



# LOMaC

## Laboratory of Optics and Scintillating Materials

**Rute Pedro**, on behalf of the team

LIP Lisboa - 28 April - Advisory Committee Meeting

# Team and Infrastructure's mission



B. Pereira, PhD



R. Machado, PhD



J. Gentil, Res.



L. Gurriana, tech.



L. Seabra, tech.



A. Gomes, Res.

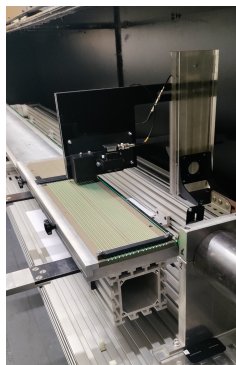


R. Pedro, Res.

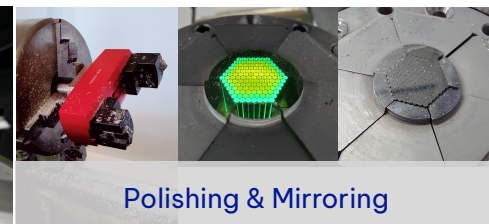
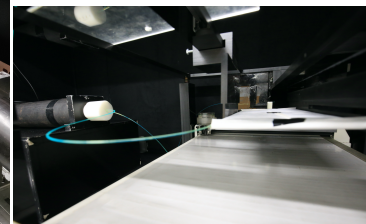
**Close LIP collaborators:** P. Conde, R. Gonçalo

**Other students:** Pedro Sousa, Gonçalo Rosa,

3+ intership



**study and characterise** scintillators and optical materials  
**prepare** optical fibres for light readout  
**integrate** optical systems for radiation detection



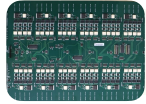
Polishing & Mirroring

**to develop detectors** for Particle/Nuclear Physics and applications  
and **advance scintillator technology**

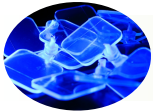
**training and educating**



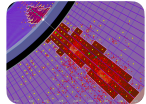
# Ongoing projects and time scale



ATLAS TileCal HV Upgrade - **entering production now**



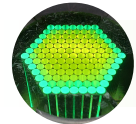
Scintillator R&D - **funding-dependent**



ALLEGRO/FCC Hadronic Calorimeter



**AntiMatter-Otech - NEW, intense R&D and production peak**



Fibre preparation (NEXT, Dosimetry, **Boneoscopy - NEW**)

2025

2026

2027



# ATLAS TileCal Phase II Upgrades

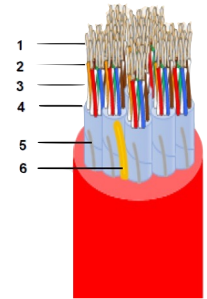
## HV supply, remote regulation and bus boards

- Final set of prototypes; 256, 256 and 896 units needed
- Pre-production **delays due to PCB QC test failures at producer**
- **Pre-production this year**, followed by production (first batch of HV bus already in production)
- Preparing QC protocol and monitoring for production



## HV Cables

- Prototypes developed with national branch of General Cable
- **Successful prototype/pre-production of cable with 12 pairs of wires**
- 24/32 pair cables delayed to 2026 (fire tests triggered production procedure review and/or material change)



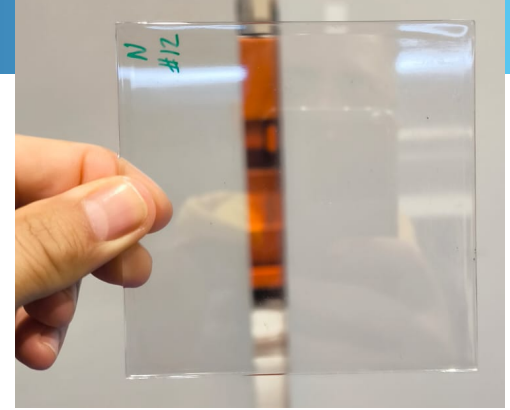
## Scintillator Radiation Hardness

- **Published** Run 2 study, including HL-LHC extrapolation [JINST 20 \(2025\) 06, P06006](#), Run 3 data analysis

