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# MICROME GAS

## TB plans with W structure

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# Outline

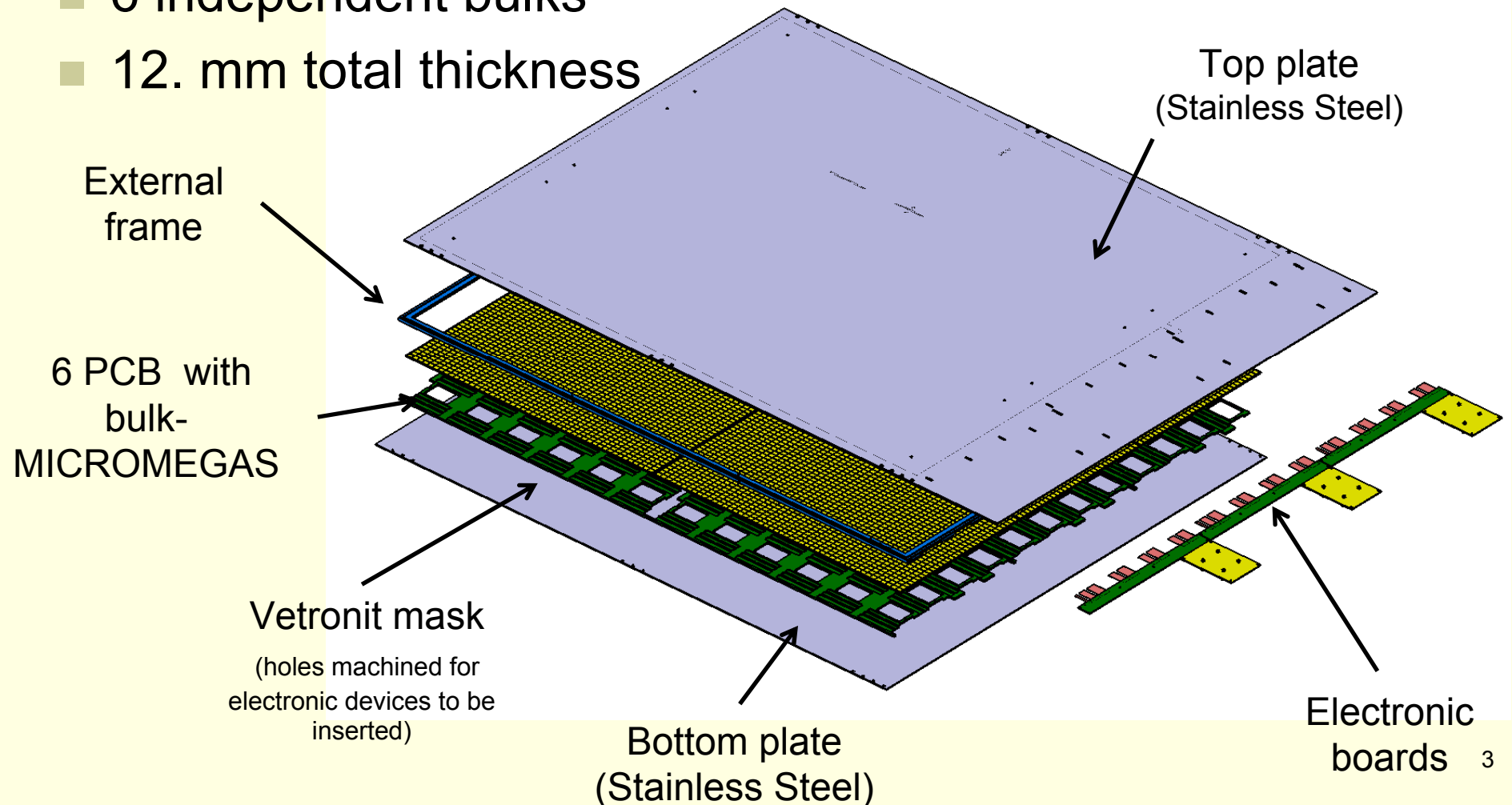
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- Short status report on 1m<sup>2</sup> MICROME GAS
- Scientific aim
- Scientific programme
- Roadmap

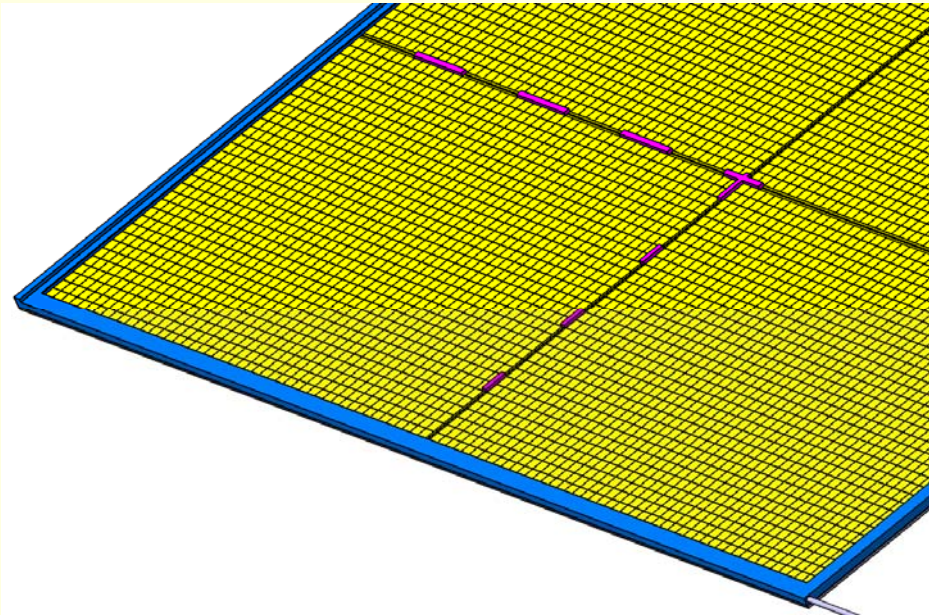
# 1 m<sup>2</sup> MICROME GAS for a DHCAL

