Long term tests of large CMS silicon detector structures

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On behalf of CMS tracker collaboration

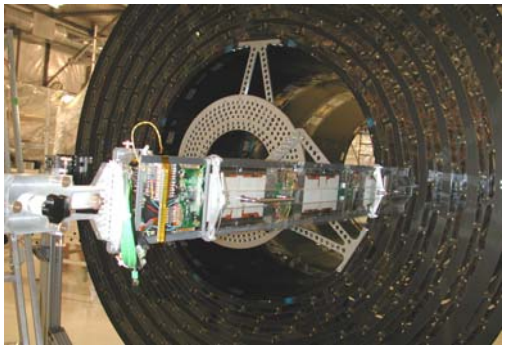
Outline

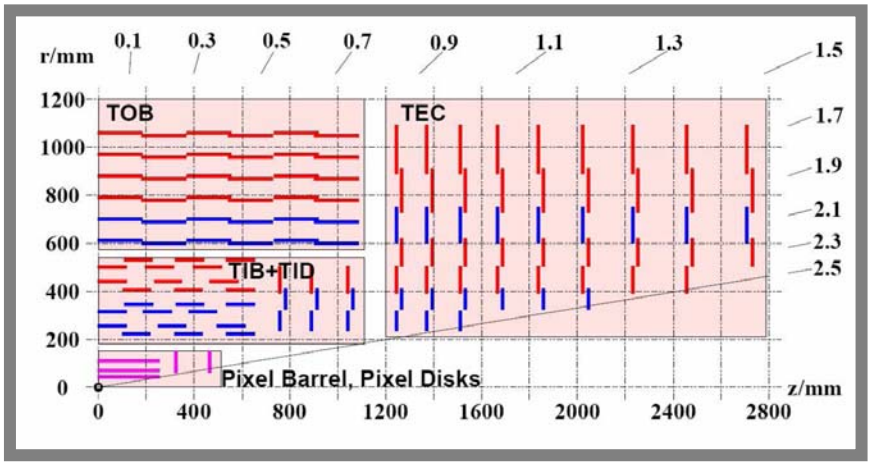
Final assembled structures are powered up and read out with the final power supply and DAQ systems at a temperature similar to that in the CMS experiment.

In the following slides, are presented:
- tracker subsystems
- DataAcquisition system
- power supplys system
- description of a long term test

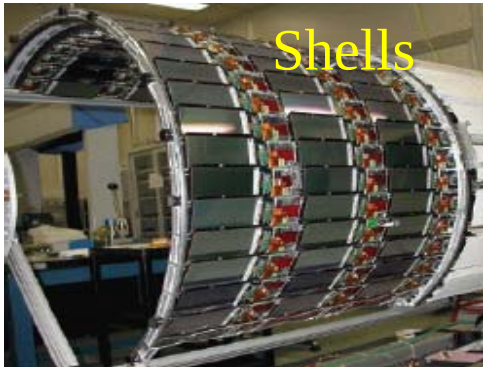
CMS Tracker subsystems

Tracker Outher Barrel (TOB)



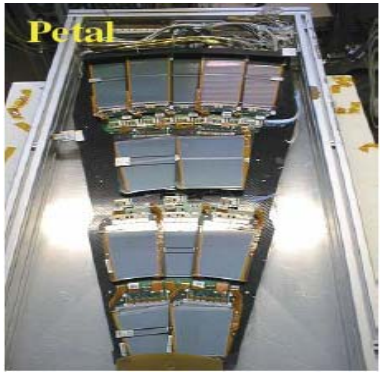


Tracker Inner Barrel (TIB)



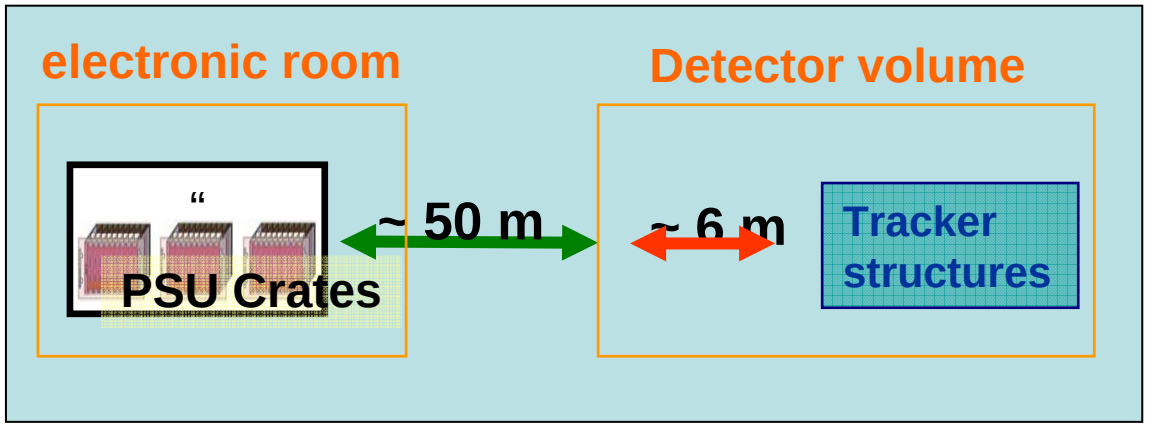
Tracker Inner Disk (TID)