# Scintillator R&D and DRD Calo activities

## Investigating **new polymer matrices based on PET/PEN**

- Collaboration with IPC/UMinho
- Good progress: from small samples to **better/large quality plates**
- New characterisation setups (decay time)
- Set basis for development with industry

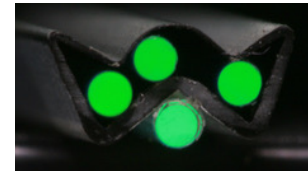


## **Funding and International framing**

- ScintiLink proposal (250k€ early 2024) unsuccessful -> resubmitted **ScintiNext** (early 2026)
- Participation in plastic scintillator R&D work package of DRD Calo

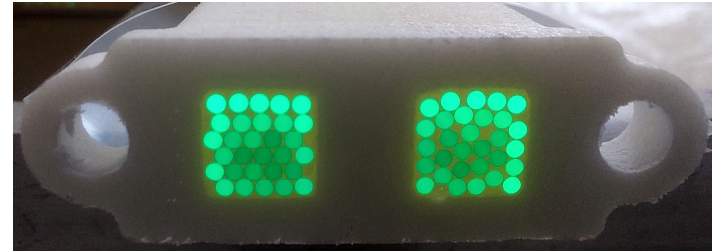
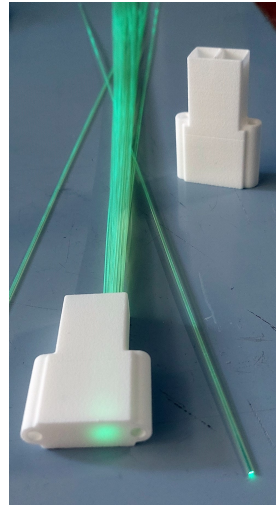
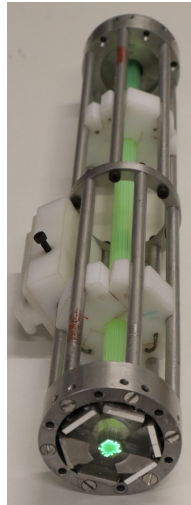
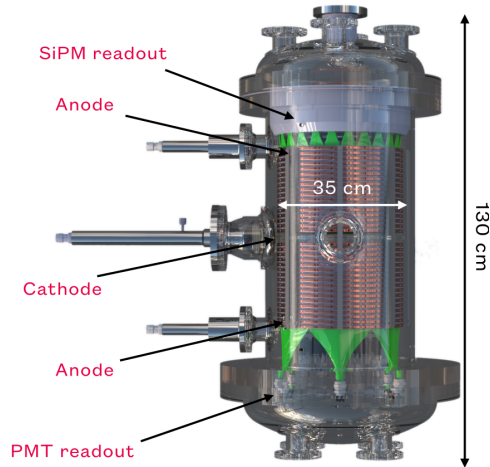
## **DRD Calorimetry**

- **Co-leading HCAL/ALLEGRO proposal for FCC**
- Contribution to optical coupling R&D, scintillator tests in prototype



# Fibre preparation for NEXT

NEXT HD demonstrator



## 300 individual fibres prepared for

- NEXT-100 muon veto
- NEXT HD demo prototype planes

## Fibre bundling and connection

- Optimisation of connectors for gluing
- Production and gluing of fibre bundles to connectors