- 1 m<sup>2</sup> Prototype
  - 6 independent bulks
  - 12. mm total thickness

⇒ Fits for the 1m<sup>3</sup> steel and the tungsten prototypes

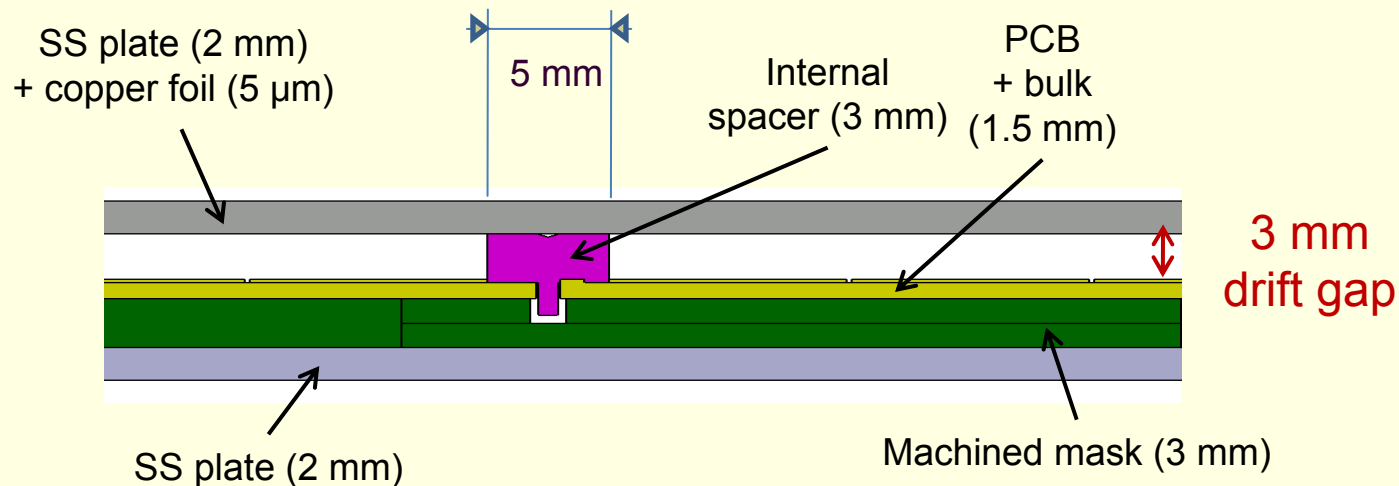


# 1 m<sup>2</sup> MICROME GAS for a DHCAL



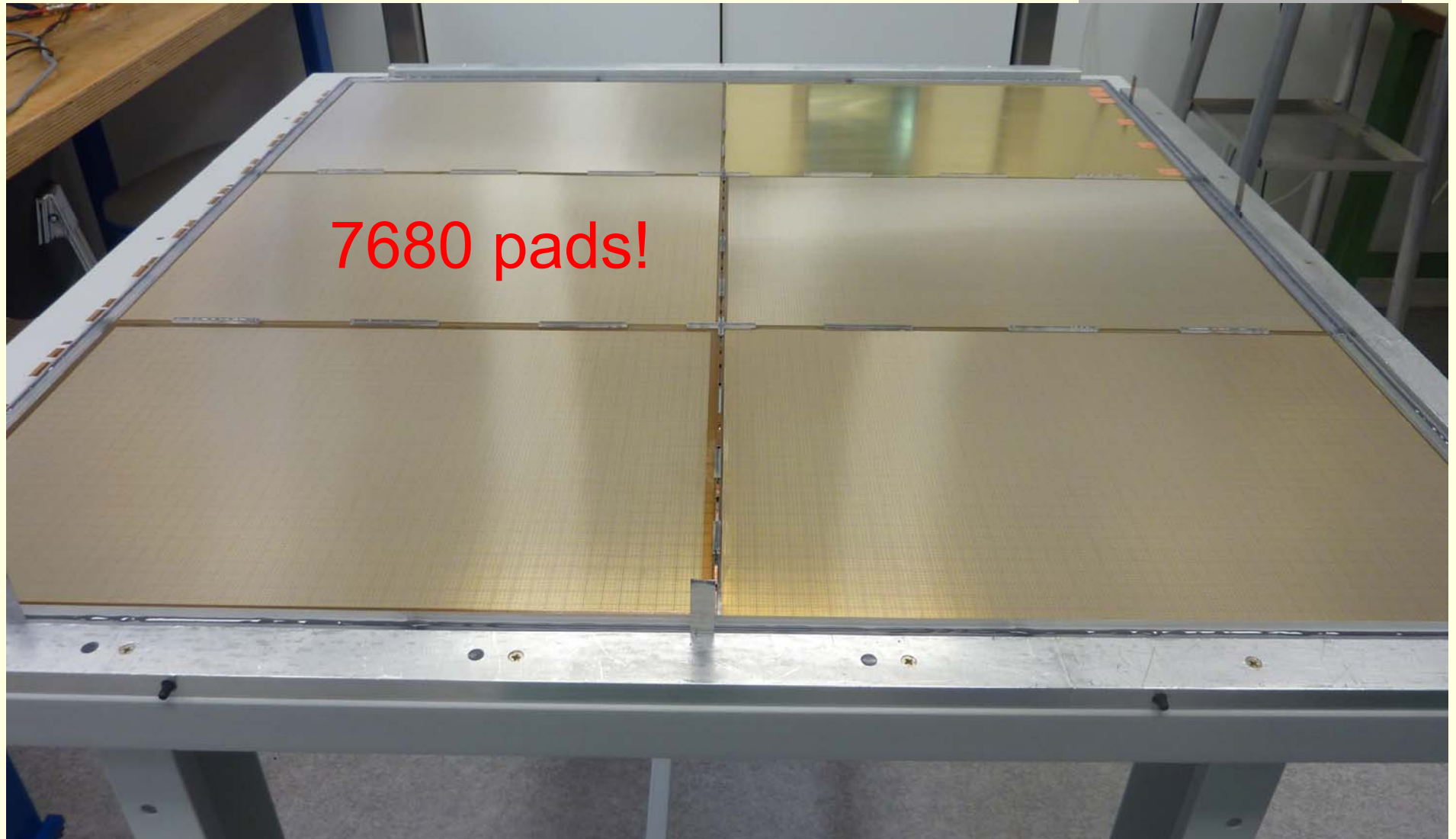
frame + internal spacers  
fix the 3 mm drift gap

