

# DHCAL-MICROMEGAS Test Beam

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I r f u



saclay

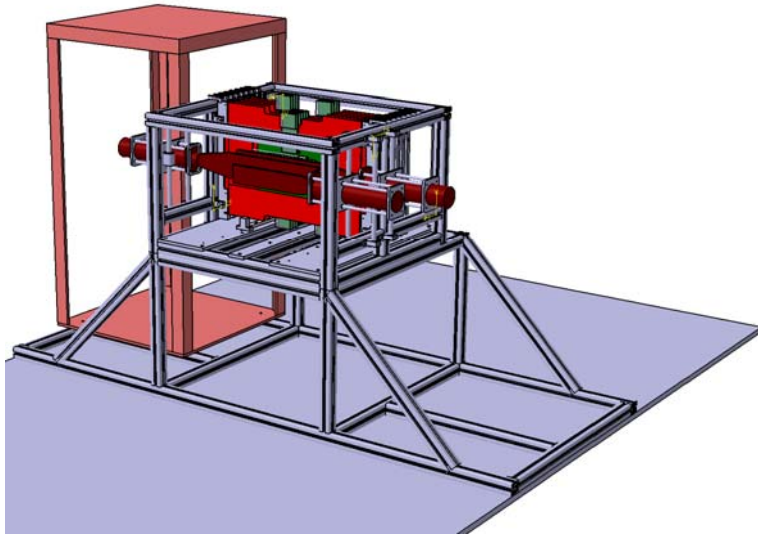
Institut de  
recherche sur les lois  
fondamentales de  
l'Univers



