



Calibration Status

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29 June 2011

- Energy Calibration
 - Stabilities/instabilities
 - ...of gains & databases
- Tools
 - And what we are still missing
- Summary

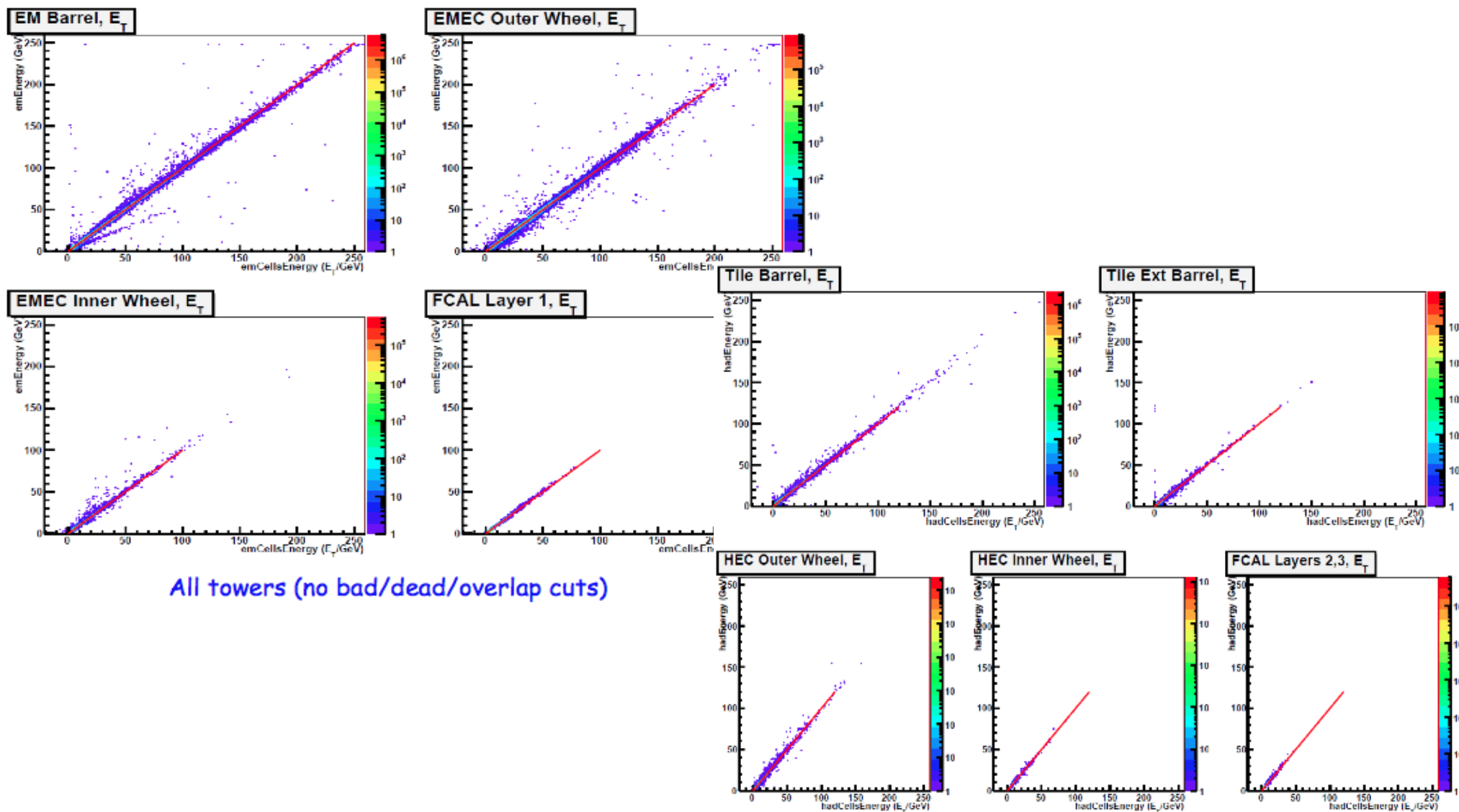


Updates of Gains

- Only one complete gain update this year (18 March)
 - Details in talk by Juraj in Cambridge:
 - <https://indico.cern.ch/getFile.py/access?contribId=6&sessionId=0&resId=0&materialId=slides&confId=120126>
 - Since then aiming to keep the calibration stable
 - Cross checks with physics runs suggests we have it ~right
 - At least in most places
- Few subsequent changes in limited areas
 - EM overlap region gains updated after timing changes
 - But now Barrel component gains from pulser are 10-30% “too high”
 - Comparison of Calo/L1Calo in Physics runs suggests lower gains
 - We are unintentionally making (variable) dead material corrections!
 - Channels where HV known to have changed
 - About 40 channels, all in EM layer, changes from 10% to factor of 2



Comparison with Data: Looks Good!



