



TEC X-Calibration, Observations Antwerpen

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CMS Tracker Module Test Meeting 10 February 2004



Overview talk

- Organization
- module status
- observation made in Antwerpen.
(the analyzing of the TEC data is done by T. Keutgen and will be presented after this presentation)
 - Common mode
 - Temperature
 - Truncation pulse shape



Organization

- TEC Longterm centers
 - Aachen based on ARC
 - Antwerpen "standard"
 - Louvain "standard" CMS DAQ , Coldbox frame cooled with liquid
 - Strasbourg "standard" CMS DAQ , horizontal mounting cooled with liquid
- TEC LT centers with CMS DAQ never had more than 2 modules before. Aachen had tested already several modules (see presentation last module test meeting).
- For this test we could only get 4 modules that could not longer be used by others



The Modules

- 5 Modules for the test
- **30211630200026** old Antwerpen module with ceramic hybrid old DCU (so no DCU id) Put in bench position 0
- **30200020000641** old Antwerpen module with ceramic hybrid old DCU (so no DCU id) This is also the hybrid ID as this module has no number. Put in bench position 2
- **30200020015002** "Aachen" system test setup module with new hybrid But not functioning PLL. Put in bench position 1
- **30200020015003** "Aachen" system test setup module with new hybrid But not functioning PLL. Put in bench position 3
- **30200020015008** "Aachen" system test setup module with new hybrid But not functioning PLL. and not working DCU Put in bench position 4



"Starting Problems"

- I found that the CCU channel 3 was not working in the Antwerpen Setup. (never tested ? or broken in the last 2 years) . Have to find a replacement
- Forgot to increase the dry air flow after the Christmas period and proved that the humidity check before cooling was working correctly (restarted test)
- One of the "new" modules had :
 - bad contact in the kapton cable
 - many bad strips (pin holes ? after HV problem)
 - bad hv behavior

So this was excluded from the test but stayed in the box (on position 3) as heat load.



The test

- Version lt_1_22 with a small patch to handle the PLL errors
(If the PLL fails no other I2C settings are done so also no APV I2C settings)
- Minimum test so just one cycle ~ 9 hour.
- Scenario with for each temperature Pedrun, CalRun and Calprof run for all four APV modes with on each temperature a latency test and IV curve



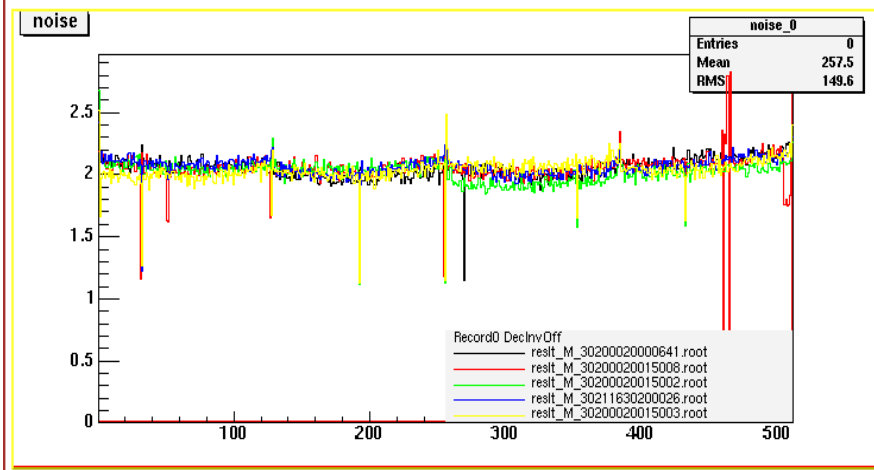
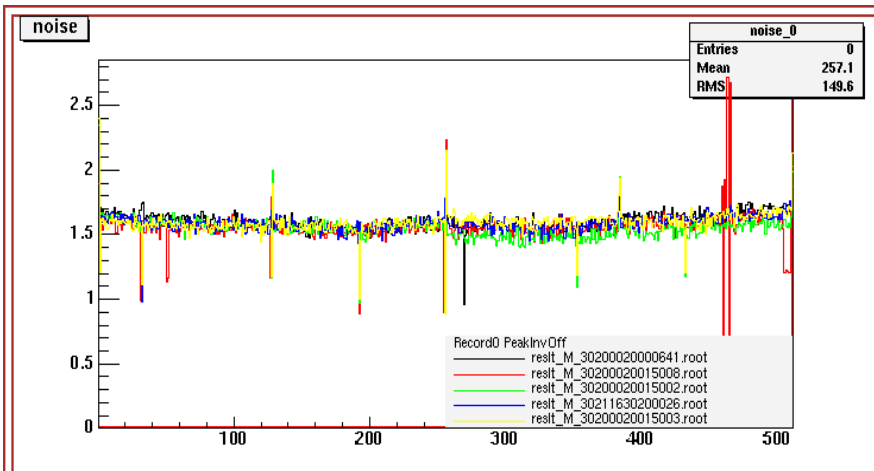
Common mode

