

# The European DHCAL status

CIEMAT, IPNL, LAL, LAPP, LLR, PROTINO, SACLAY

- Detectors study: GRPC,  $\mu$ MEGAS
- Electronics development : Semi-digital
- 4-chip board
- Beam test & prototype
- Funding

Imad LAKTINEH

# GRPC development & characterization

**GRPC** : IHEP+IPNL (see Vladimir talk)

8X8 pads ok , 8X32 pads ok

**Activities :**

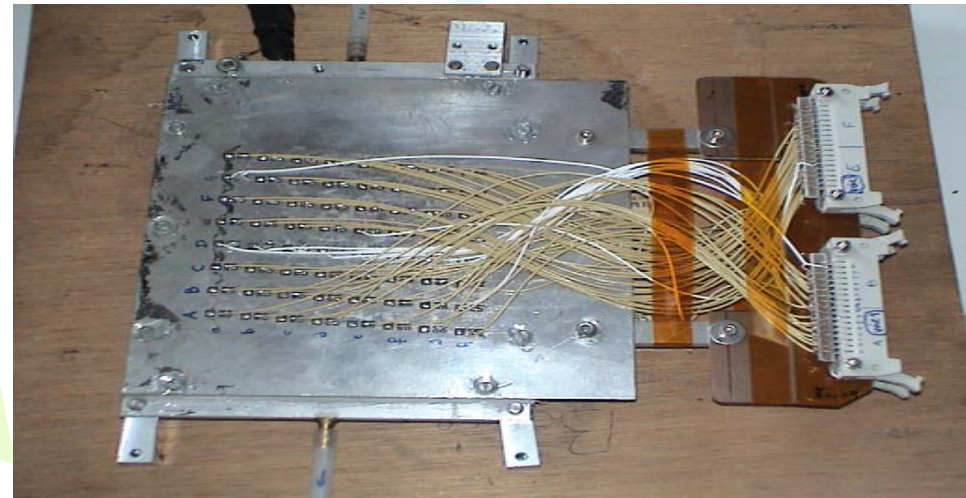
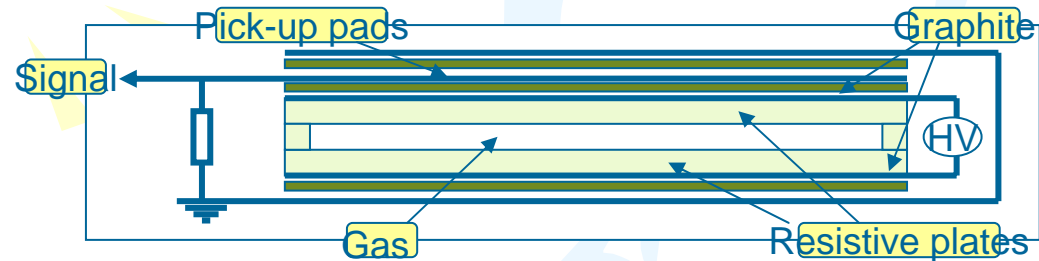
Efficiency vs multiplicity

Gas mixture (Isobutene->CO<sub>2</sub>)