11.5 mm thickness + glue + tolerance = 12. mm total thickness



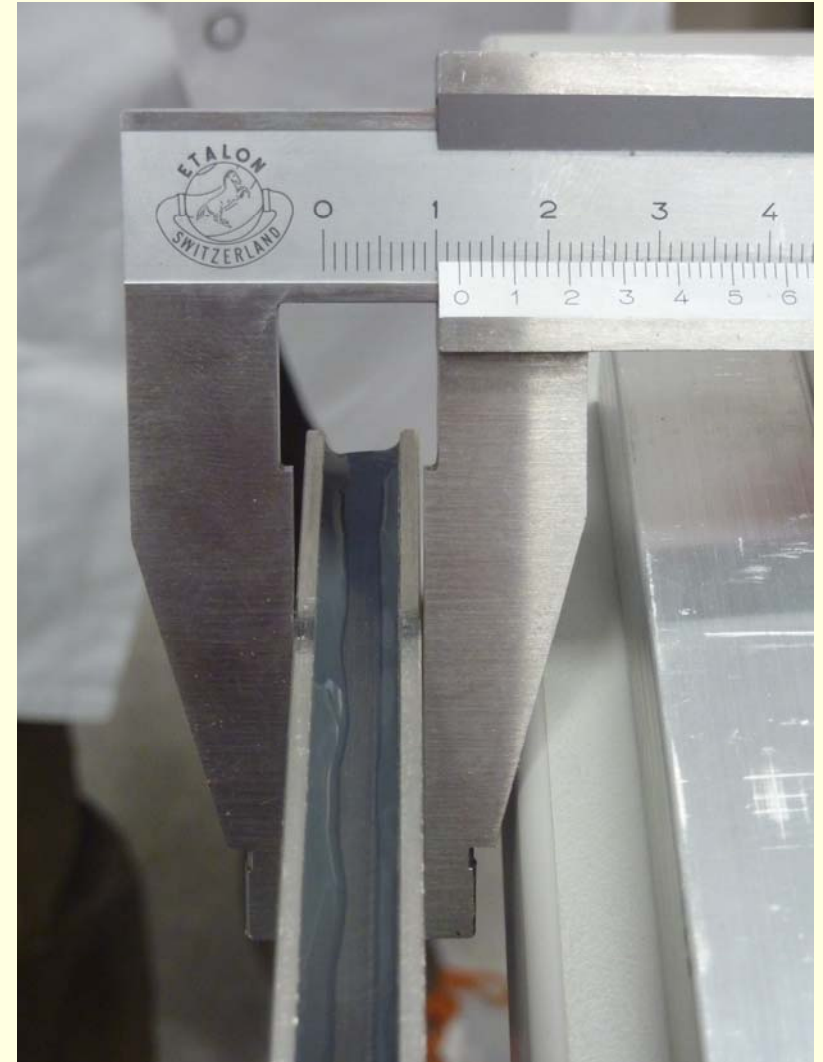
# The 1m<sup>2</sup> prototype

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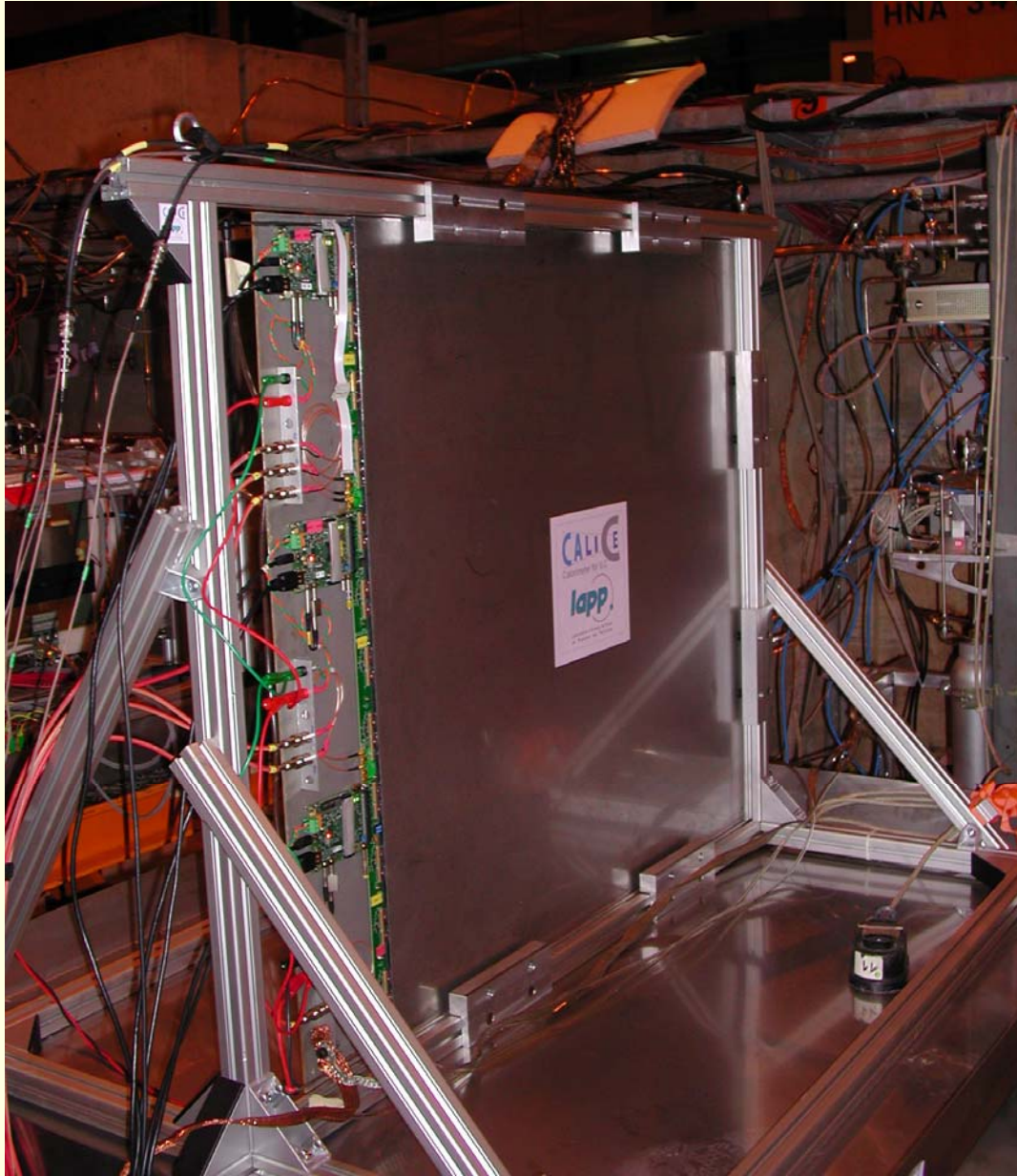