- average common mode for the modules (last record)

module	PeakInvOff	PeakInvOn	DecInvOff	DecInvOn
20000641	0.388519	0.375404	0.659504	0.618022
0200026	0.375107	0.371867	0.633433	0.621223
20015008	0.327044	0.31314	0.544201	0.518041
20015002	0.320914	0.305188	0.540892	0.50643
20015003	0.321073	0.305919	0.537959	0.496106

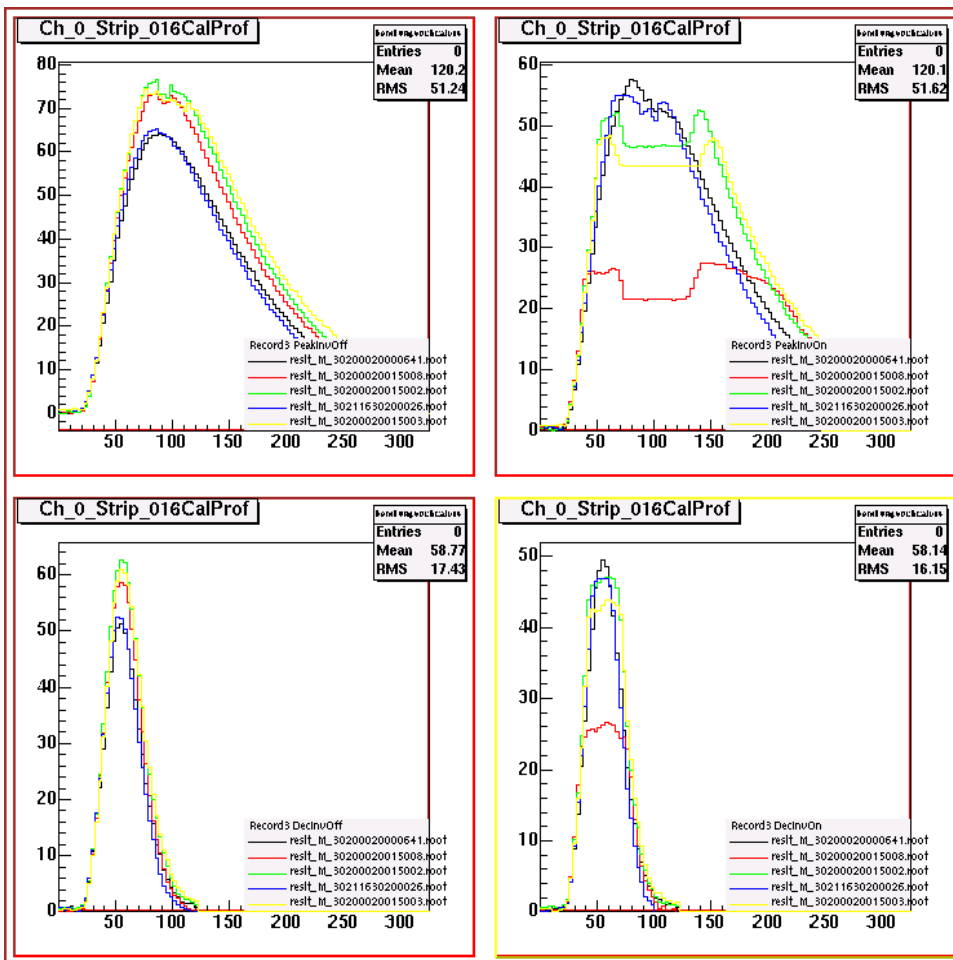
- The first two modules are the modules with old ceramic hybrids AND an old VUTRI adapter. The common mode for these modules is higher.