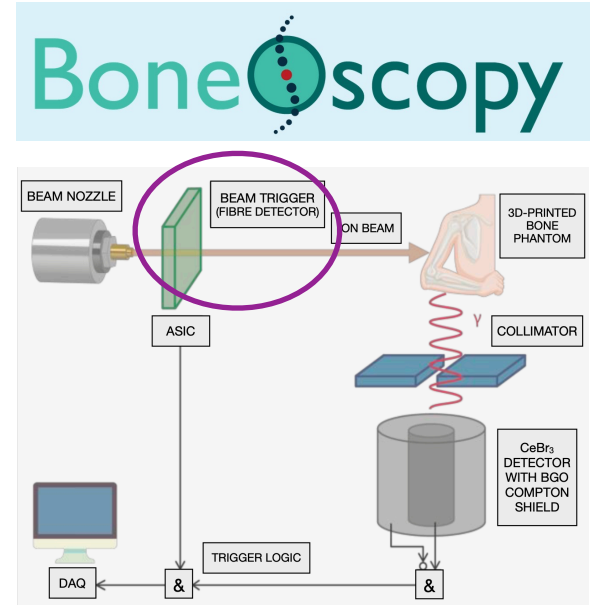
# Medical Applications

Supporting LIP's participation in **Boneoscopy** EIC project - **NEW**

- Collaboration with the **Part4Health** group
- Real-time monitor of bone cancer radiotherapy
- Contribution to **beam trigger** based on sub-mm  $\emptyset$  scintillating fibres

## Microdosimetry

- Collaboration with the **RADART** group
- **New project SciMINT** with  $<0.5$  mm  $\emptyset$  fibres for radiation field characterisation in mini-beams therapy



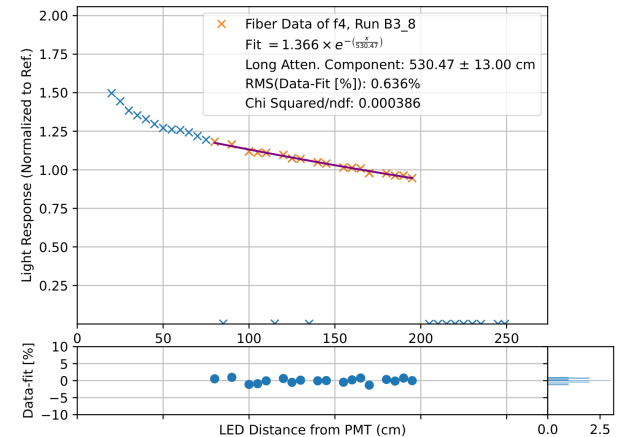
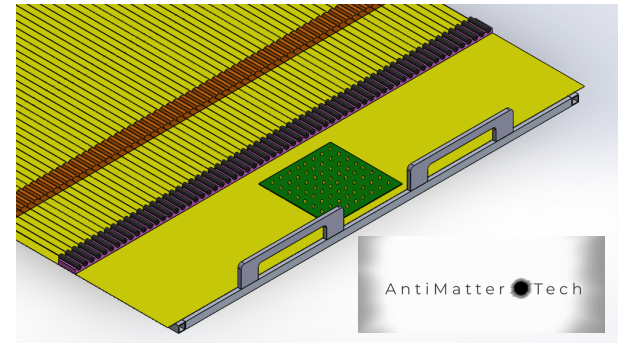
# AntiMatter-OTech - NEW

## EIC project led by CNRS (on-hold after amendment approval)

- Opaque liquid scintillator detector for **nuclear reactor monitoring**
- Amendment: detector construction to Lisbon
- **LIP entering consortium**, 300 k€ (PhD grants)
- Co-organised collaboration meeting in Lisbon, Nov 2025

## Responsible for optical fibre readout system (R&D and production)

- **20000-fibres** (1 mm Ø, ~4 m-long) with SiPMs
- First mechanical drawings of fibre assembly system
- Light attenuation measurements



# SWOT

**Long-standing expertise** in scintillator-based detectors

R&D across **fundamental science and applications** supports **flexible funding strategies**

Recent **equipment/infrastructure investments** expanding technical capabilities

Established **project pipeline** for the coming years

Growing **international collaborations** and **leadership roles** within the team

New projects successfully **attracting students**

Key **team members** distributed across **multiple groups/projects**

Increasingly **demanding project portfolio** ahead

Unpredictable **funding landscape**