**important issue**

Conceiving, building and testing

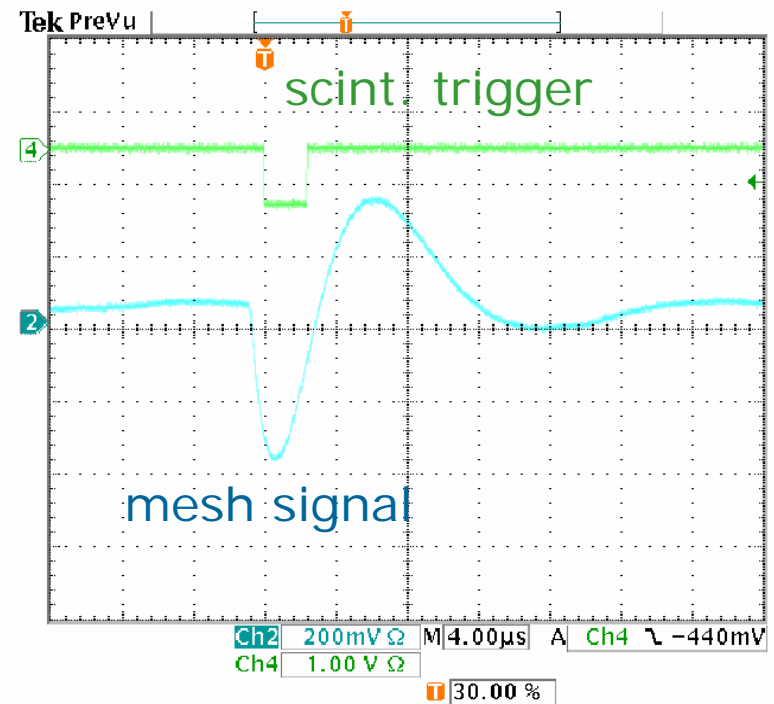
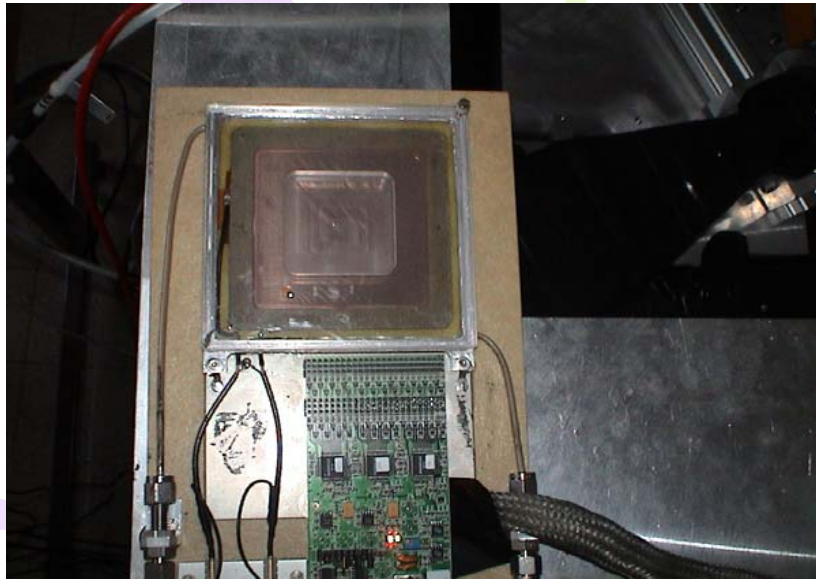
large area GRPC



# $\mu$ MEGAS development & characterization

$\mu$ MEGAS : LAPP+IPNL (see Catherine talk)

8X8 pads (*mesh*) ok , 6X16 pads (*bulk*) ok , 8X32 pads (soon)  
(collaboration with Saclay and CERN))



