

# CMS status

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- Swiss institutes in CMS
- Hardware installation
  - Pixel installation
  - Ecal installation
- Software and computing
- Cosmic muon event displays
- Outlook

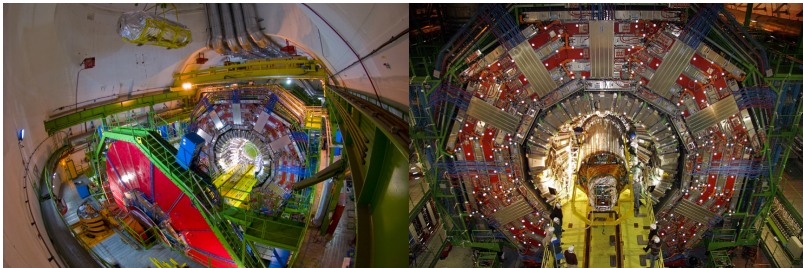


Uni Zürich	PSI	ETH Zürich
<p><b>C. Amsler</b> V. Chiochia, C. Regenfus, P. Robmann, A. Schmidt, E. Alagöz (PSI, UZh), T. Rommelskirchen, D. Tsirigkas, L. Wilke (PSI, UZh), J. Rochet, S. Steiner, H.-P. Meyer</p>	<p><b>R. Horisberger</b> W. Bertl, W. Erdmann, H.-C. Kästli, S. König, D. Kotinski, T. Rohe, A. Stradodunov, D. Feichtinger</p> <p><b>Q. Ingram</b> K. Deiters D. Renker</p>	<p><b>F. Pauss G. Dissertori</b> B. Betev, M. Dittmar, K. Freudenreich, P. Lecomte, D. Luckey, W. Lustermann, F. Moortgat, F. Nessi, L. Pape, D. Schinzel, J. Weng, D. Treille, F. Stoeckli, F. Ronga, V. Sordini, A. Thea (from October) Z. Chen, W. Hintz, C. Marchica(PSI,ETH), P. Milenovic, T. Punz, M. Weber, L. Caminada(PSI,ETH) J. Eugster, B. Stieger A. Brett, D. Calafiori, L. Djamabazov, M. Dröge, C. Haller, G. Leshev, S. Zelepoukine + IPP workshops</p> <p><b>U. Langenegger</b> S. Dambach(PSI,ETH), C. Eggel(PSI,ETH), P. Trüb(PSI,ETH)</p> <p><b>C. Grab</b> A. Rizzi L. Wehrli</p>

66 total    39 Physicists    17 PhD students    10 Techn./Eng.



# Tracker installation



- lowered and installed in December 2007
- cabling and piping finished March 08
- some problems with cooling occurred but were solved
- joint cosmic global runs in July 08

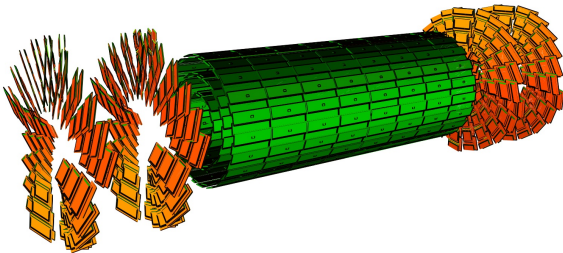


# Beam pipe installation



- 44m long
- installation finished June 10th
- bakeout for 48h at 200-250°C
- does not need to be removed to open CMS
- now under vacuum





## barrel pixel (ETH, PSI, UZH)

- 672 modules  
92 half modules
- 3 layers
- $|\eta| < 2$

## forward pixel

- 672 plaquettes
- 2 disks on each side
- $1.5 < |\eta| < 2.5$

65'000'000 channels in total

- contains optical analogue and digital hybrids
- contain the power supplies
- produced at UZH
- finished in April 2008
- transported to PSI to be connected to pixel detector

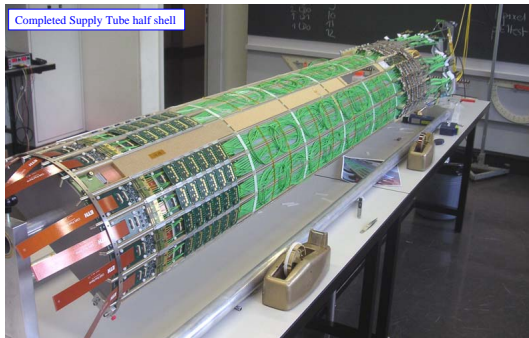


photo from P. Robmann

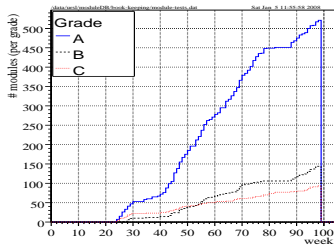


# Pixel construction



- pixel modules developed, produced and tested at PSI
- support structure designed and produced at UZH
- mounting of half shells finished March, 12th (+x-side), and April, 12th (-x-side) at PSI
- connected to supply tubes in May and June
- transported to CERN on July 15th

