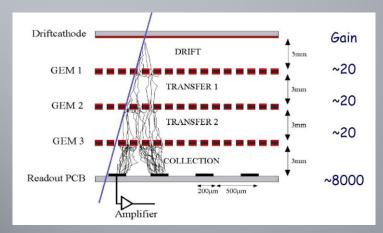
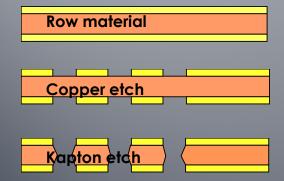
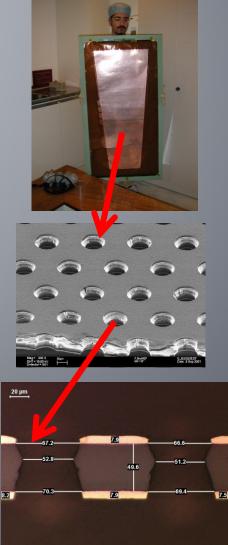


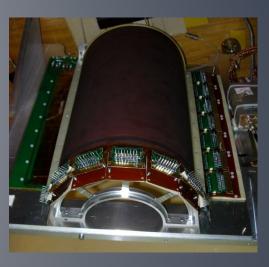
- MPGD principle (Micro Pattern Gas Detector)
 - GEM
 - Micromegas
- Large detector projects
 - CMS
 - Atlas
- Timing/equipment/ man power