Tracker End-Cap (TEC)

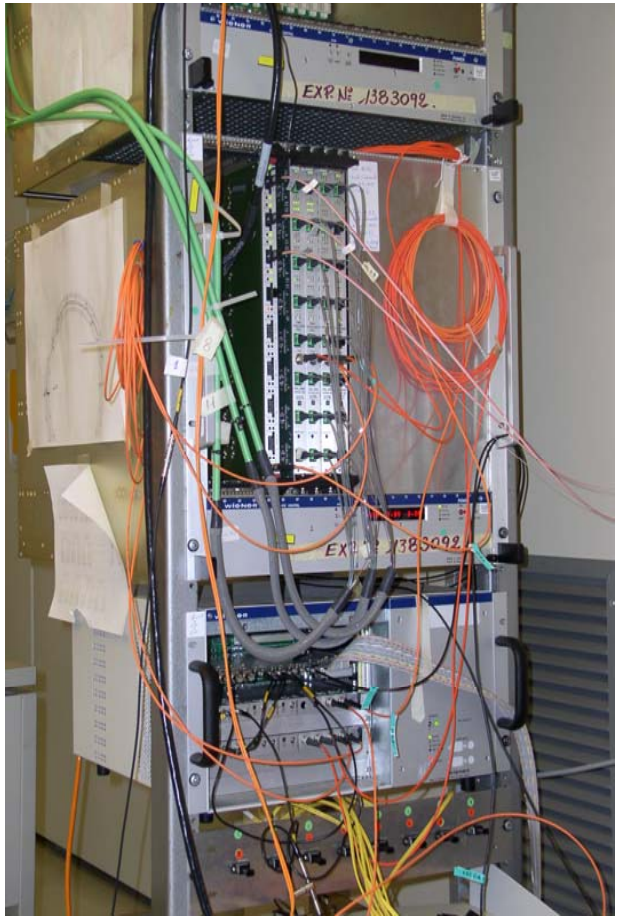


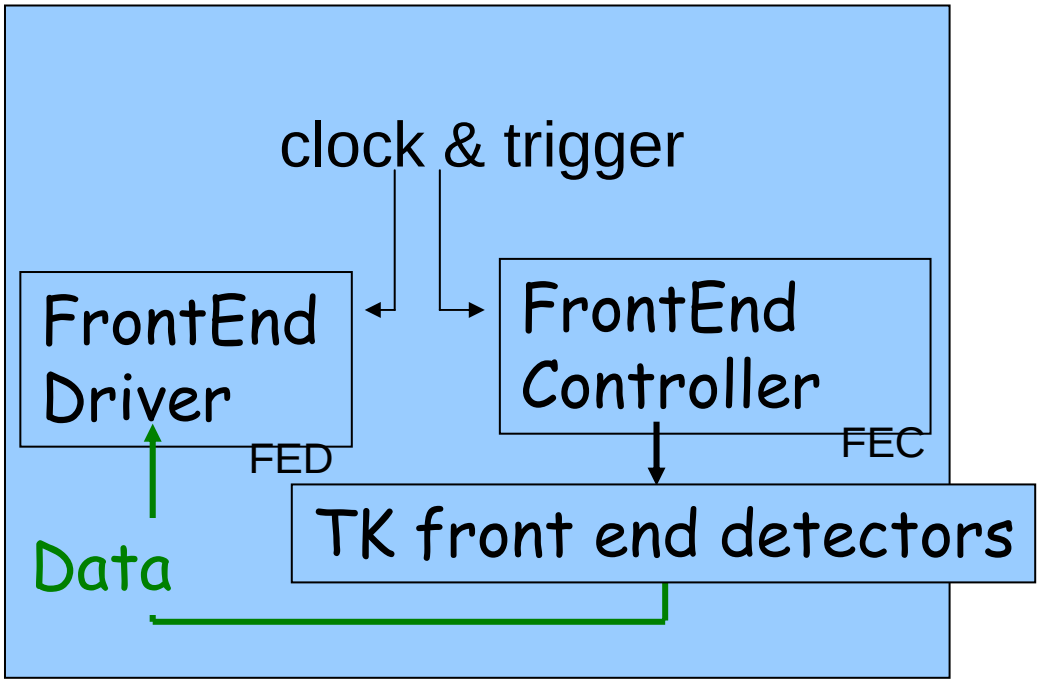
Power supply system

CMS power supplys units and cable chain are used to power up the tracker structures