noise



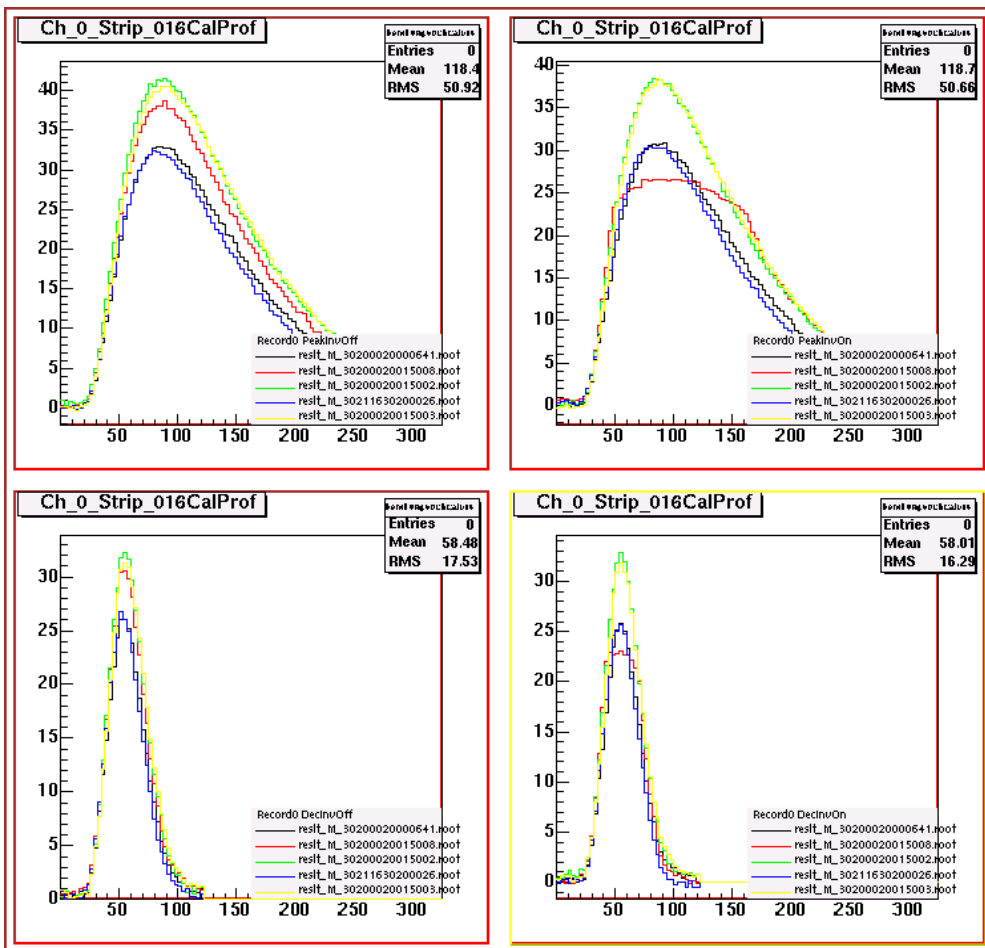
- Noise level as expected
- Clearly to see the APV edges
- Some strips fails in several modules
- For red module many (new) bad strips around 470 and at the end (transportation?)
- Y axis noise in ADC counts
X axis strip number

Pulse shape record 3



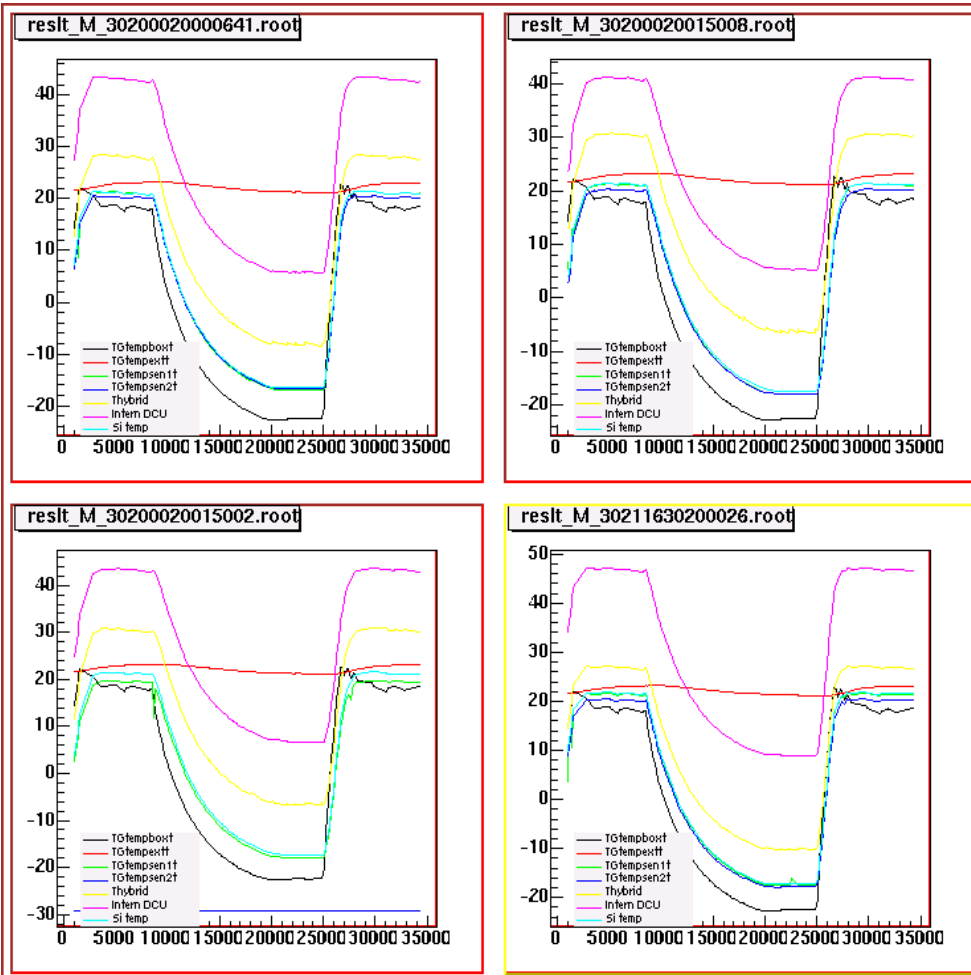
- This are the pulse shapes for strip 16 (o.k. for all modules) taken from the last record
- Y axis signal in ADC counts
X axis time [ns]
- "new" modules have higher pulse.
- Clearly seen the pulse in the inverter on mode are truncated. V_{psp} is not corrected.
- BUT (see next)