# The 1m<sup>2</sup> prototype

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# The 1m<sup>2</sup> prototype in H4 line



- HR2 threshold around 20 fC
- MIP MPV  $\sim$  20 fC  
 $\Rightarrow \epsilon \sim 70\%$   
but HR2 shaper  
 $\Rightarrow \epsilon \sim 10$  to  $20\%$

# Scientific aim

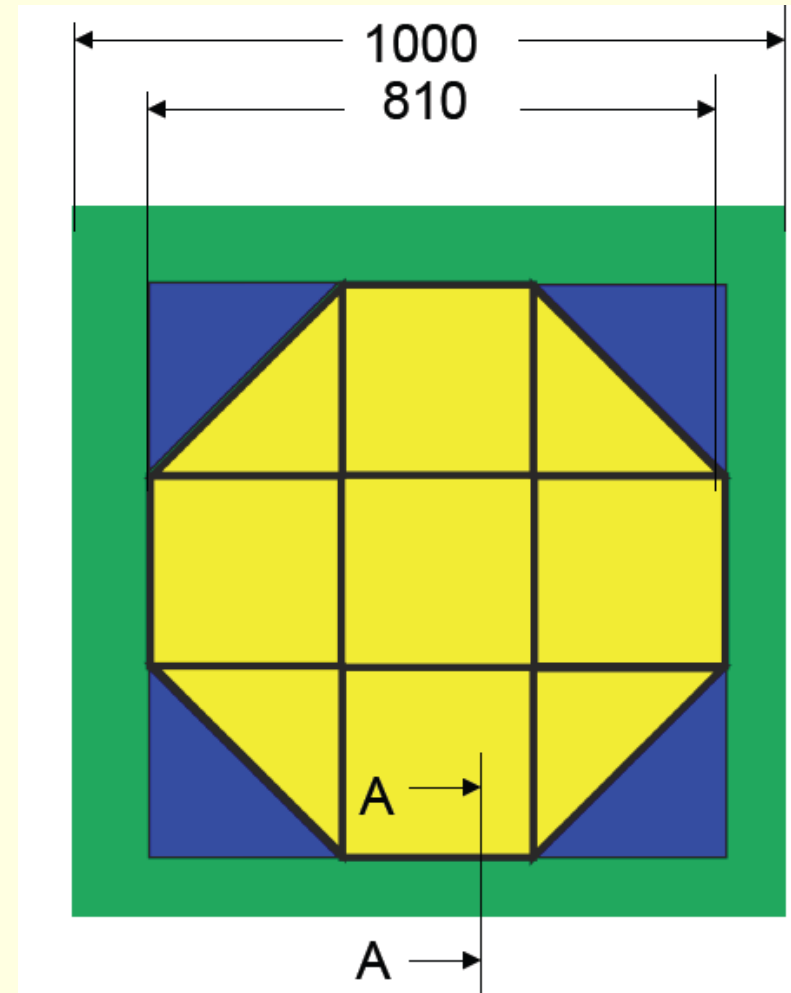
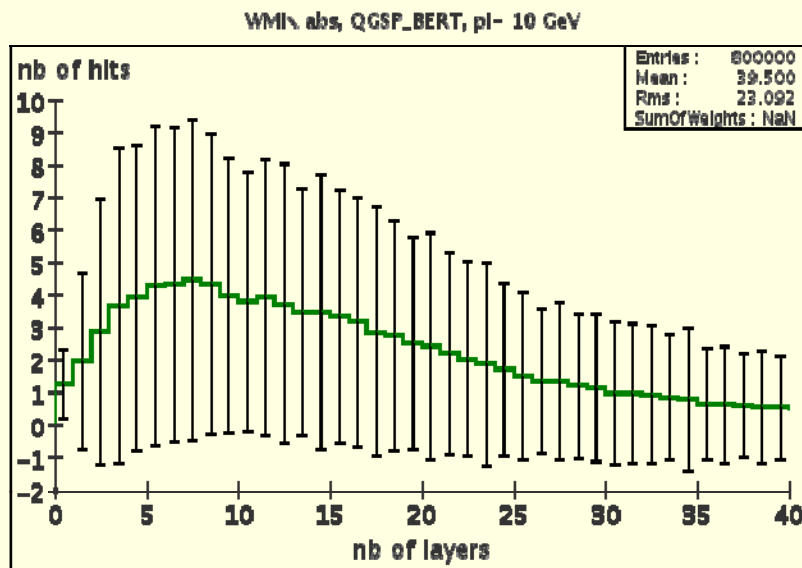
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- tests of the 1 m<sup>2</sup> MICROME GAS in W-structure (showers)
  - behaviour in hadronic showers (sparks effects etc...)
  - comparison  
1cm<sup>2</sup> MICROME GAS and 3 cm<sup>2</sup> scintillator



# Simulations studies (J. Blaha)

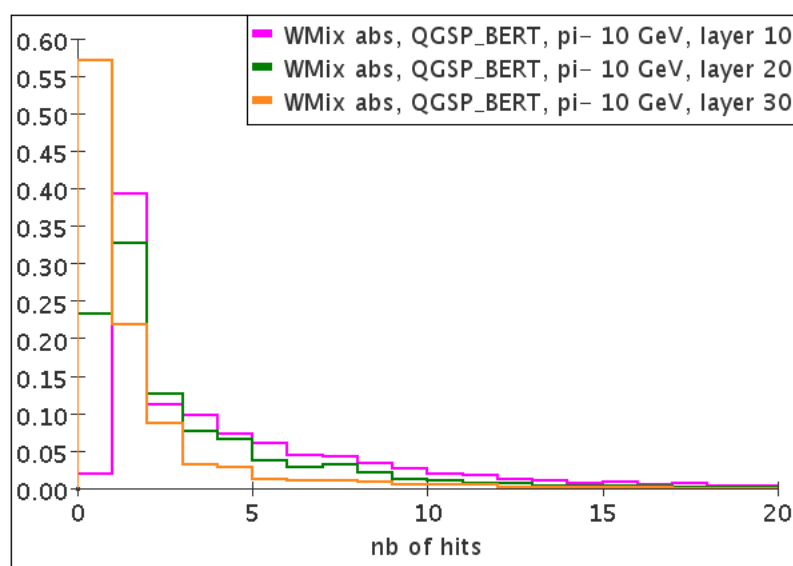
- active area of 32 x 80 cm<sup>2</sup>  
2 central ASUs  
(32 x 96 cm<sup>2</sup>)
- analog threshold = 1.5 fC
- digital threshold = 19 fC