Data Acquisition System





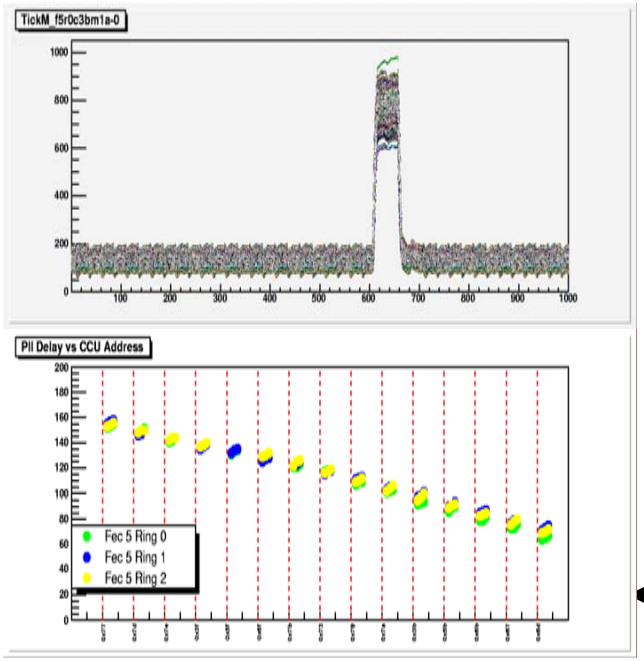
CMS data acquisition system used to read-out the tracker structures

configuration

All front end electronics should be confingured

Step 1) all modules should be time aligned

A syncronisation pulses (tick-mark) from each modules are sampled by the FED and reconstructed in time with different delays.



All modules delayed to compensate the delay in the time arrival of trigger on front end

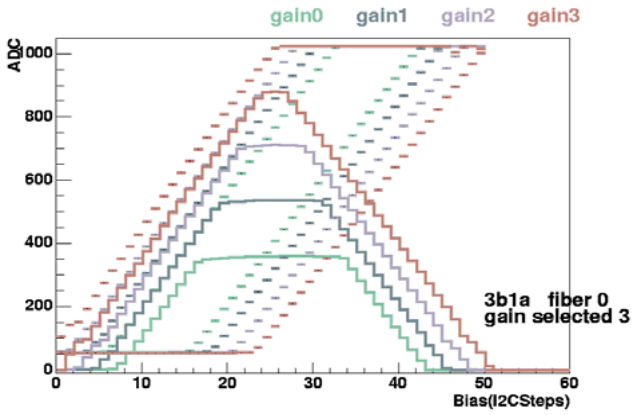
← Example in the TIB subsystem

configuration

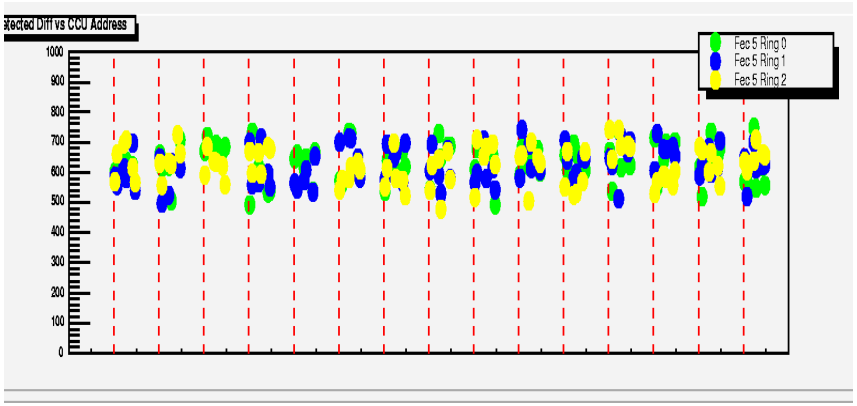
All front end electronics should be confingured

Step 2) data from modules to FED are transmitted through analog opto link.
To reach a uniform response, a syncronisation pulses (tick-mark) from each laser are sampled by the FED and reconstructed different gain and bias.