All towers (no bad/dead/overlap cuts)

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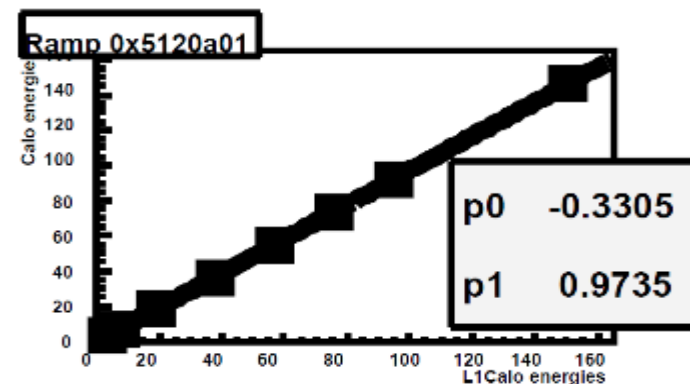
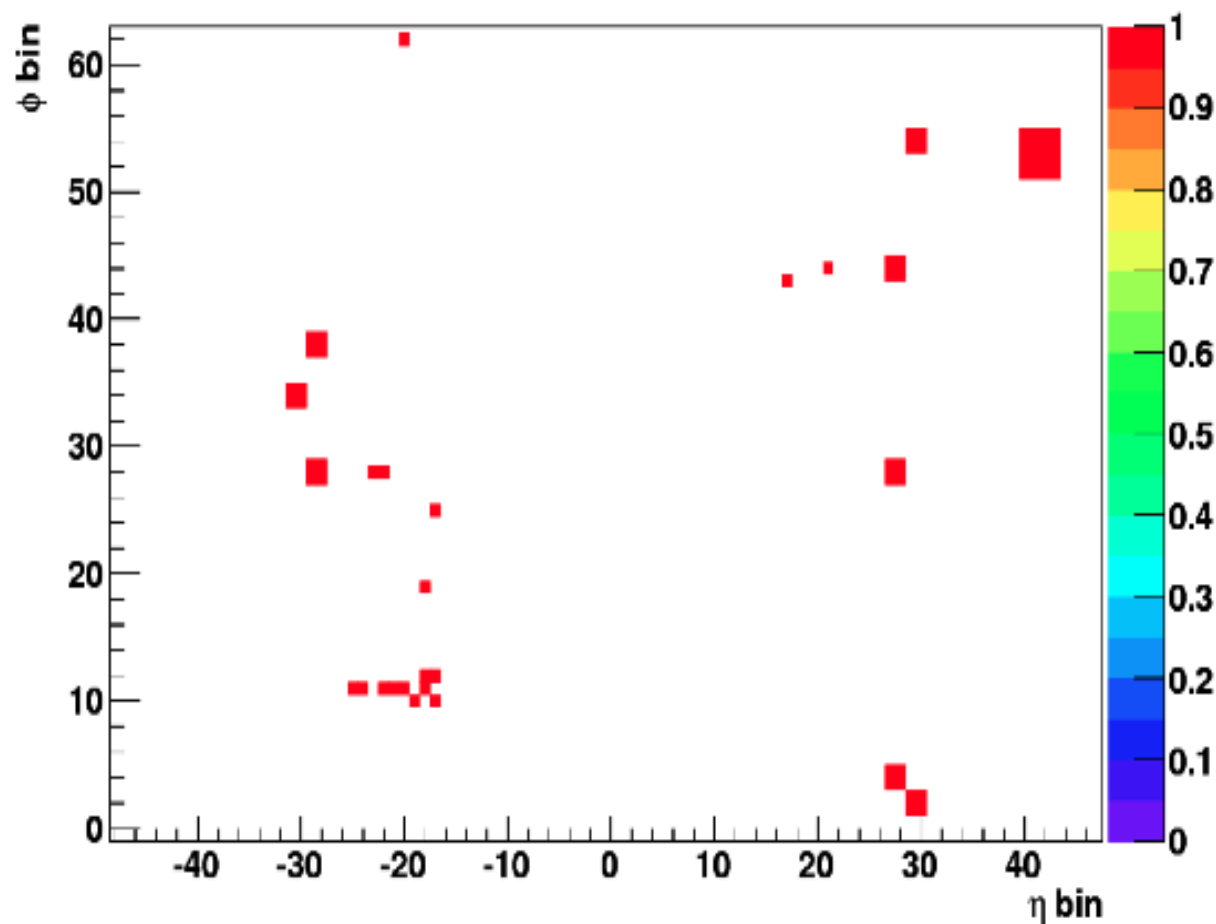
Updates of Understanding (1)