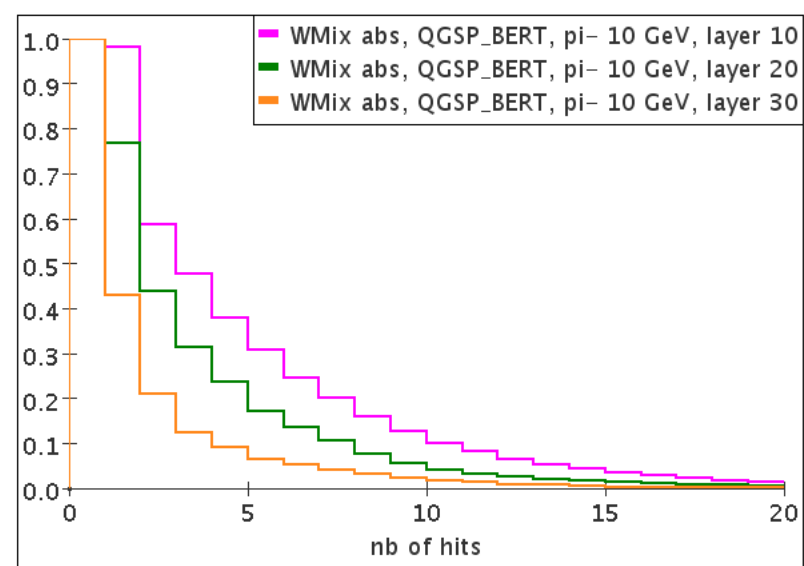
# Simulations studies (J. Blaha)

- fraction of events with:

- N hits



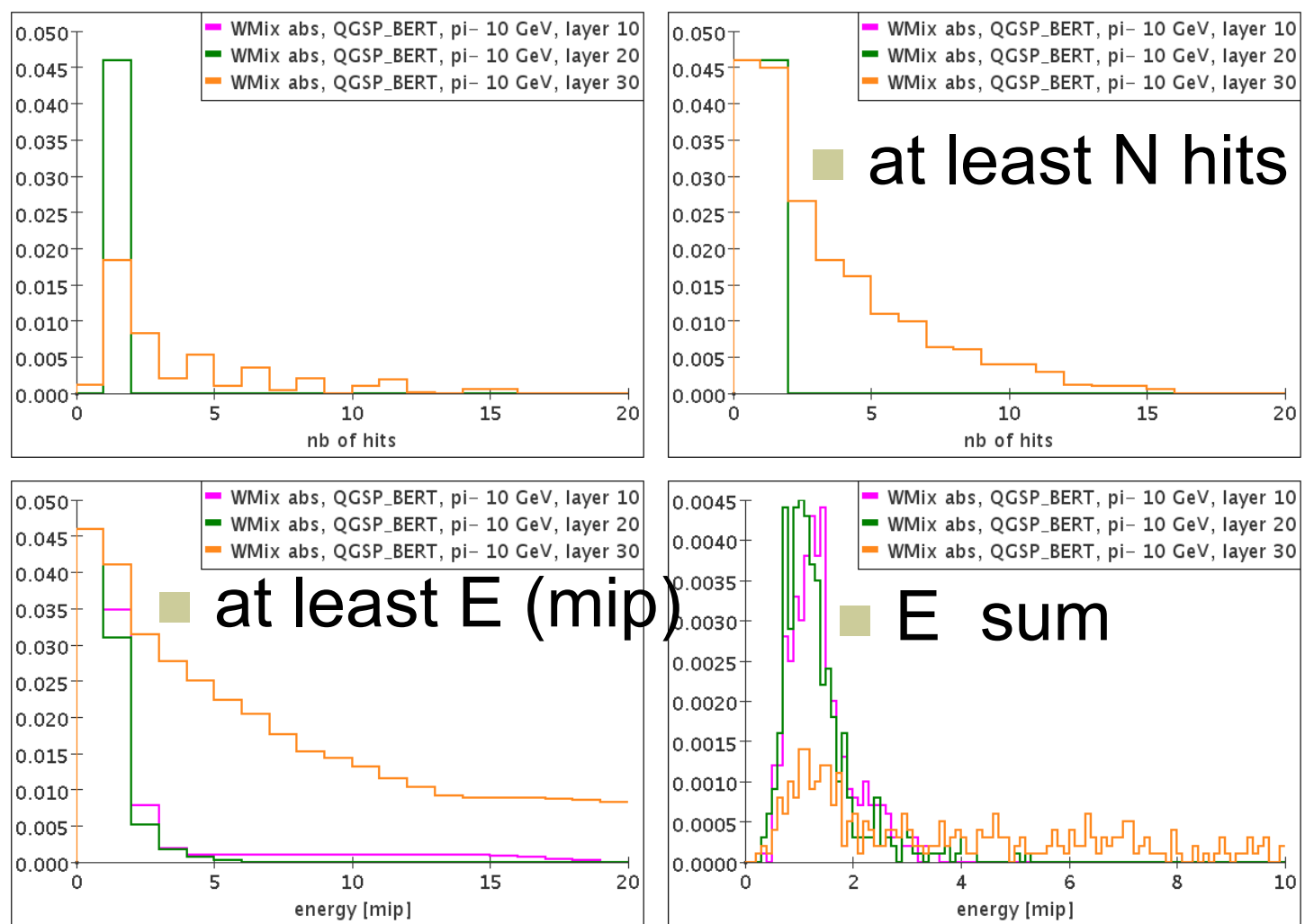
- at least N hits



	evts fraction of with 4 hits	evts fraction with at least 4 hits
layer 10	0.07	0.38
layer 20	0.06	0.24
layer 30	0.03	0.09

