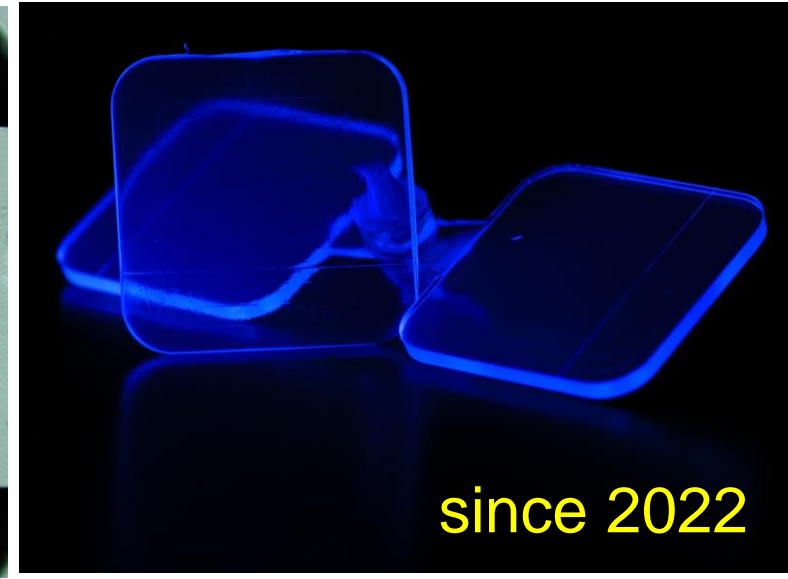
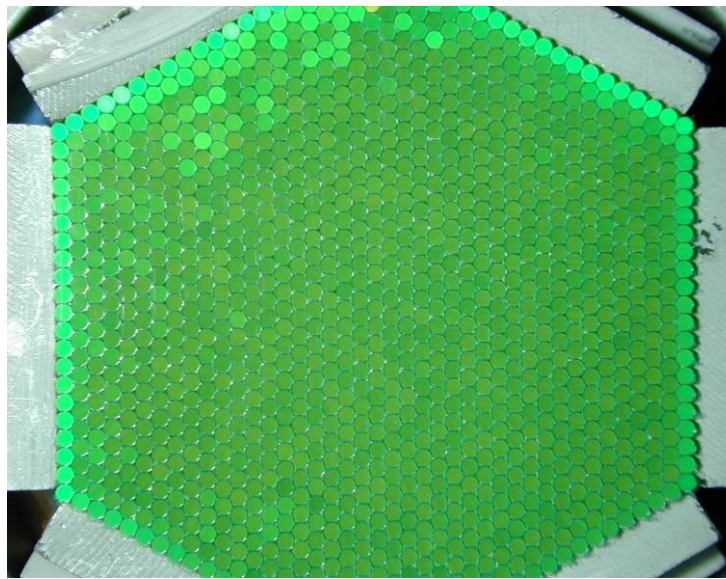
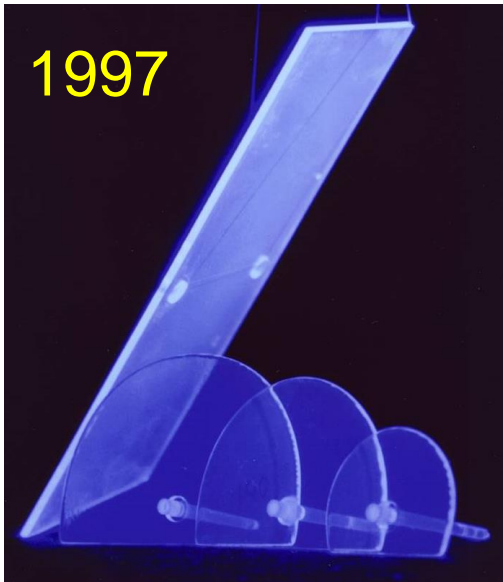




LABORATÓRIO DE INSTRUMENTAÇÃO  
E FÍSICA EXPERIMENTAL DE PARTÍCULAS

# LOMaC

Laboratory of optics and scintillating materials



A. Gomes, R. Gonçalo, L. Gurriana, A. Maio, R. Pedro,  
J.G. Saraiva, L. Seabra

PhD students: R. Machado, B. Pereira

IPC/Univ. Minho main collaborator: A. Pontes

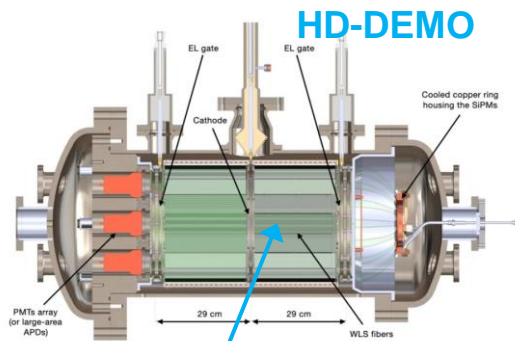
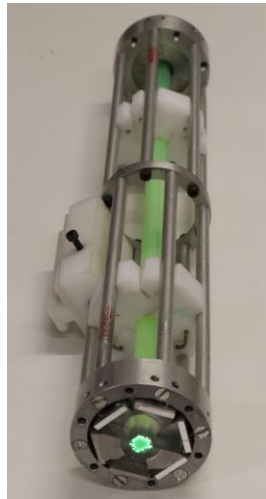
# MAIN ACTIVITIES 2023-2024



## New scintillators based on PEN and PET

(next slide)

## Sets of fibres for NEXT

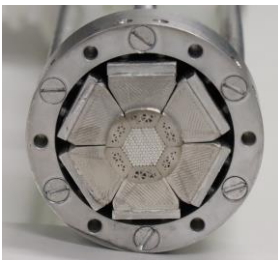


WLS fibres panels

Preparation and aluminisation of sets of optical fibres with different lengths.