# Test Beam (4th August-14th August 2008)

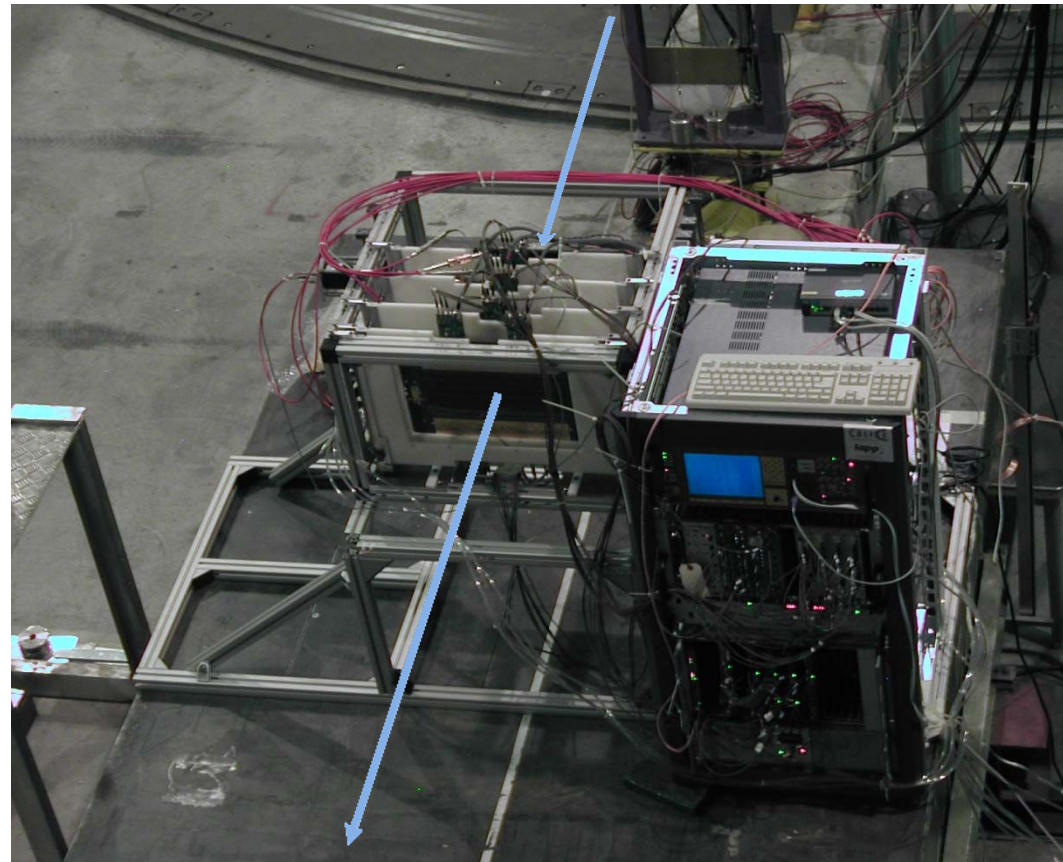
- From dream to reality

H2 line at SPS-CERN



## Characterisation of the prototypes:

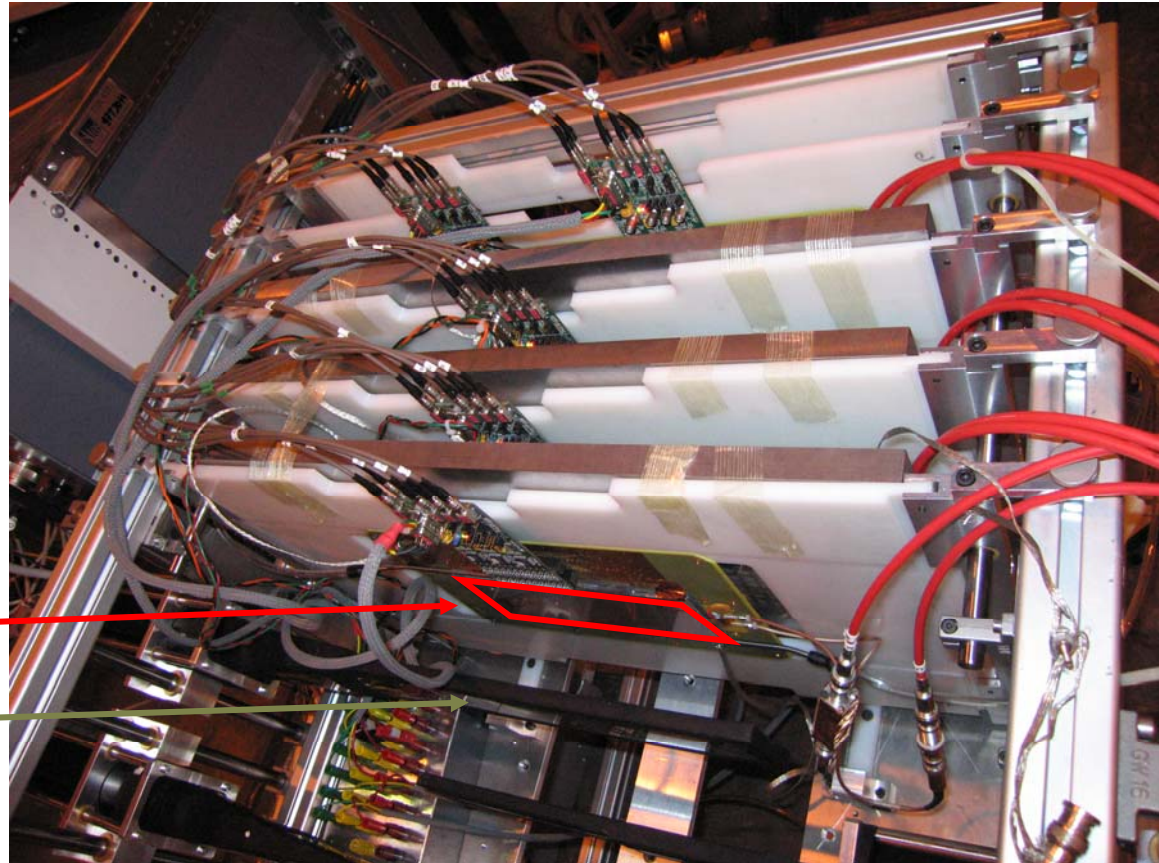