Tipical gain scan



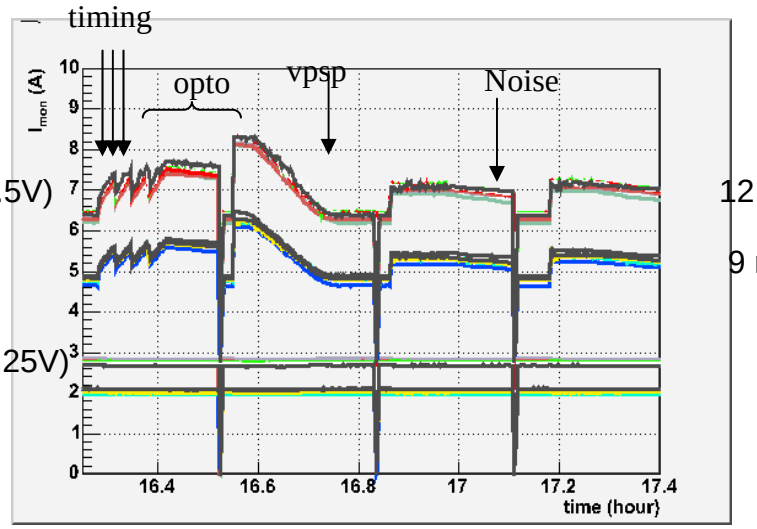
Example in TIB subsystem



Uniform response of 258

Slow controls

- Power consumption is monitored during all runs

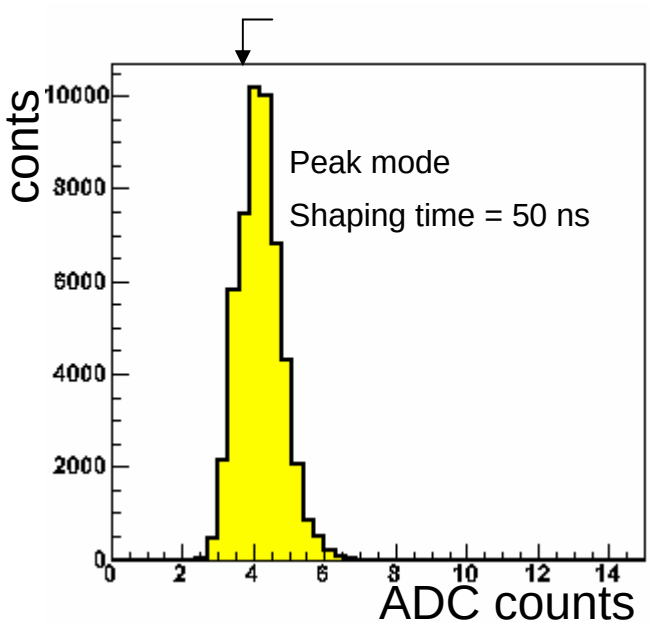


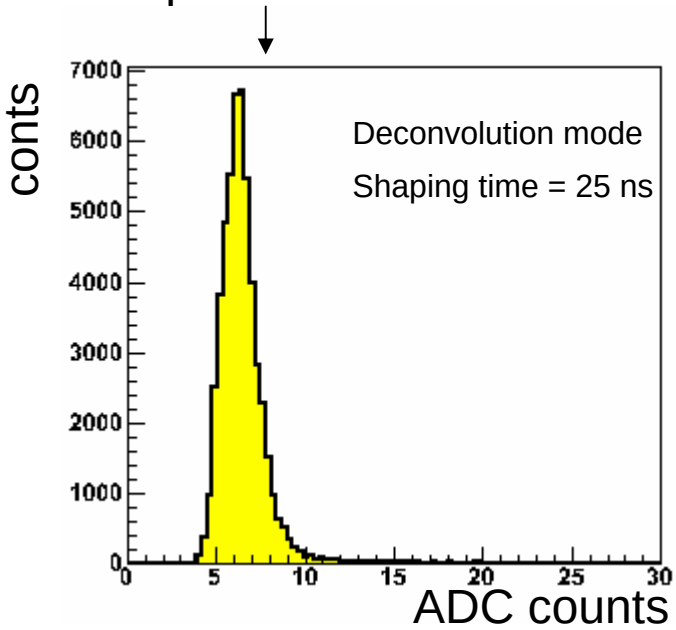
Example in TIB subsystem

- Termal cycles are performed between 10 degC (warm) and -25 degC (cold). Data taken at warm and cold.
  Temperature of the hybrid e silicon monitored with DCU on the modules

Rumore

noise distribution: 66048 strips





Example in TIB subsystem
Room temperature

Noise levels as expected: ~5 counts in peak, ~7 for deconvolution
Compare TIB result from test beam 2004 Signal/Noise = 24 in peak mode ,
Signal/Noise =16 in deconvolution mode

Summary

Each subsystem is fully tested after the assembly of singles components, to validate the tracker structures.

This burn in activity is an excellent opportunity to study in detail same system aspect.

After this tests, this large structures will move to CERN and a slice test of 25 % of tracker is planned.