# Design and characterization of the electronics of a fully functional FoCal-E prototype

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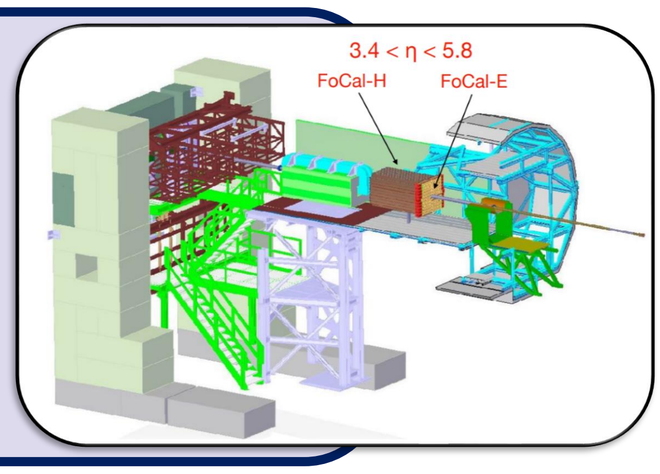
# Introduction

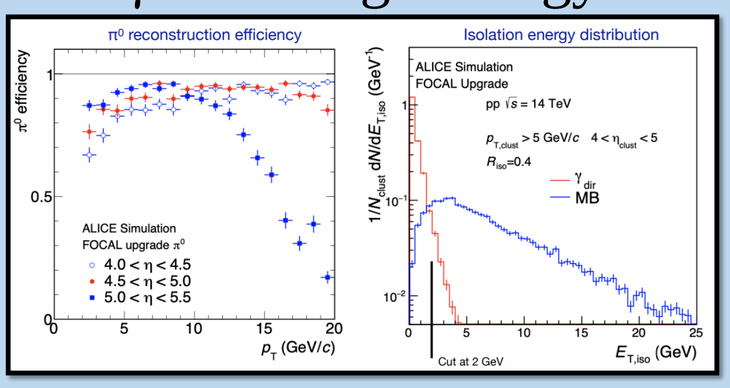
**The FoCal-E (electromagnetic calorimeter) detector is a part of the FoCal detector aiming to provide unique capabilities to measure small-x gluon distributions via prompt photon production.**
**It represents an upgrade to the ALICE experiment, and will be installed during LS3 (in 2026–2028 ) for data taking at the LHC in 2028-2031.**




# Challenges

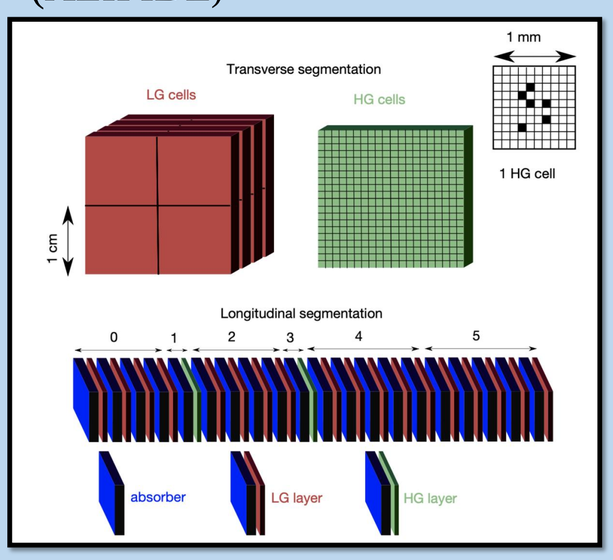
## Goal:

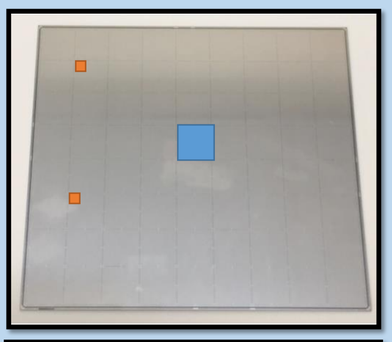
- **Separate $\gamma/\pi^0$** at high energy




## System design:

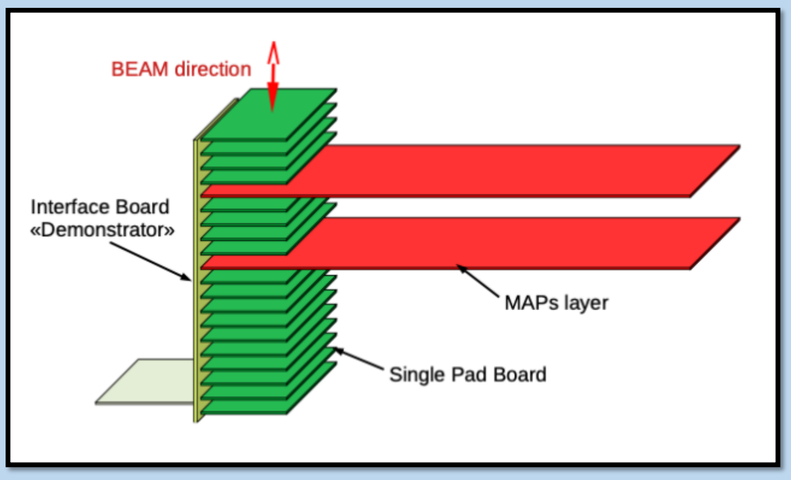
- **PAD (LG) layers:** granularity 1x1 cm2, analog readout
- **PIXEL (HG)** layers: 30x30 µm2 digital readout (ALIPIDE)