# Simulations studies (J. Blaha)

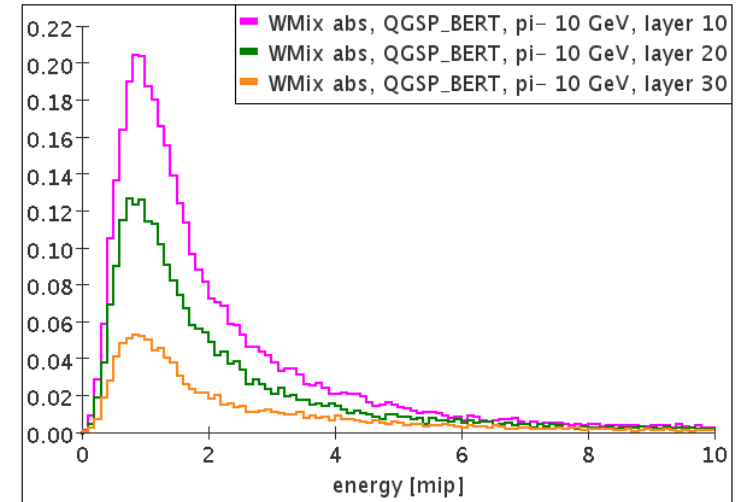
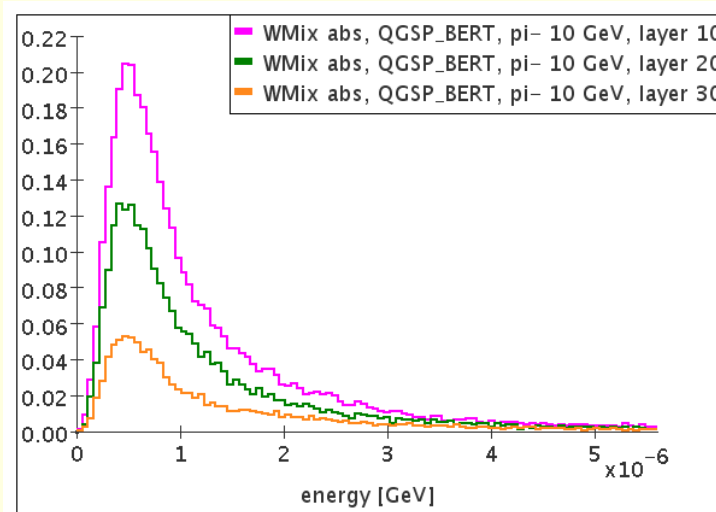
- Events with 20 MIPs in the consecutive first layers



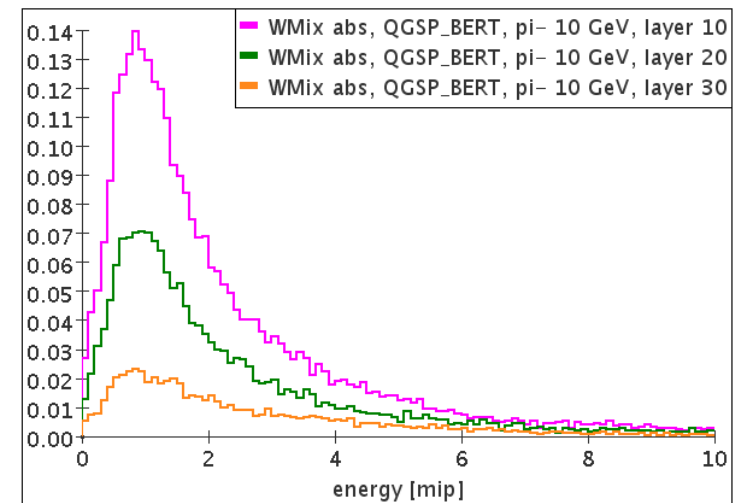
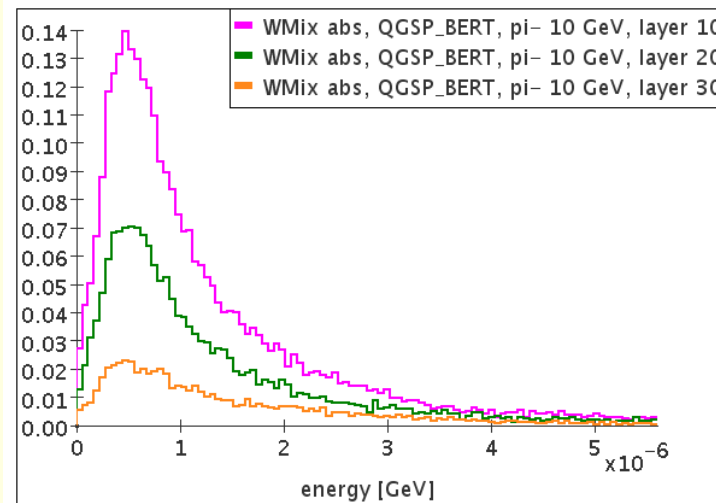
# Simulations studies (J. Blaha)