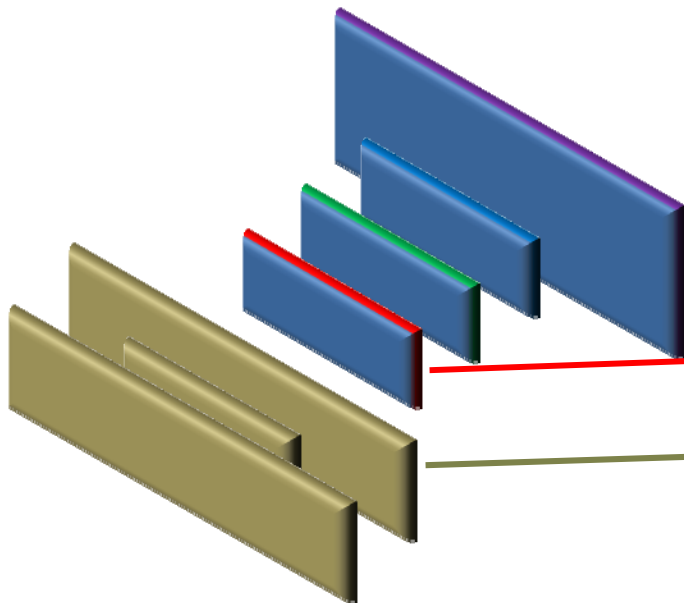
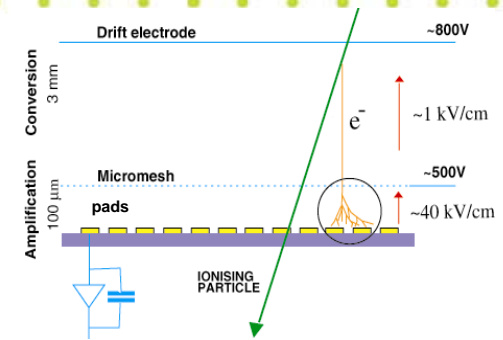
- prototypes disparity
- pad homogeneity
- multiplicity, efficiency
- X-talk studies
- behaviour in hadronic shower