Tested Modules since Jan 2006



U. Langenegger (ETH)

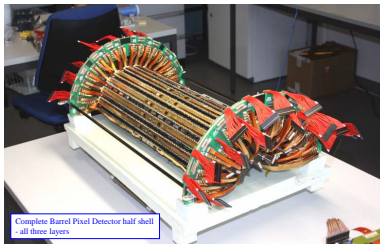


photo from R. Horisberger





# Barrel pixel installation July 23rd-24th

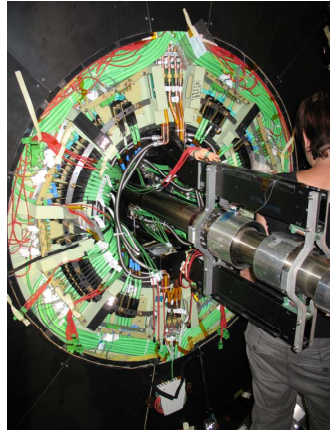


photos from V. Chiochia





# Forward pixel installation July 29th-30th



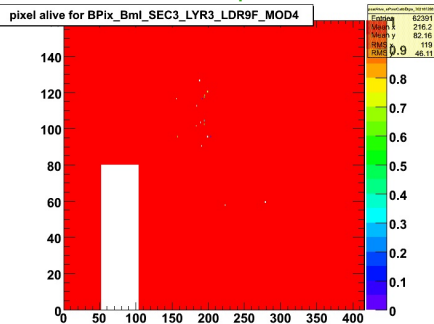
photos from T. Virdee

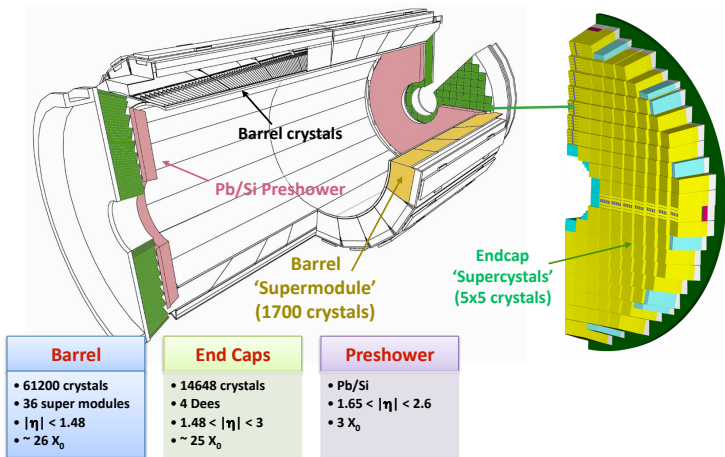




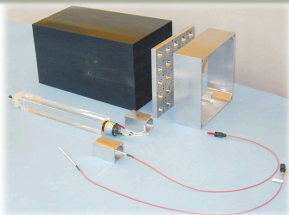
- sector tests finished
- 96 out of 11500 bpix ROCs do not work (0.8%)
- one octant in fpix does not work, can be fixed in winter shutdown (3%)
- noise of  $\approx 160$  electrons
- for startup pixel threshold are at  $\approx 5000$  electrons
- threshold will be later optimized to  $\approx 3000$  electrons

## pixel alive test for bpix module





## Supercrystal (SC): 5x5 crystals



Each Dee is made of 156 so called SCs. 138 have 5x5 crystals. The others less.

The mounting of the first super-crystals started in September 2007

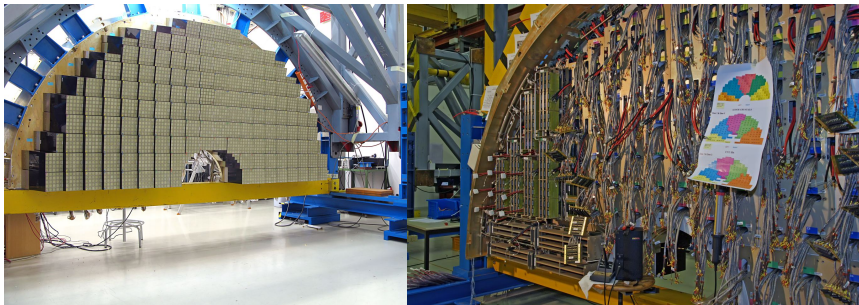
The last super-crystal was ready for mounting on 21. May 2008 and mounted on 23. May 2008