## ■ Average energy per hit

■ all hits

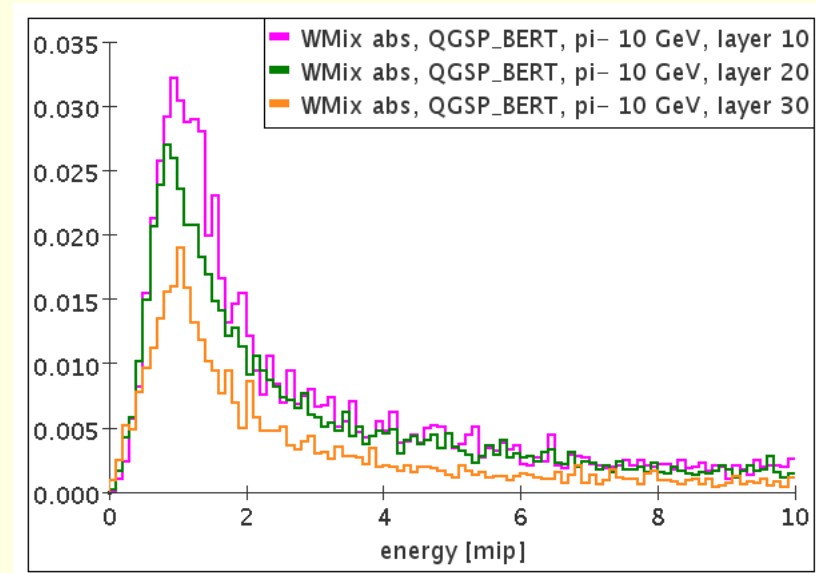
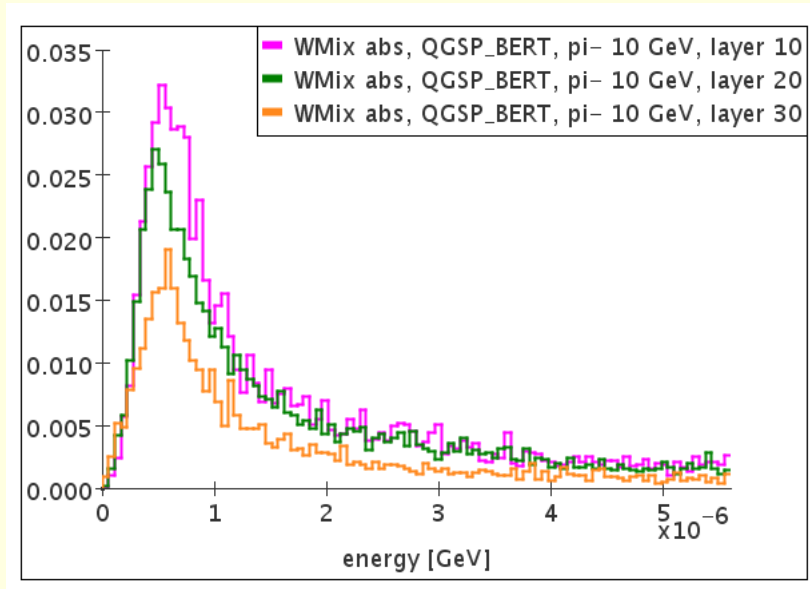


■ at least 4 hits



# Simulations studies (J. Blaha)

- Energy sum (threshold 1.5 fC)



- Test in showers are significant if enough rate (good efficiency is not compulsory)

# Scientific programme

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- General requests
  - Running time with maximum beam energy.
  - Position 30 might allow the comparison studies but will not be sufficient for testing the behaviour in shower.
  - Moving to position 5 or 10 at end of the TB to test behaviour in shower.
- Specific request for statistics at least 2 days at maximum beam energy

# Roadmap

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- 1m<sup>2</sup> MICROME GAS is available
- For the comparison test 2<sup>nd</sup> proposition of Wolfgang is the easiest:  
external Trigger with NIM units and a trigger counter which is read into both DAQ's  
**BUT NEED TO IMPLEMENTED**

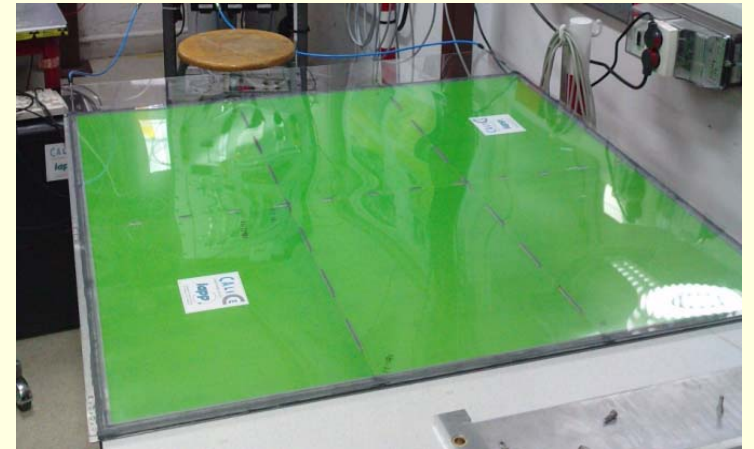
Thank you

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# 1 m<sup>2</sup> MICROME GAS for a DHCAL

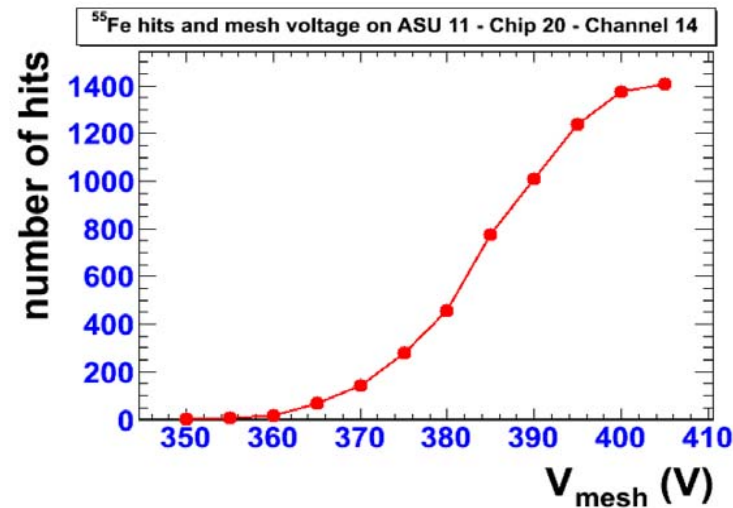
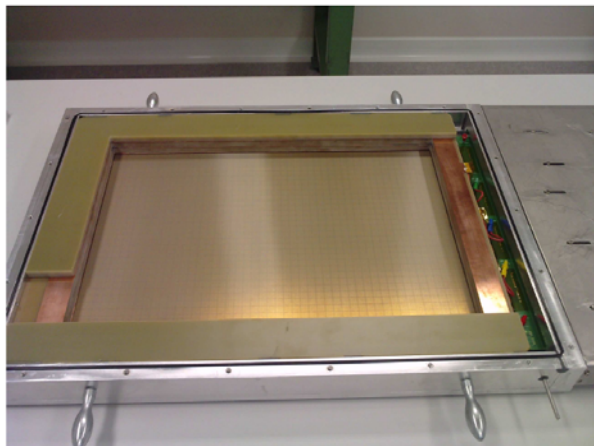
- originally only 4 equipped ASU with HR2 + 2 dummy PCBs
- Roadmap
  - Construction of a mechanical prototype
  - tests of 4 individual 32x48 cm<sup>2</sup> ASUs
  - one more ASU with HR2b
  - special thanks to Olivier Pizzirusso (EN-ICE-DEM@CERN) for realising the fifth bulk!
  - Assembly inside a 1 m<sup>2</sup> chamber : end of May