**Activities:**

Efficiency, X-talk, homogeneity

*more efforts for large  $\mu$ MEGAS (largest mesh size 50X50 cm<sup>2</sup>)*

# Electronics development

LAL, IPNL, LLR

## HaRDROC1

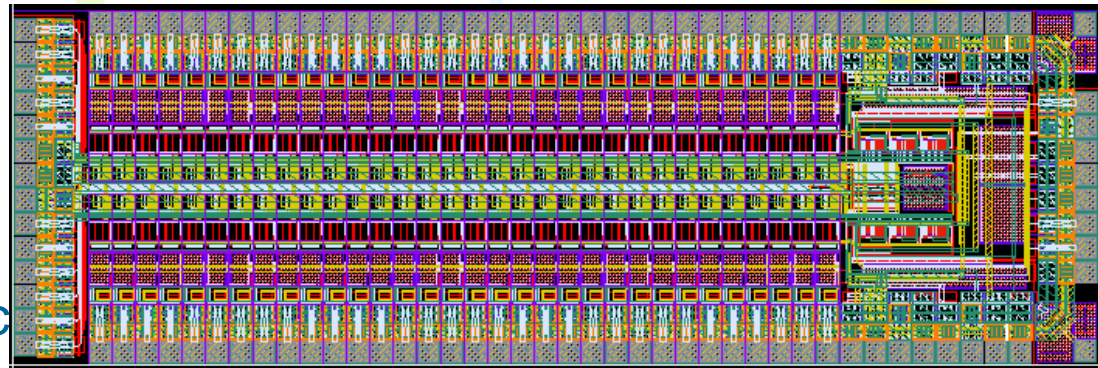
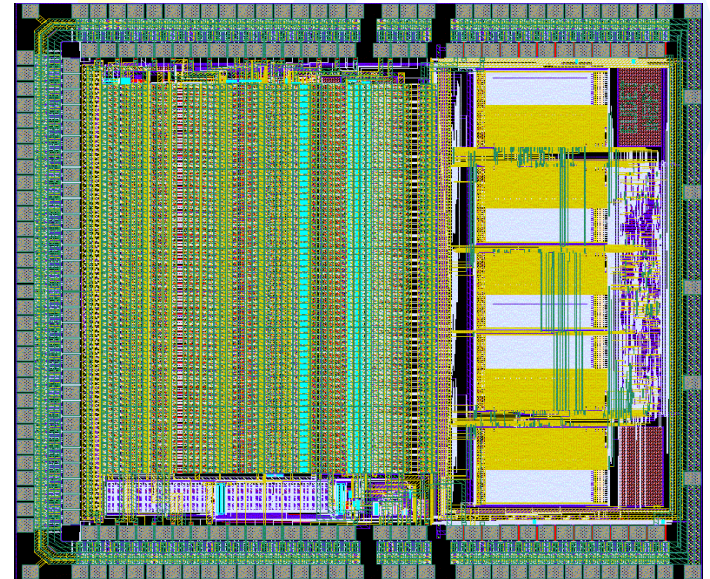
- 64 ch.
- Digital/analogue output.
- Low consumption, power pulsing.
- Digital memory.
- GRPC ( $\mu$ MEGAS? Mikhail work)
- SiGe

**Already tested**

**New development for low charge detector, new chip**

- 64 ch (charge preamp)
- Digital output.
- Low consumption, power pulsing.
- Digital memory(5 evts)
- $\mu$ MEGAS (threshold # 2 for

**To be tested soon**



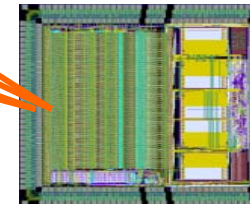
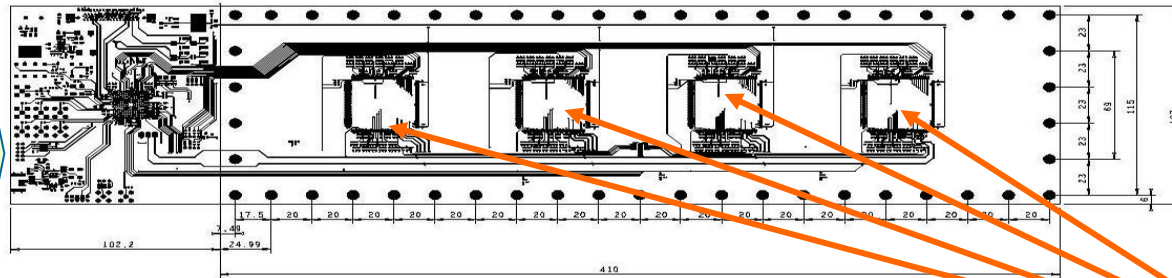
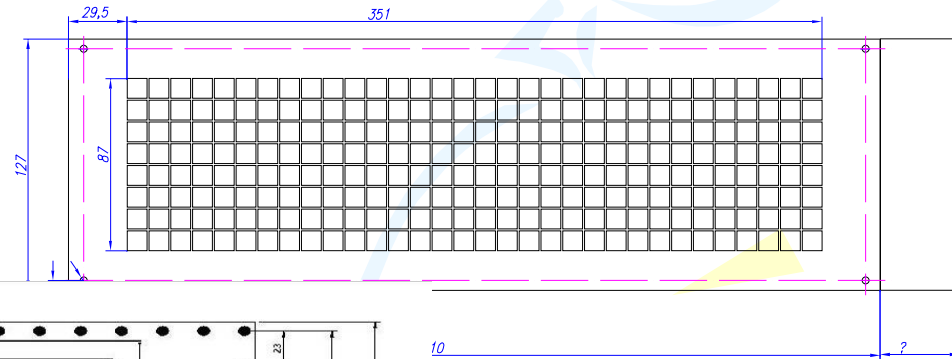