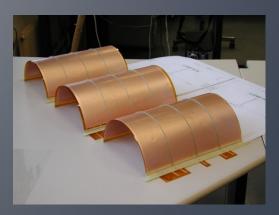
GEM detector principle



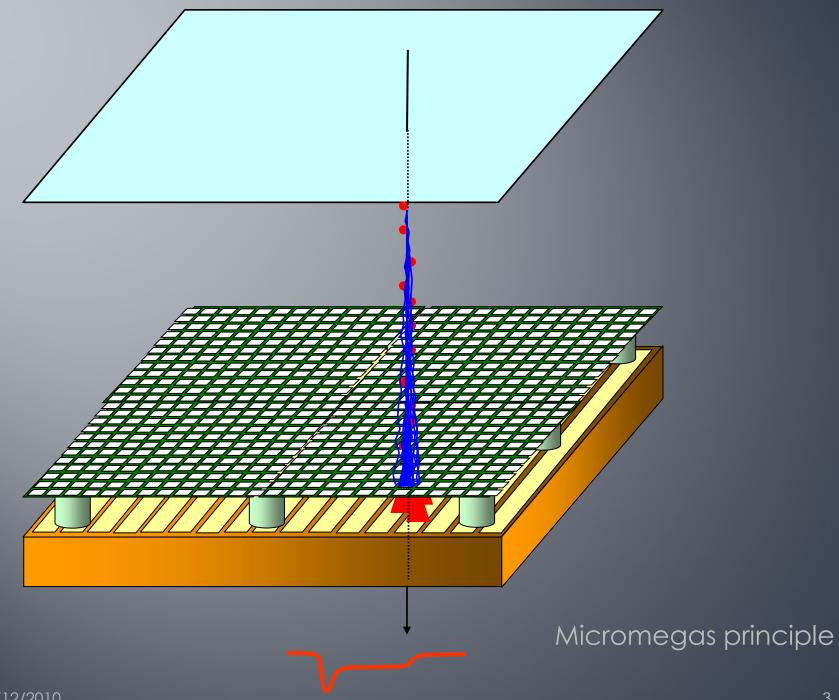




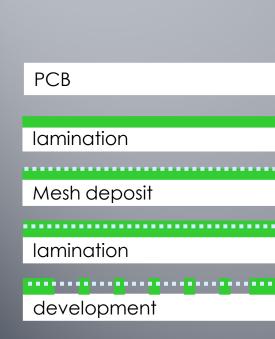


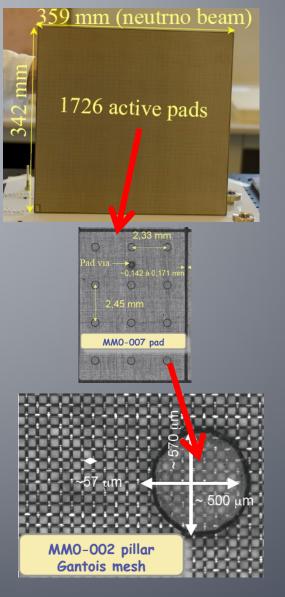


Rui De Oliveira



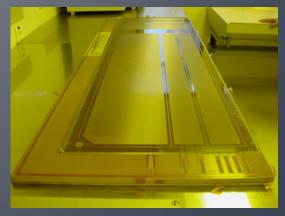
Micromegas





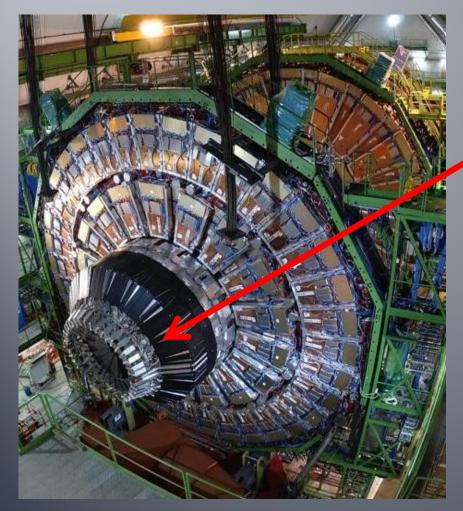




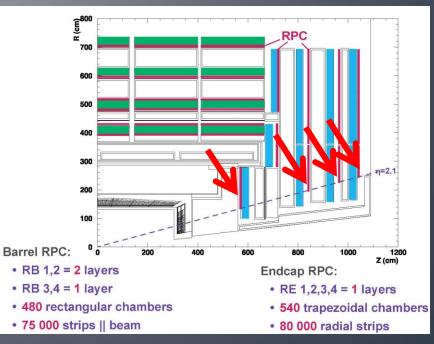


CMS RE1-1 project

1m x 0.5m



MPGD Vs RPC Faster Radiation hardness



14/12/2010

Rui De Oliveira

Atlas CSC replacement project

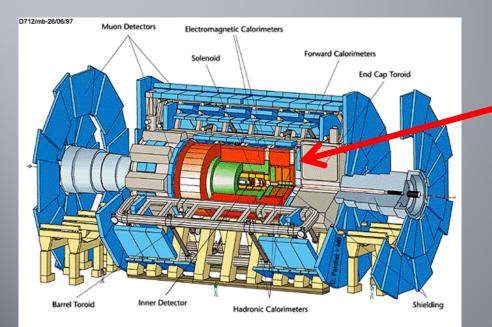
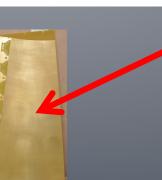
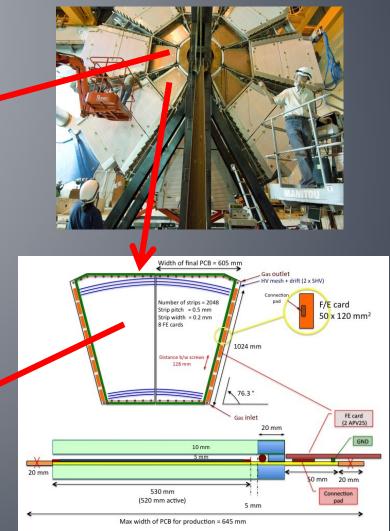


FIG. 1: Lay-out of the ATLAS detector with its major sub-system components. The diameter is about 25m, the total length about 46m, and the weight 7000 Tons.

1.1m x 600





Timing

CMS

- 2010 \rightarrow 2 prototypes OK
- 2011 \rightarrow build 2 new prototype for test beams
- 2012 \rightarrow large production of 80 detectors at CERN
- 2013 \rightarrow large volume production with industry
- Atlas
 - 2010→ prototype Normal Bulk OK
 - 2011 \rightarrow build large protected Bulk
 - 2012 \rightarrow install few detectors in ATLAS
 - Start large volume production with industry (100pieces)

Equipment

Investment of 785 KChf 2010-2011

- Large developing machine (DR)
- Large copper etching machine (DR)
- Large stripping machine (DR)
- Large laminator (ordered)
- Large dryer (ordered)
- Large oven (ordered)
- Large exposure machine(OK)
- Continuous Kapton etching machine(ordered)
- Electro-chemical copper etching line(study)
- All the machine should be running by mid 2011

Man power

No problem for 2011

- I staff + 1FSU affected to CMS project
- I staff + 1 fellow affected to Atlas project