# The Setup

- Trigger: 3 scintillators in coincidence
- 3 MicroMegas 6x16 pads
- 1 MicroMegas 12x32 pads
- Steel absorber option

**analog  
readout**



# The Team

- LAPP
- + IRFU (P. Colas, D. Attié, S. Turnbull)
- + IPNL (R. Gaglione)



Nice contribution from IRFU



Efficient work in good atmosphere

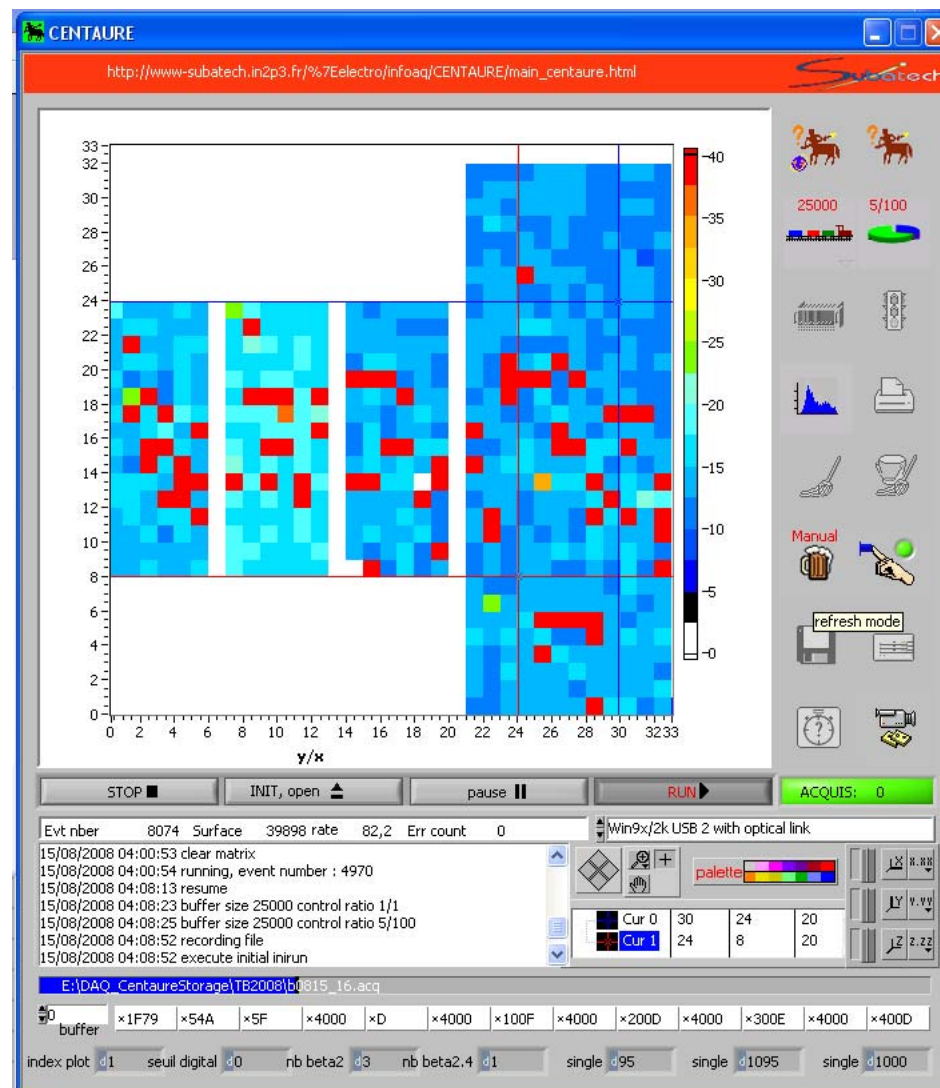
# The Beam and the Data

- The beam
  - H2B at the SPS-CERN
  - Officially from 4<sup>th</sup> to 10<sup>th</sup> August (but SPS problems)
  - Thanks to COMPASS-Shashlik from 14<sup>th</sup> to 15<sup>th</sup>
- The data
  - 6<sup>th</sup> and 7<sup>th</sup> August
    - 50k Muons @ ~200 GeV
    - 250k Pions @ 50 and 200 GeV (adjustment, gain calibration)
  - 7<sup>th</sup> and 14<sup>th</sup> August
    - 200k Pions @ 200 GeV** (+ 50k to check electronics HOLD)
  - 14<sup>th</sup> August
    - 200k Muons @ ~200 GeV**
  - 15<sup>th</sup> August
    - 250k Pions with 1 steel block + absorbers**

A. ESPAGILIÈRE  
Preliminary Analysis and Results  
this afternoon

# The DAQ

- CENTAURE  
(Didier ROY, Subatech)
- very precious monitoring!
- Slow control
  - Temperature
  - Pressure
  - HV supply parameters