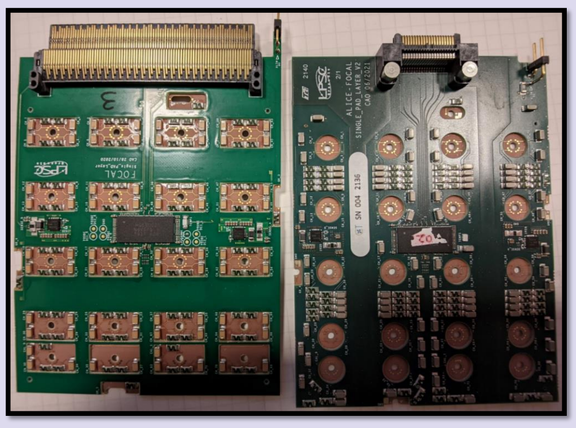
# Demonstrator module:

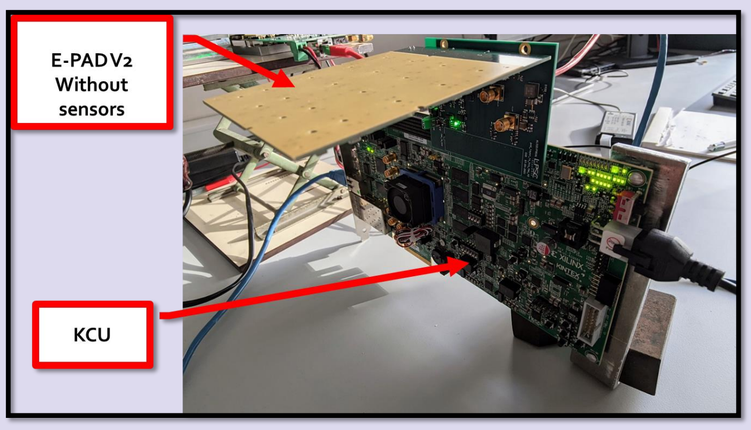
- 18 single pad board (18 HGCROC with 1296 channels)
- 1 Aggregator board



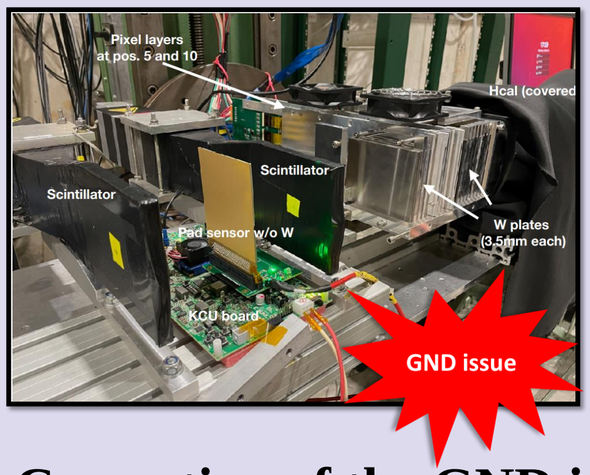

# Results

## The design of the single E-PAD board: V1 and V2

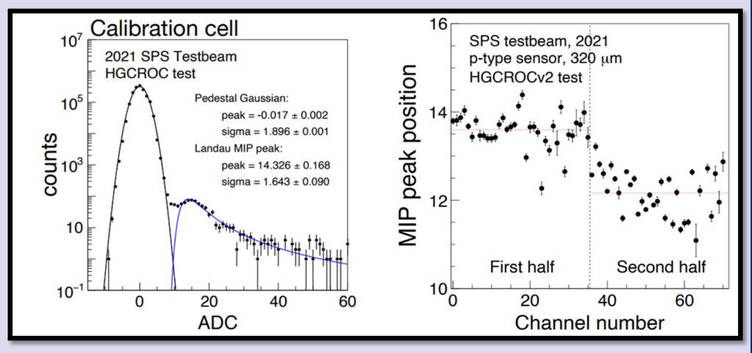





## First measurements under beam: SPS Sept. 2021

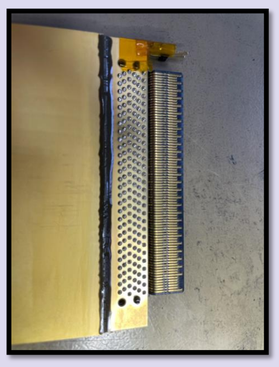



### MIP extraction



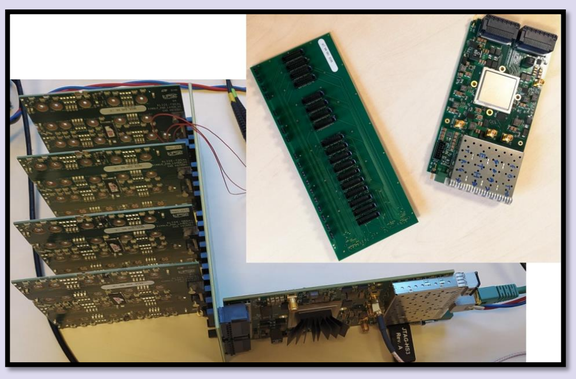

## Correction of the GND issue

- Connecting efficiently the bottom of the detector to the GND of the PCB.
- Solution tested and validated in Lab conditions under HV.



## The design of the aggregator board

- First prototype of the aggregator board and its interface board for the demonstrator module
- Readout : With a CRU or via Ethernet.



# Conclusion

**This prototype is firstly used to validate and characterize the choice of the front-end ASIC, the design of a testing board capable of emulating the response of the Si-sensors and the development of the aggregator board and its associated firmware and software.**
**The performance of this demonstrator board will be evaluated soon under beam.**