2012

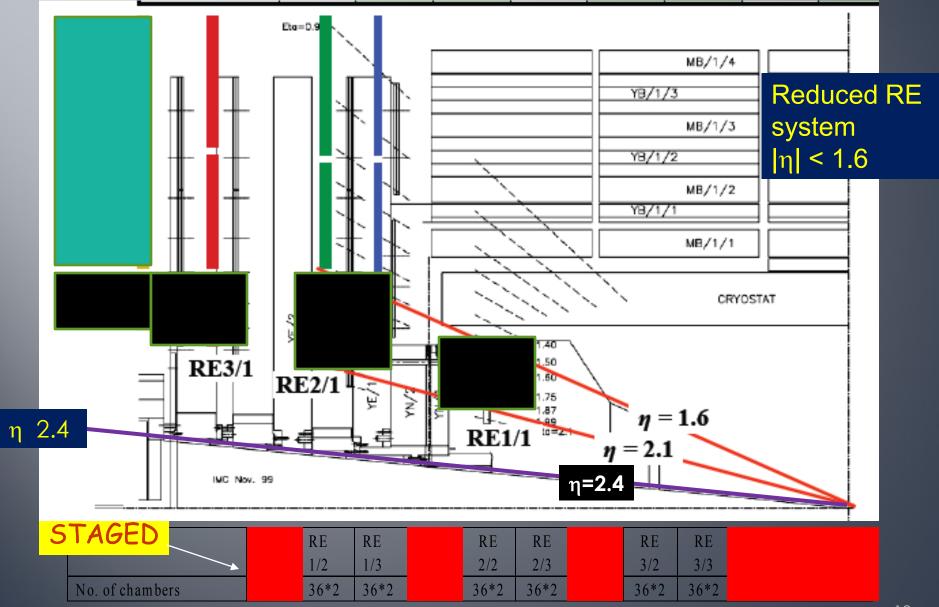
- CMS \rightarrow 2 FSU for large production (100 detectors)
 - +1 staff for technology transfer with industry
- Atlas \rightarrow 1 staff affected to technology transfer with industry
- 2013
 - CMS+Atlas → 2 staff to follow the subcontracted productions

Thank you

Questions?



Initial RE system -tailored to budget





Estimated Particle rates in Forward CMS



| RPC Region | Rates Hz/cm ² LHC (10 ³⁴ cm ² /s) | High Luminosity LHC 2.3 x LHC | (10 ³⁵ cm ² /s) Phase II SLHC ?? |
|--|---|----------------------------------|---|
| RB | 30 | Few 100 | kHz (tbc) |
| RE 1, 2, 3,4 η < 1.6 | 30 | Few 100 | kHz (tbc) |
| Expected Charge in 10 years | 0.05 C/cm ² | 0.15 C/cm ² | ~ C/cm ² |
| RE 1,2,3,4 η > 1.6 | 500Hz ~ kHz | Few kHz | Few 10s kHz |
| Total Expected Charge in 10 years | (0.05-1) C/cm ² | few C/cm ² | Few 10s C/cm ² |



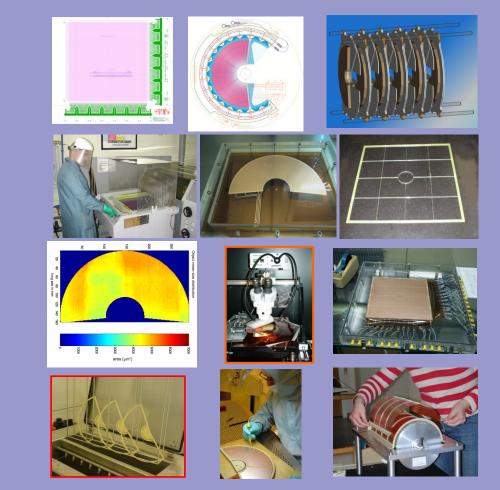
CERN is involved in all aspects of GEM detectors design, production and applications.

Detector Design

Component Production

Component Quality Control

Detector Assembly

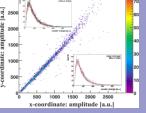


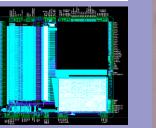


Detector Test

Readout Electronics





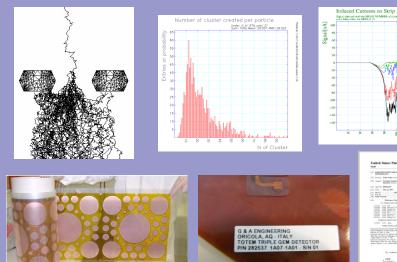


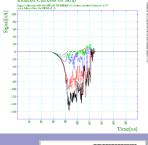




Detector Simulations

Technology Dissemination





| United States Patent | | |
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