Pion event with steel block

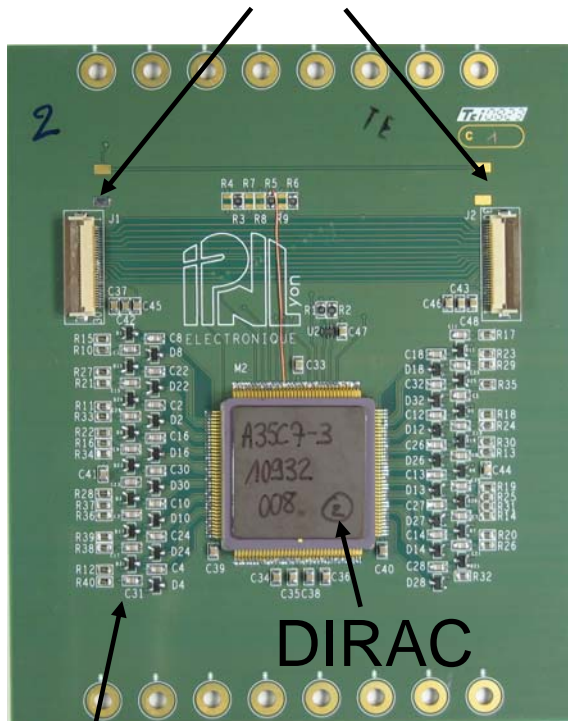
# MicroMegas with Digital Readout

- PCB with DIRAC 64 channels ASIC

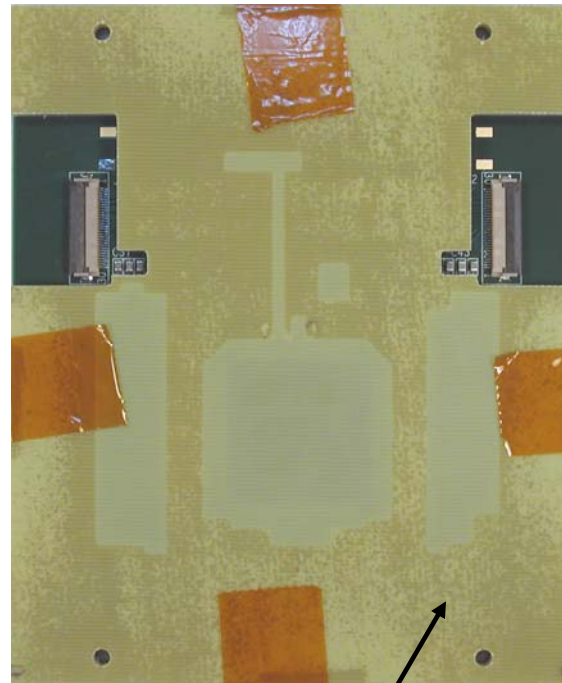
3 thresholds on 8 bits each, 8 events memory

2 Gains  $\Rightarrow$  6 fC to 200 fC or 100 fC to 10 pC

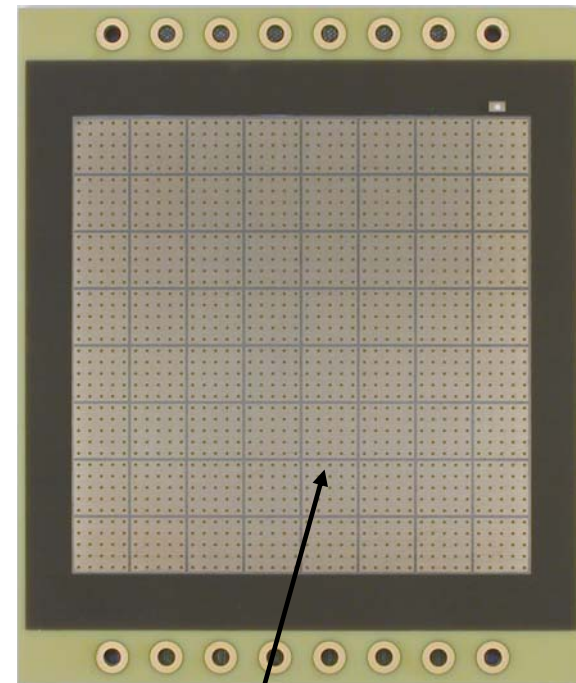
Digital link to DAQ  
(possibility to chain detectors)