# 4-Chip board

## Aims:

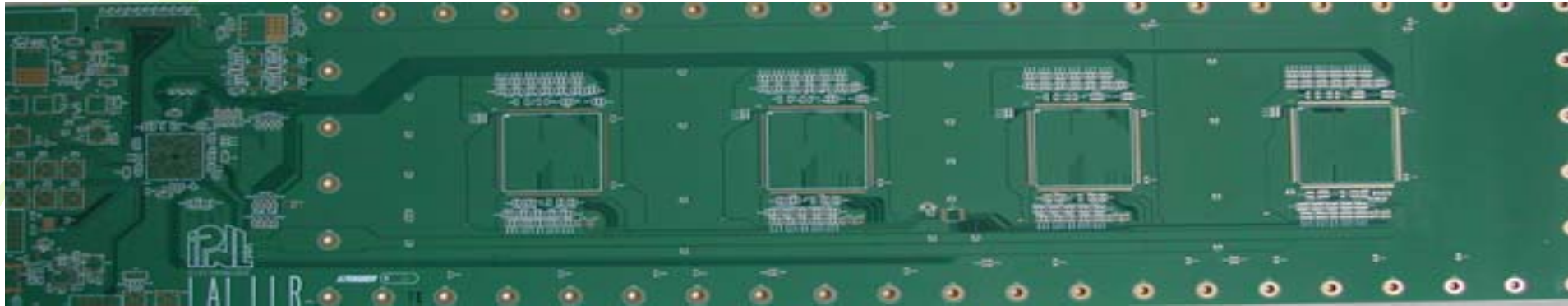
- Validate electronics for DHCAL
- Study the different detectors behavior.

- 8X32 pads detector (GRPC and  $\mu$ MEGAS)
- 8-layer PCB
- 4 HARDROC
- Readout USB + FPGA  
(see Clément talk)