Pulse shape record 1



- This are the pulse shapes for strip 16 (o.k. for all modules) taken from the first record
- Y axis signal in ADC counts
X axis time [ns]
- Only truncations effects for 1 module. Why it is different from record 3 situation.
- Louvain found the same difference between record 1 and 3

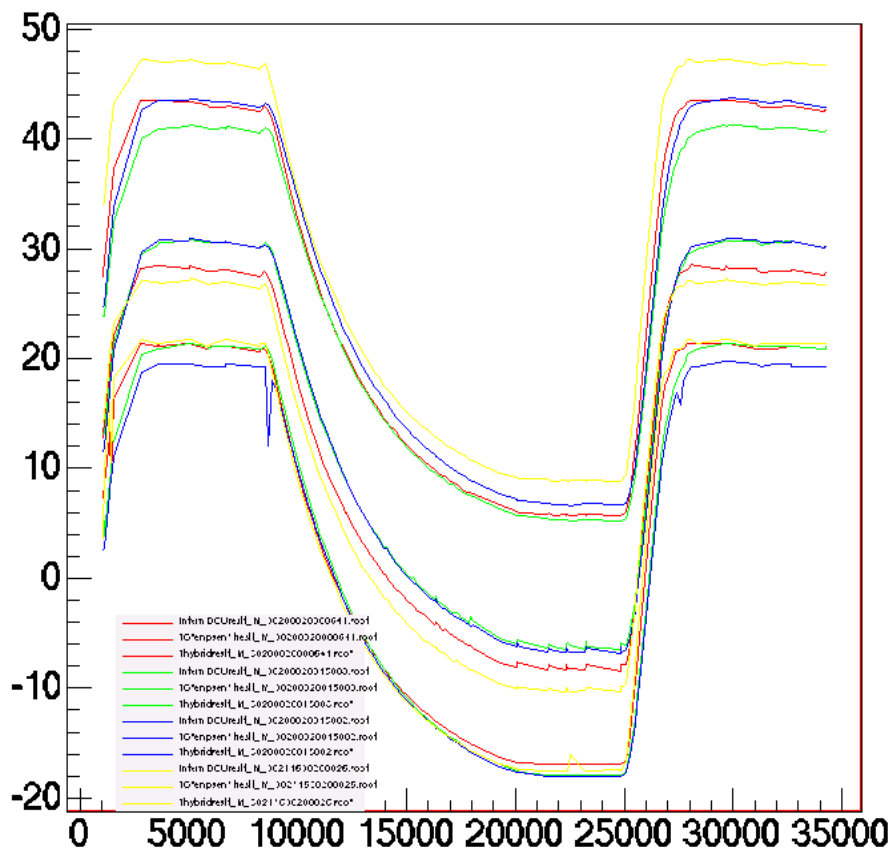
Temperature measurements



- temperature measurements for modules with working DCU.
- Y axis temperature [$^{\circ}\text{C}$]
X axis time [s]
- In most cases good agreement between the Si sensor temperature measurements.
- calibration needed for inter DCU internal sensor or higher DCU chip temperature?

Comparison of the module temperatures

temperature agreement



- temperature measurements for modules with working DCU.
- Y axis temperature [°C]
X axis time [s]
- The DCU measurements give a good indication for the Si and Hybrid temperature



Summary / actions

- Stable running
- Calprof runs in peak inverter on has to be done again
- Discrepancies found between ARC results. But also modules where not well treaded in between.
- CCU chip /module has to be replaced.
- DCU temperature information is a good indicator for the Si temperature.