Sparks protections



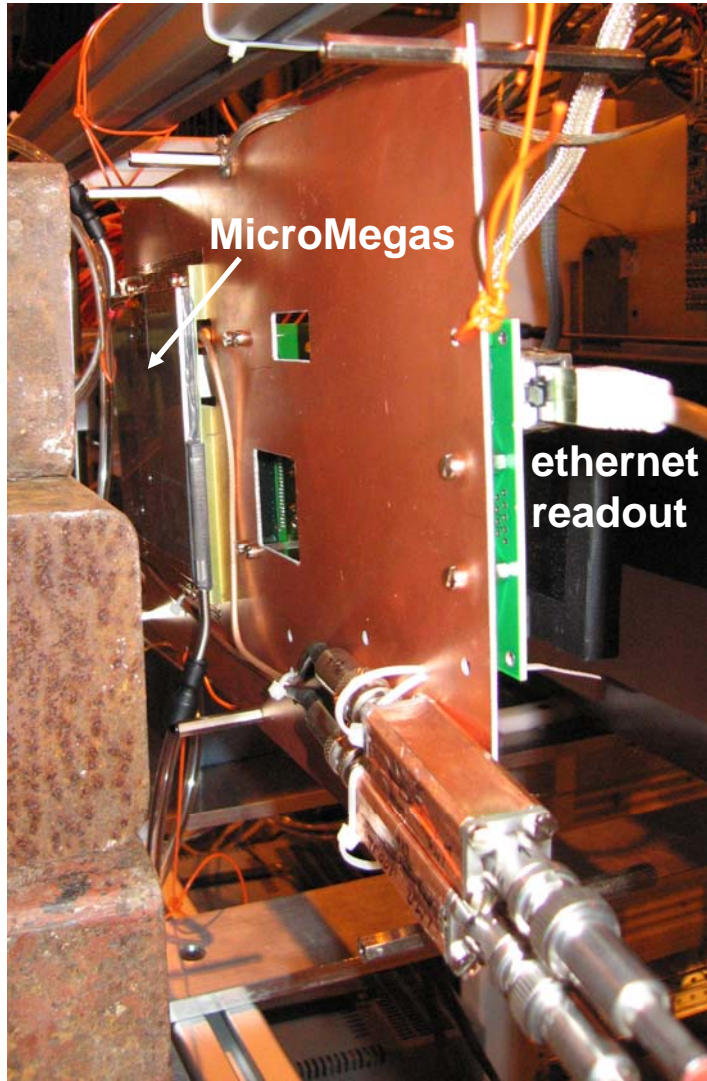
mask for bulk laying



8x8 pads with bulk

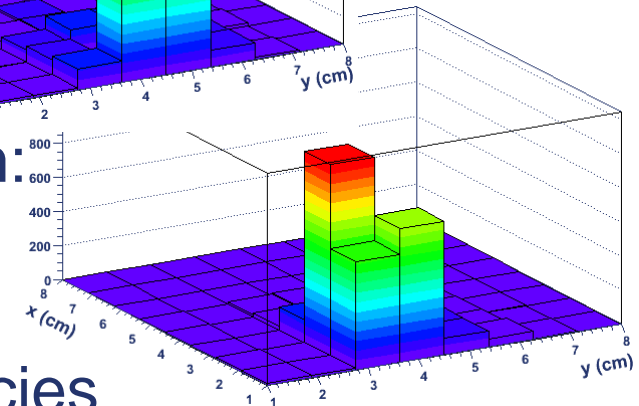
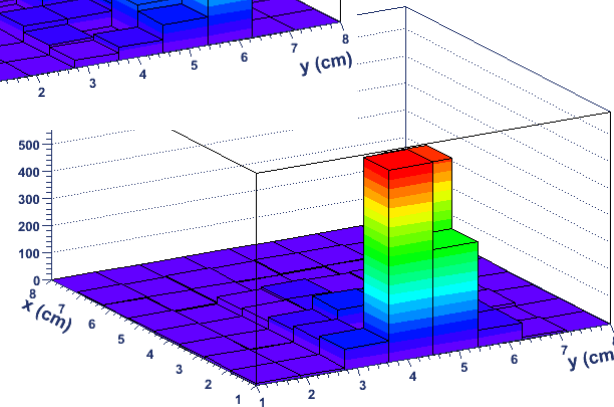
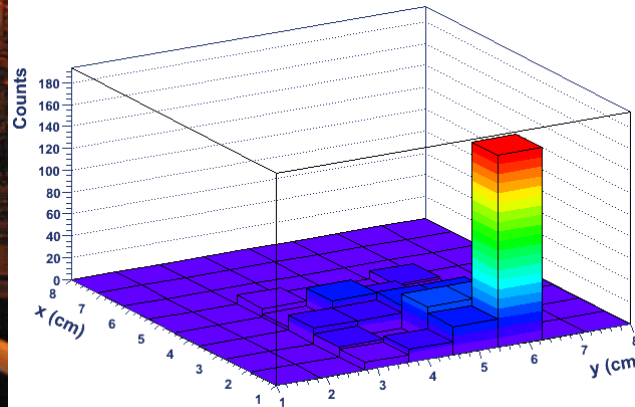
# MicroMegas with Digital Readout