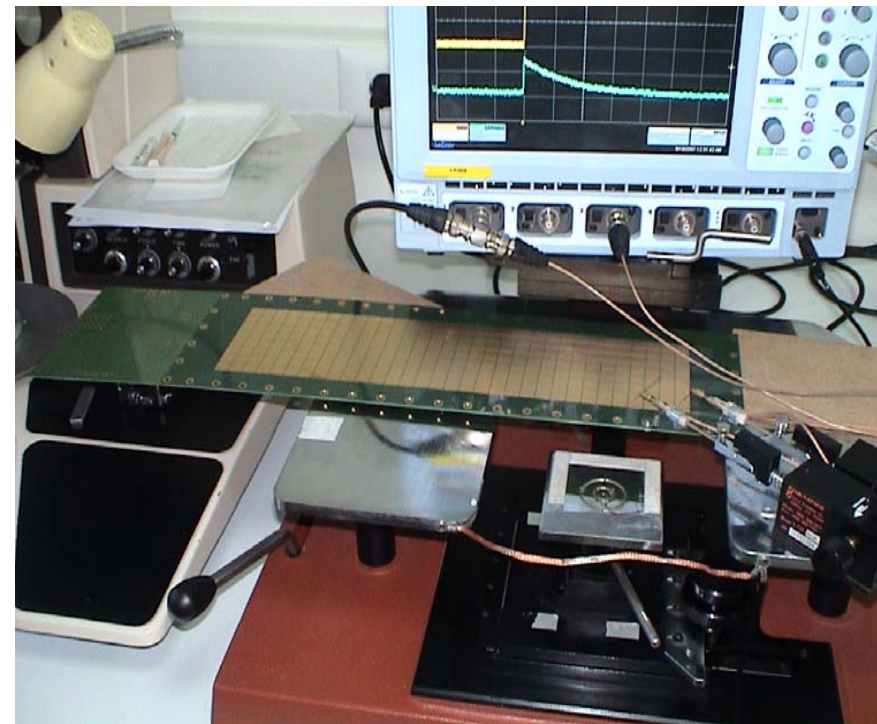
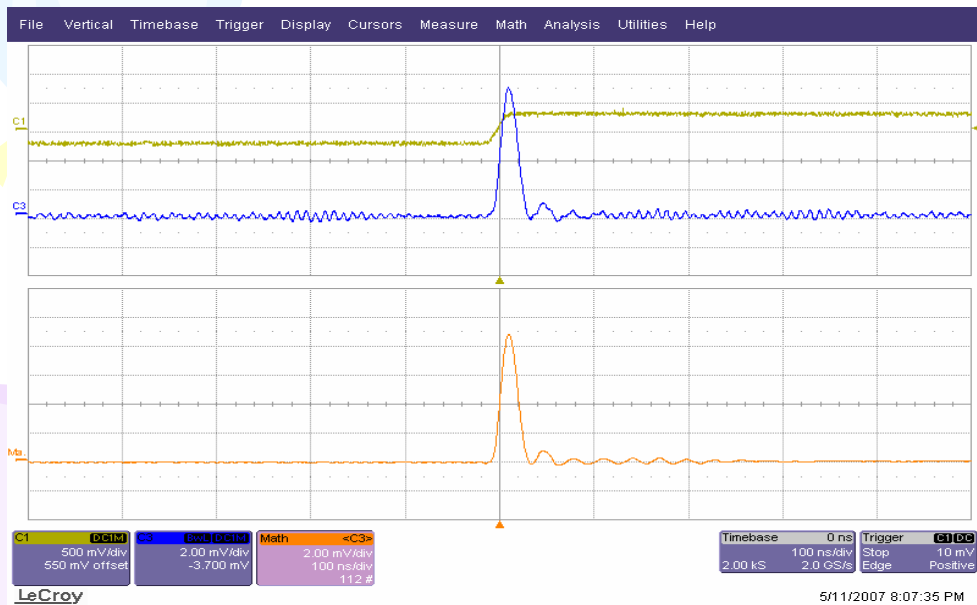


- **Acquisition** : digital and analogue  
(collaboration with U.K groups)