- Twice we thought we needed more gain updates
 - Both times we were wrong
 - Finding out why has taken about 40 emails with LAr experts
 - To whom many thanks for their patience and careful answers!
- April: drifts of $\sim 10\%$ were observed in 20-30 towers
 - But without any known HV changes
 - We did not change gains because we didn't understand this
 - It was due to a change in the LAr database
 - We were automatically picking up an old version (without warnings)
 - The new DB has additional cells marked as dead or noisy
 - These are zeroed in the calculation of LAr tower energy
 - Even if only slightly noisy
 - But are still active in the trigger => inconsistency!

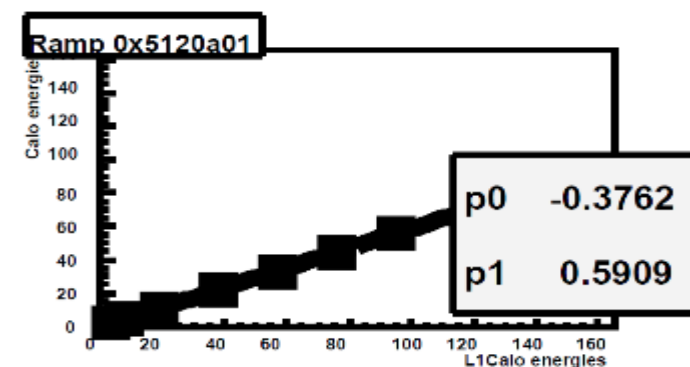


Drifts in HEC towers

HAD TTs that drifted more then 10 %



r. 178744 (pulser)



r. 178975 (pulser)

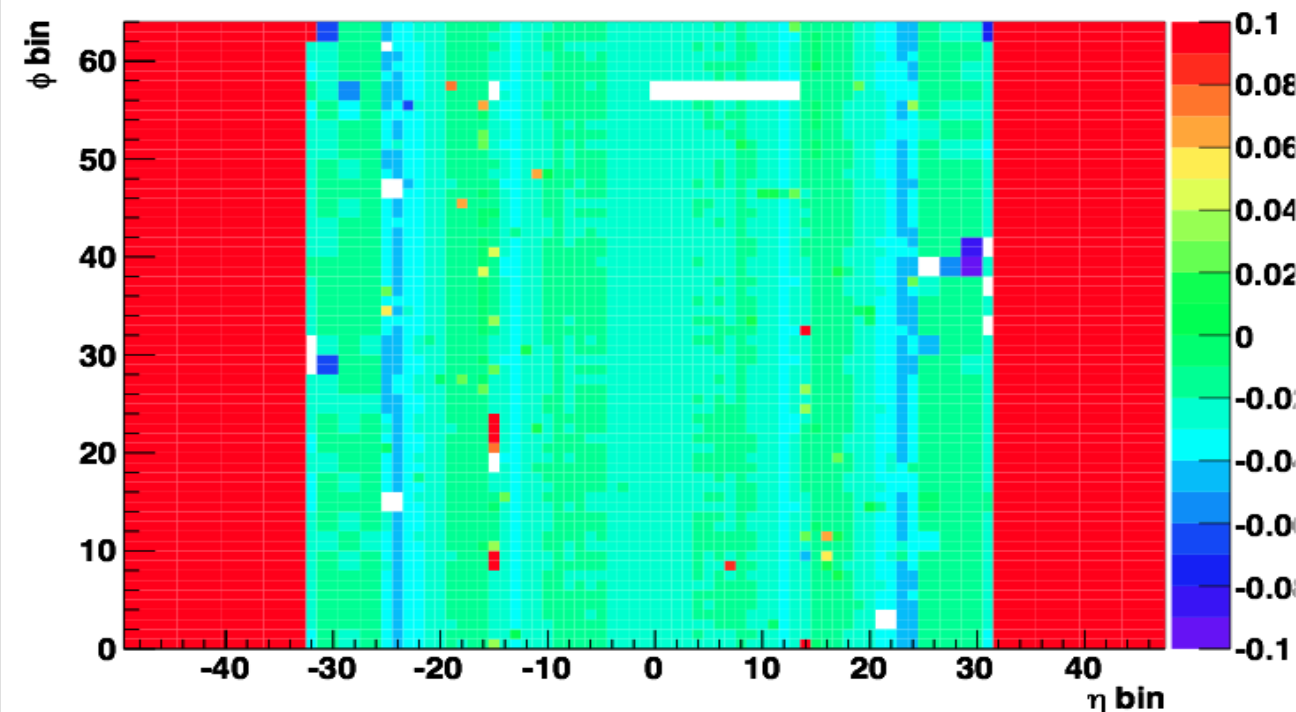
- Towers that changed gains by more then 10 % between r. 178744 (1 apr 2011) and r. 178975 (4 apr 2011) - 26 HAD TTs (and few EM)
- No clear reason!