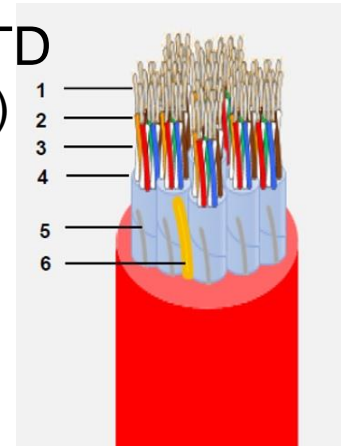
➡ IFIC, Valencia

➡ DIPC, Donostia



## ATLAS Phase II upgrade

HV cables for TileCal and HGTD  
(with PT branch of General Cable)



HV regulation & distribution boards for TileCal  
(with contributions from LIP eCRLab and Detector lab)



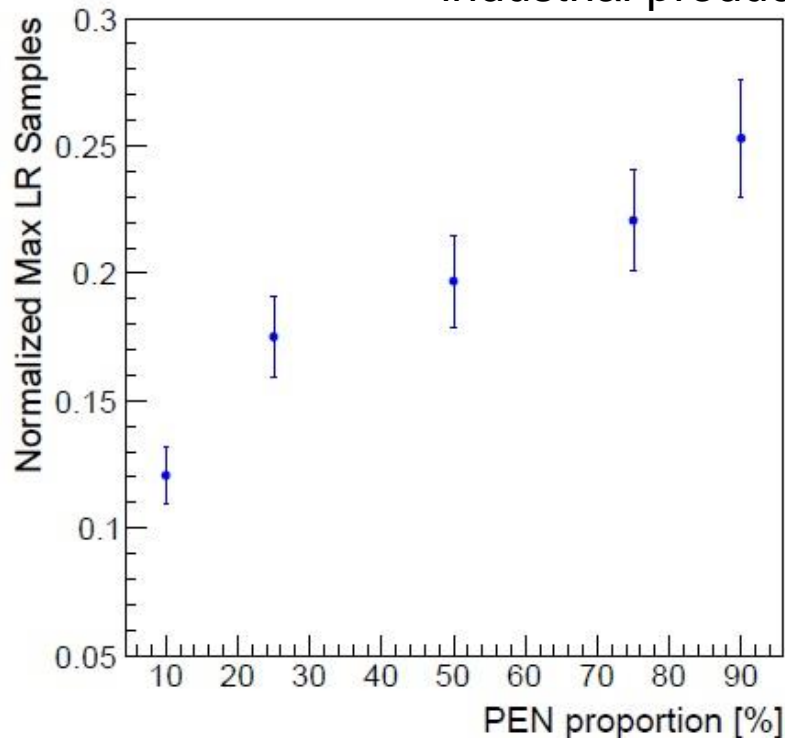
R&D finishing

Preparing for production

# TOWARD FUTURE DETECTORS

## New scintillators based on PEN and PET

With IPC / Univ. Minho  
**DLight** exploratory project (PI: Rute Pedro) finished in 2023  
 New proposal **ScintiLink** submitted: towards real size tiles produced by injection moulding; set basis for industrial production



## ECFA Detector R&D Roadmap DRD6 DRD6 Collaboration

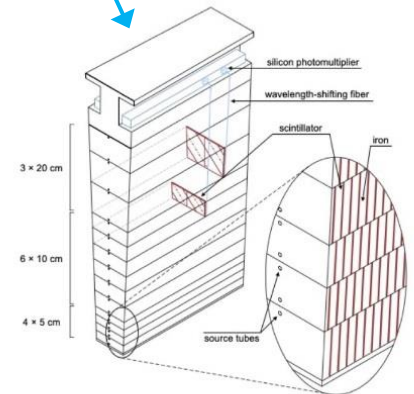
- Sampling HCAL made of scintillator tiles, readout using WLS fibres
- Cost-effective approach for hadron calorimetry



TileCal

### Hadronic calorimeter

- Design based on alternating steel and scintillator layers
  - Well studies and tested design (similar to ATLAS TileCal)
  - 5 mm absorbers, 3 mm scintillators
- 13 radial layers
- 128 modules in  $\phi$ , 2 tiles per module  $\rightarrow \Delta\phi = 0.025$
- $\Delta\eta = 0.025$  (grouping 3-4 tiles)
- Acts as return yoke for solenoid
- Performance studies progressing well



Our intentions for DRD6:

- R&D on PET + PEN scintillators with cost-effective production of tiles
- simulated performance studies of a high granularity calorimeter for a future lepton collider

# SWOT analysis

## □ Strengths

Long-standing expertise in the test, preparation, and aluminization of plastic optical fibres for detectors.

Only a few facilities of this kind exist in the world. LOMaC is fundamental for the ATLAS TileCal upgrades and it is frequently requested to contribute to other experiments (e.g. NEXT).

## □ Weaknesses

Difficulty to keep regular funding.

Laboratory poorly or not equipped for the characterisation of important properties of scintillating materials (light signal decay time, pulse shape, transmission spectra).

## □ Opportunities

The FCC-hh Conceptual Design Report has demonstrated that the TileCal design is still one of the best for a hadronic calorimeter. This opens the opportunity to participate in new detectors in HEP or related fields.

The ECFA Detector R&D Roadmap implementation, with the new Detector R&D Collaborations, opens new opportunities to boost our R&D on scintillators and calorimetry for the future experiments, to establish new international collaborations and attract new funding. **Materializing with participation in DRD6.**

## □ Threats

The closure of the PT-CERN PhD programme will most probably affect the incoming of new students.