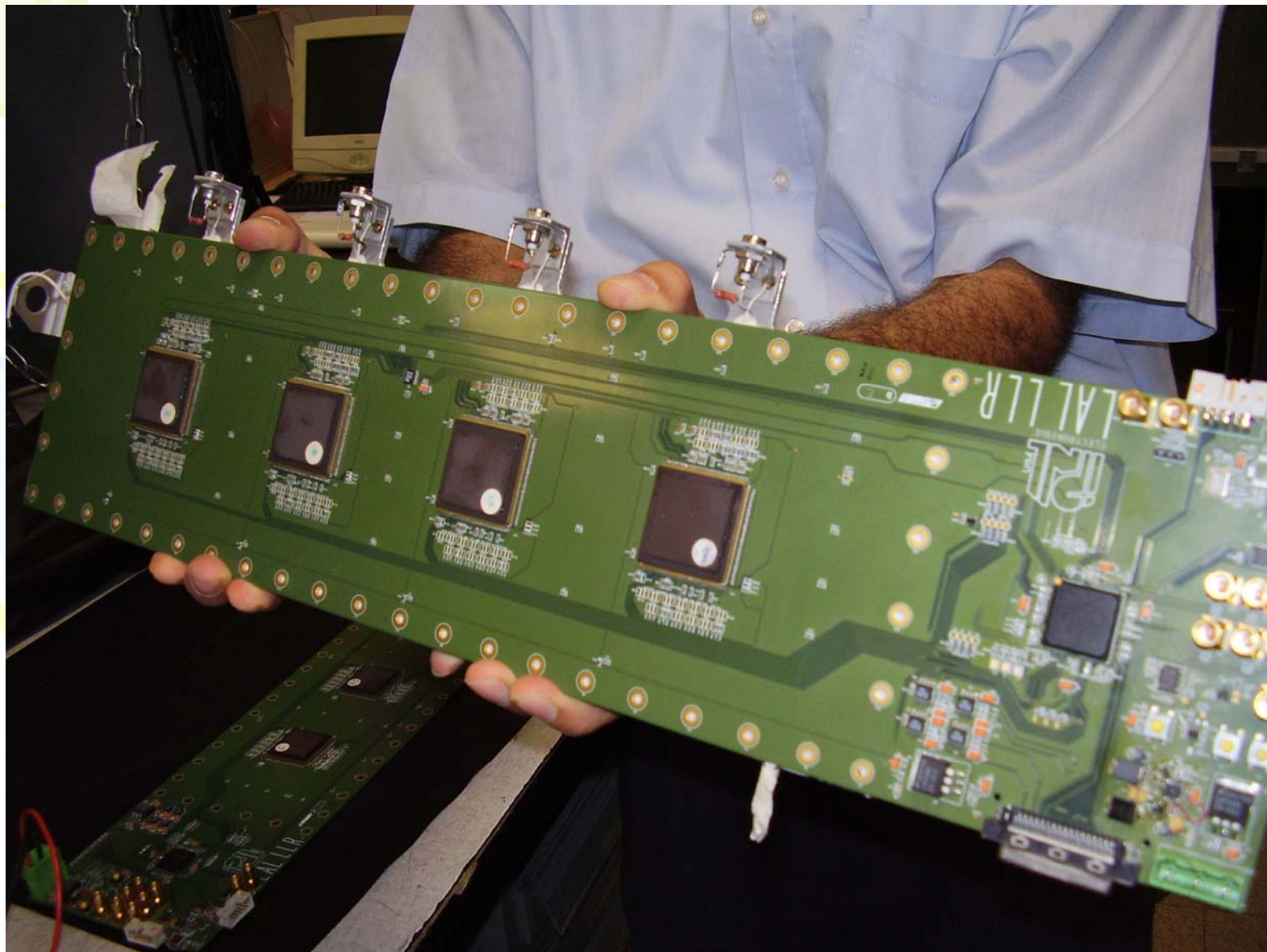
- 8-layer PCB , 800  $\mu$  thick
- 8X32 pads of 1 cm<sup>2</sup> and 500  $\mu$  separation



See Hervé talk



X-talk (<0.5 %)