The commissioning of Dee in CMS was finished 18. Aug. 2008, meaning that the CMS Magnet from ECAL point of view could be closed

Dee	SC monting finished	Electronics Integration and commissioning finished	Transport to P5	Mounted in CMS
Dee1	19.Nov. 2008	11.June 2008	8. July 2008	21.July 2008
Dee2	7.Feb. 2008	26.June 2008	16.July 2008	24.July 2008
Dee3	10.Apr. 2008	11.July 2008	24.July 2008	31.July 2008
Dee4	23.May 2008	18.July 2008	29 July 2008	1.Aug. 2008



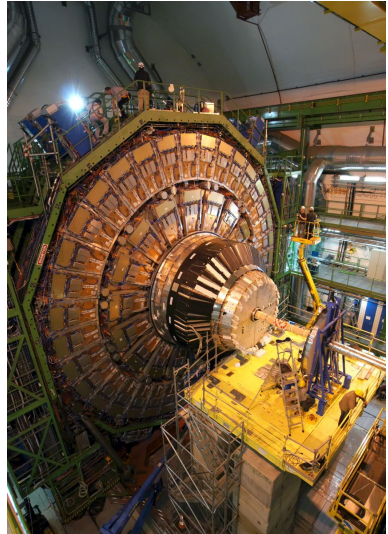
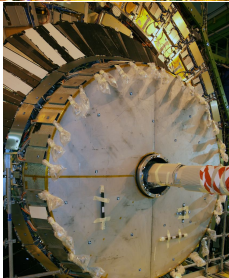
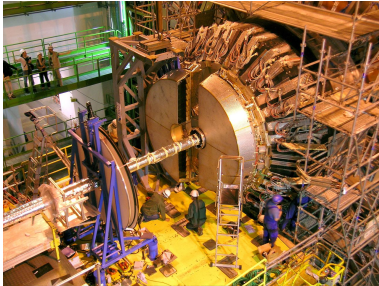
# Ecal endcap production and cabling



photos from the ETH team



# Ecal endcap installation at P5





# Ecal endcap testing



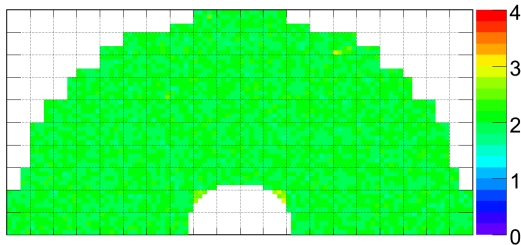
- The front end electronics uses 3 different gains (1, 6, and 12) where 12 is the most sensitive one
- The Pedestals and the their RMS were systematically tested during the integration and commissioning of the electronics

## Quality at the end of the commissioning

Dee	Number of channels	RMS gain1	RMS gain6	RMS gain12
Dee1	3662	0.60	1.11	1.97
Dee2	3662	0.60	1.11	1.97
Dee3	3662	0.60	1.11	1.97
Dee4	3662	0.60	1.11	1.97

Typical example

Dee 1: Pedestal RMS, Gain 12



Towards Interaction Point

Plot created: Fri Jul 4 16:54:34 2008

After installation in P5: 1 TT (25 ch) in Dee2 and 1 TT (25 ch) in Dee3 have missing data.  
All other channels (14648 – 50) are working!

W. Lustermann + ETH team







## CSA08

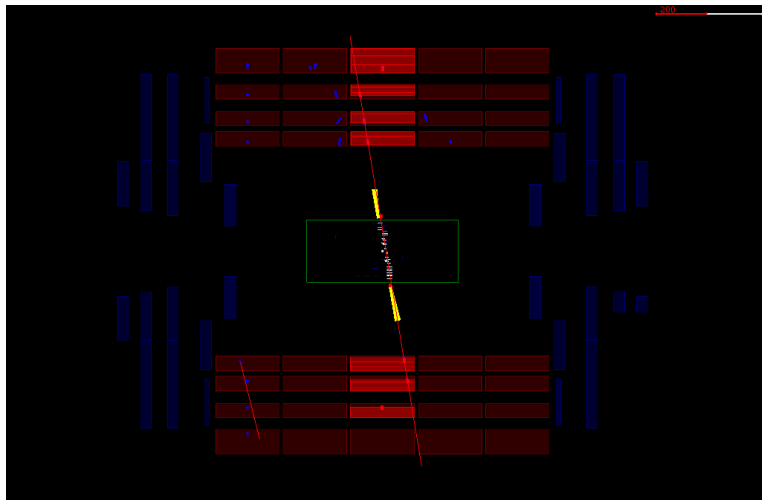
- test full scope of offline data handling and analysis 2008
- reconstruction with different startup conditions was tested
- focus on offline detector alignment and calibration
- great success, objectives achieved in pre-defined 4 weeks
- a number of problems were encountered and quickly fixed

