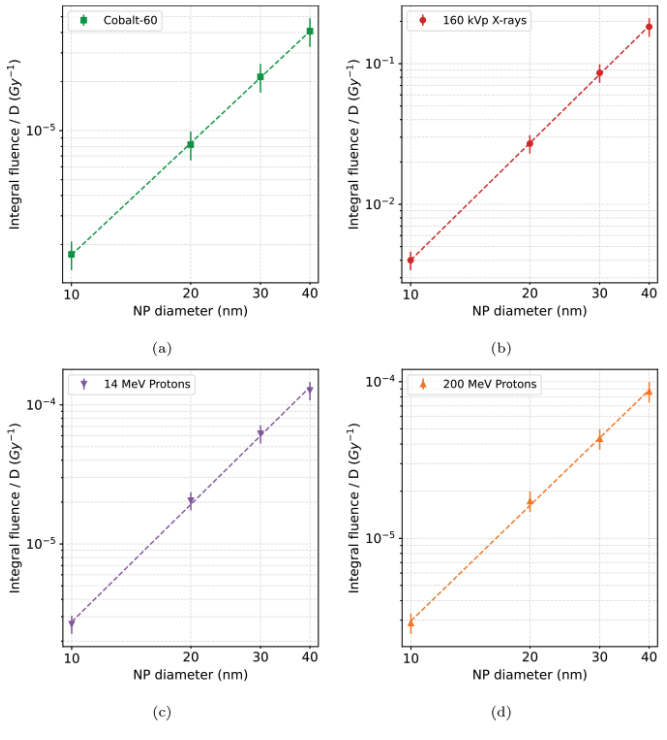
Next steps

- J. Antunes completion of the PhD thesis.
- Start the Cell.DOT project (june 2025)

Modelling radiobiological effects of NPs

ROS production as a function of the NP size





Effects of PT in NDD

- Irradiation with ^{60}Co source (C2TN) and MV X-rays (HSM) continued and new irradiations with proton beams at CMAM, Spain, were performed.
- Biochemical analyses confirmed reduced huntingtin protein expression and aggregation.
- pdb4dna scorer in TOPAS nBio was modified to analyse protein files and assess irradiation-induced bond breaks
- Implementation of proton-boron fusion reaction in TOPAS n-Bio

Next steps

- C. Coelho completion of the PhD thesis
- Clinical proton irradiations are planned
- Study of proton-boron fusion reaction for bond breaks of amyloid structures

SWOT

Strengths

- Ability to attract students.
- Collaborations with from national and international research groups.
- Financial support is improving

Weaknesses

- Heavy teaching/administrative workload of researcher with permanent positions at the faculty
- Full-time researchers in precarious employment position at LIP.

Threats

- End of ProtoTera program
- Limited ability to retain graduating PhD students.

Opportunities

- > 10 new PT centres in Spain.
- 1 PT centre in Oporto, Portugal

RADART team

Ph.D. students


Cristiana Rodrigues


Duarte Guerreiro


Joana Antunes


Carina Coelho


Francisca Afonso


Joana Leitão


Mariana Brás


Miguel Molina-Hernández

Researchers


Jorge Sampaio


Daniel Galaviz


João Gentil


Luís Peralta


Patrícia Gonçalves


Pamela Teubig


José Pires Marques


José Figueiredo