- Tested during the August 2008 TB (R. Gaglione, IPNL)



– Very promising results!

Beam Profile  
when moving  
the X-Y table



- Future test beam:  
Need a stack  
of chambers  
to check efficiencies

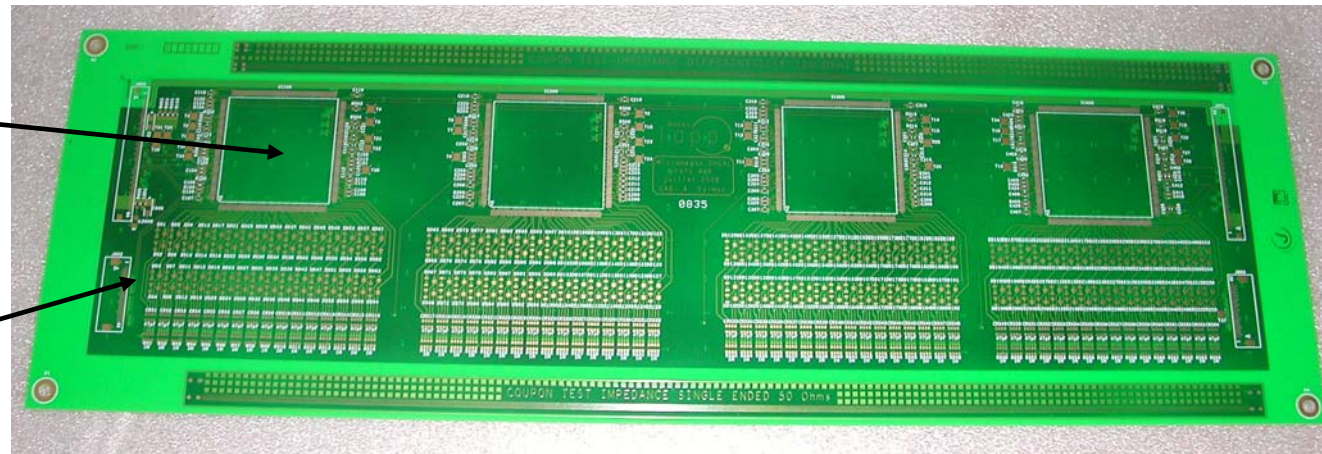


# MicroMegas with Digital Readout

- PCB with 4 HARDROC1 64 channels ASIC  
8x32 cm<sup>2</sup> for this autumn TB!

space for  
HARDROC1  
(cabling right now)

space for  
sparks protections



Mesh side



Waiting for tests  
with the new DIF

# Conclusion

- DHCAL-MicroMegas TB of August 2008
  - A huge work from a small team!
  - Very promising preliminary results (see this afternoon ...)
- TB October-November 2008
  - Mini Calo with digital readout
    - 1 or 2 MicroMegas  $8 \times 32 \text{ cm}^2$  with HARDROC1 (analog+digital)
    - 2 MicroMegas  $8 \times 8 \text{ cm}^2$  with DIRAC (digital) **1 week TB needed in 2009 for a larger stack**
    - Steel absorbers
    - Readout with new DIF
- In parallel
  - realisation of a  $1 \text{ m}^2$  MicroMegas prototype
  - studies on MicroMegas protections **2 weeks TB needed in 2009**