## Cosmic runs

- operation of almost full detector for the first time
- full tracking with pixel and strip detectors
- ecal barrel and endcap (1 side) used
- global runs at 0T and 3T



# Cosmic muon in CMS (real event)

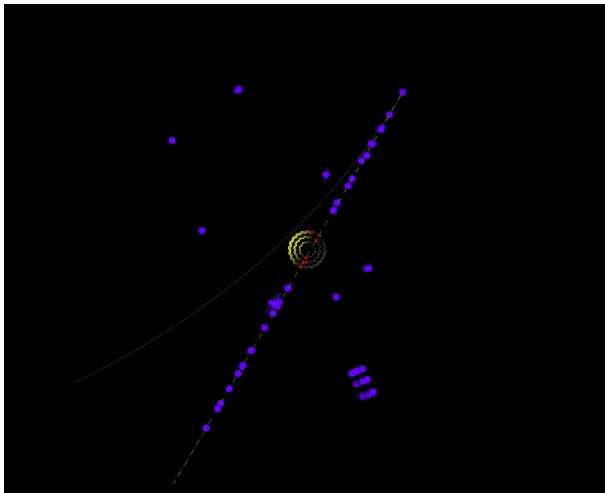


A. Rizzi





# Cosmic muon in the pixel (real event)

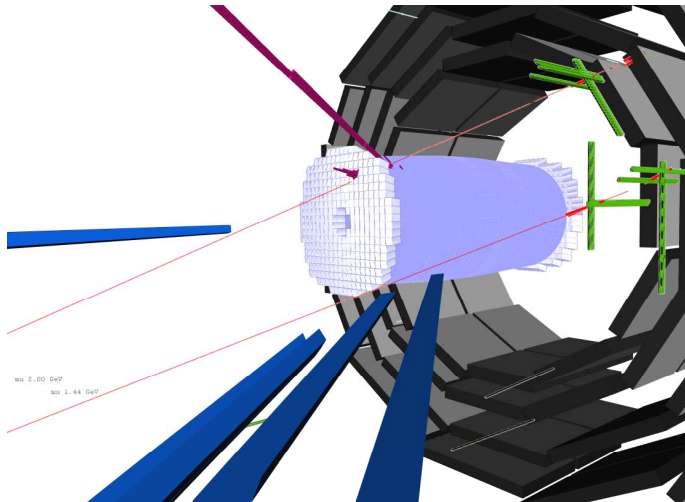


V.Chiochia





# Cosmic muon in the ecal (real event)

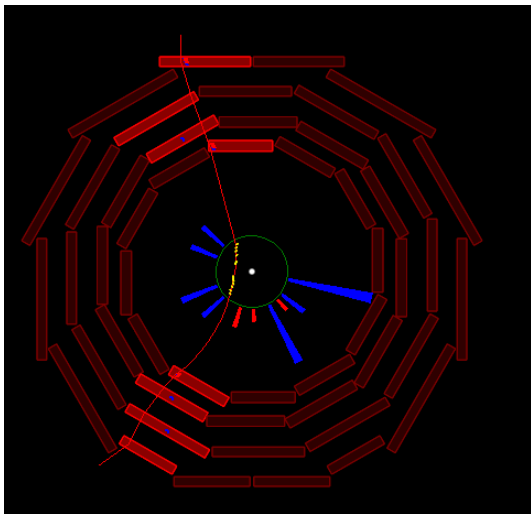


M. Schmitt





# Cosmic muon in 3T field (real event)





# Outlook for the next months



- cosmic run at 3.8T supposed to start today
- September 10th: first beam circulation
- continue taking cosmic runs with and without magnetic field
- commission the detector with first collision data
- physics startup: focus on charged particles spectra, underlying event, electrons, muons, jets and MET, not on exotic physics
- solve remaining hardware problems in winter shutdown



# Summary



- CMS detector ready to take first data!
- Ecal endcap and pixel detector were last things to be inserted
- first cosmics seen in complete detector
- waiting for first collision data within next weeks

Special thanks to G. Dissertori, W. Lustermann, F. Pauss, U. Langenegger, A. Rizzi, R. Horisberger, C. Grab, C. Amsler and V. Chiochia for their help preparing the slides.