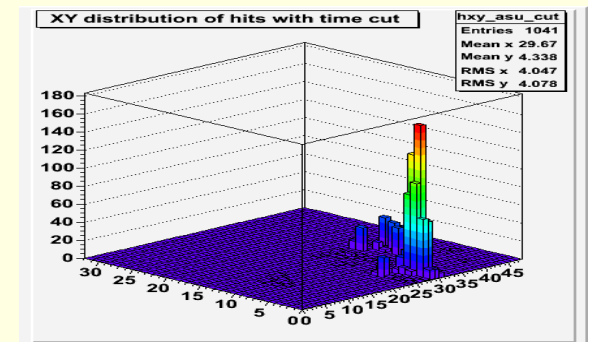
# Tests of individual ASUs

- ASU test (inside a test box) with X-rays and beam
  - Test of complete chain (bulk/HR/DAQ)
  - X-rays :  
each readout cell is measured individually

X-rays

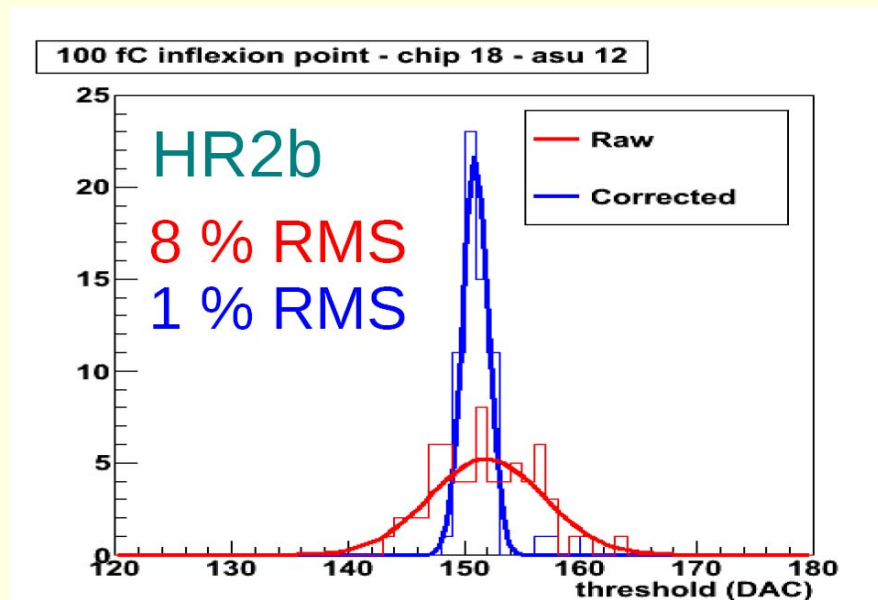


Beam Profile Nov. 2009



# Tests of individual ASUs

- HR2b calibration with test charge
  - HR2b successfully debugged (LAL+LAPP)  
⇒ need PCB modification (also for GRPC production PCBs!)
  - Gain distribution spread of 1 % RMS



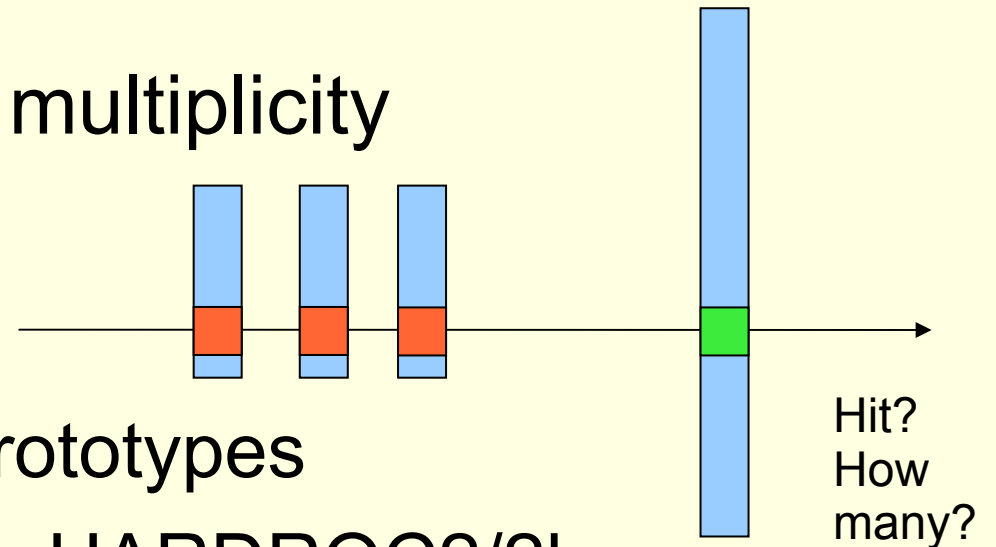
# June 2010 test beam

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- Aim: test of the 1 m<sup>2</sup> MICROME GAS prototype
  - Validate large area design, rate effects, sparks effects...
  - Efficiency and multiplicity disparity over the 1 m<sup>2</sup> area
  - Measurements inside magnet of small DIRAC2 stack  
are postponed  
priority: new chip MICROROC (LAL+LAPP)

# June 2010 test beam

- SPS muon beam :  
MIPs for Efficiency and multiplicity
- Detectors
  - scintillators
  - telescope : 3 analog prototypes
  - The 1m<sup>2</sup> prototype with HARDROC2/2b
- 10<sup>4</sup> events per pad, 10<sup>3</sup> pads  
(complete scann of ASU12)  
100 Hz DAQ, 10 % duty cycle  
→ need 10 - 20 days



# Equipment and installation (June 2010)

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- Detectors :
  - Structure with scintillators, small telescope chambers on a X-Y “red” table
  - 1 m<sup>2</sup> prototype on a second X-Y LAPP table
- Gas mixture
  - Ar/isobutane 95/5 premixed (risk 1), flow of ~ 3 l/h
  - Bring our gas distribution system on TB zone
- Power
  - PM, MICROMEGAS, electronics (10 channels up to 2 kV)
  - High and low voltage supplies in a rack
- Installation : 1 + 1 days

4x4m<sup>2</sup> area needed downstream to H4 magnet  
no change for the RD51 period (gas, location, area...)