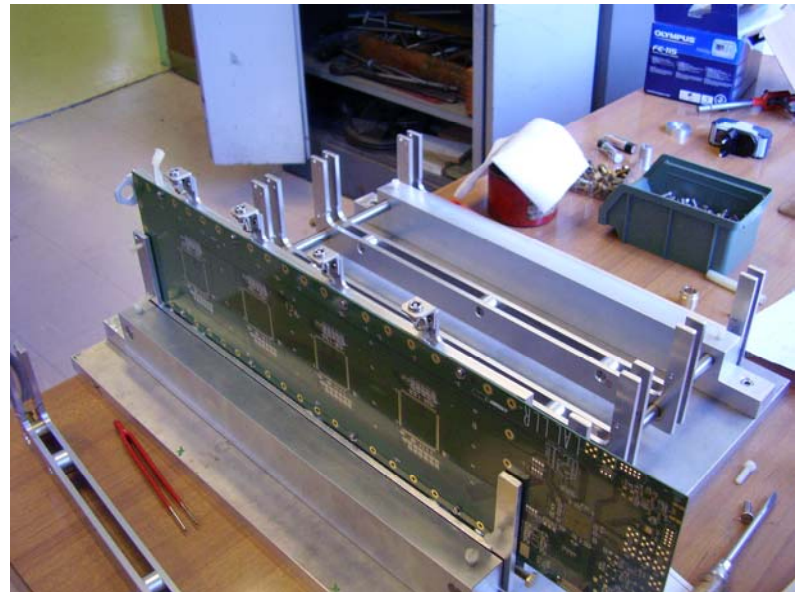
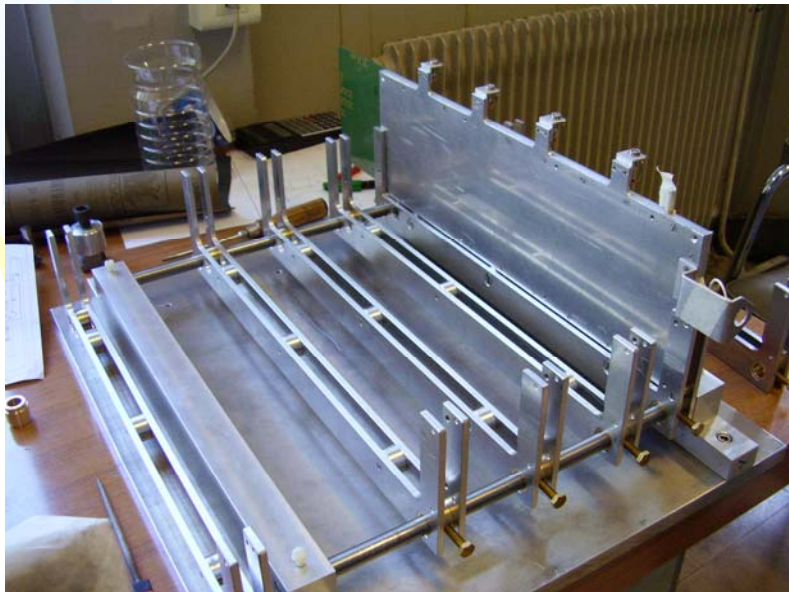




# Towards beam test at DESY

## To do List:

- Acquisition: to be completed soon (1-2 weeks)
- Detectors: GRPC is ready, MICROMEAS to be built soon using the same mesh structure to be used by T2K
- Setup: Almost done with the possibility to host few detectors







# Towards the prototype

## Milestones:

The aim is to build a prototype as close as possible to the final one (technological prototype)

- The first step after the DESY beam test is to build a large area detectors ( $>1\text{m}^2$ ) with an extensible scheme
- Compare different detectors before to make a detector choice

## Then

Build a **prototype** of 40 planes of  $70\times 70\text{ cm}^2$  each

- Detectors (IHEP, IPNL, LAPP, ...)
- Mechanical structure (CIEMAT, IPNL, LAPP, ...)
- Readout Electronics (LAL, LLR, IPNL, LAPP, ...)
- DAQ (collaboration with UK groups)

# Funding

3-year funding form "Agence nationale de la Recherche" (ANR)

**670 k\$** = 480 k\$ + 190 k\$(postdoc) **OK**

Requested for **2008** from IN2P3-CNRS  
(R&D and prototype construction only)

**240 k\$**

**waiting**

This will able us to build our technological prototype

# Conclusions

- The EDHCAL collaboration is now well established things are going as predicted;
- Going to large area fully equipped detectors will be the main issue very soon;
- There is still place for other groups to join the efforts for the technological prototype project.