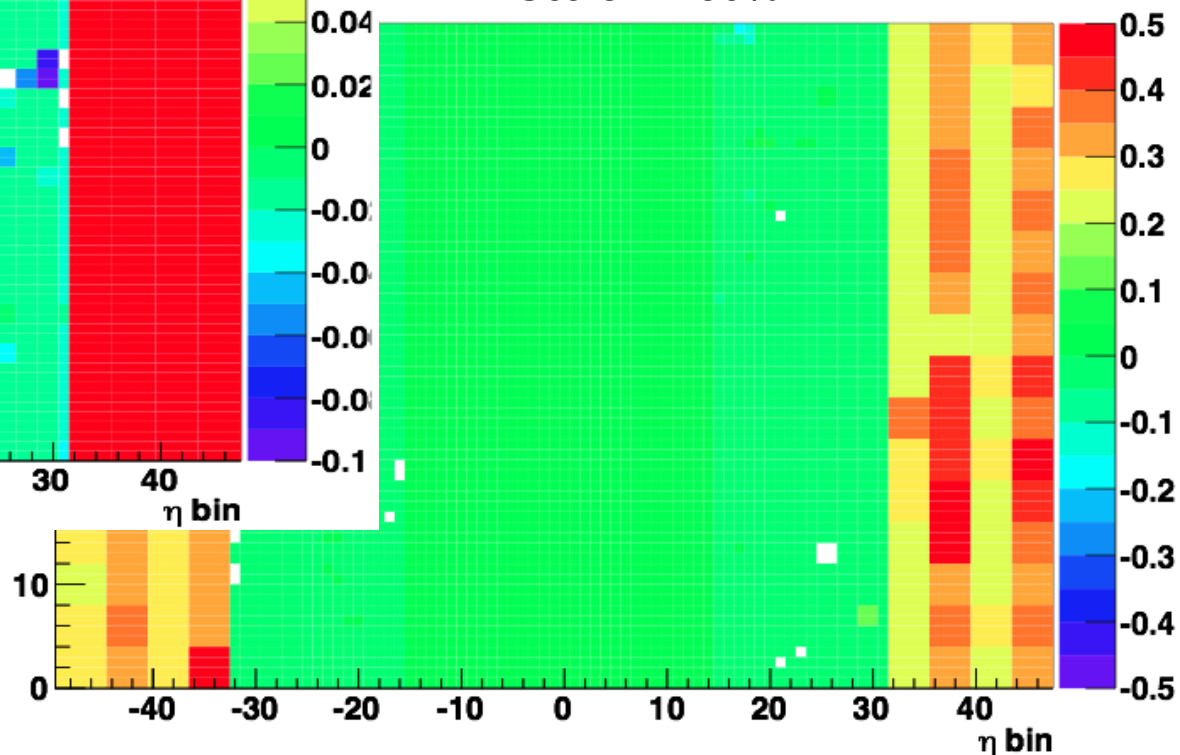
Updates of Understanding (2)

- Recently: moved to Athena 16.6
 - Saw big gain changes: 20% in FCAL, 5% in EMEC

EM layer gains: (Right – Wrong) / Wrong: Scale +/- 10%



Hadronic layer gains
(Right – Wrong) / Wrong:
Scale +/- 50%





Updates of Understanding (3)

- Again an issue with the LAr database
 - Some folder names (or tags) were changed
 - A rare occurrence but needing manual update of job options
 - Now changed to the new folders
 - Gains back to square one (ie March values)
 - Meanwhile we (or at least Juraj) learned many things
 - We must check we use correct pulser->physics corrections in LAr
 - We should think about the treatment of noisy cells
 - We have to pay attention to many many LAr details which we had hoped we could take “out of the box”
 - All this has diverted attention from (a) TileCal and (b) work on tools



Updates of Timings

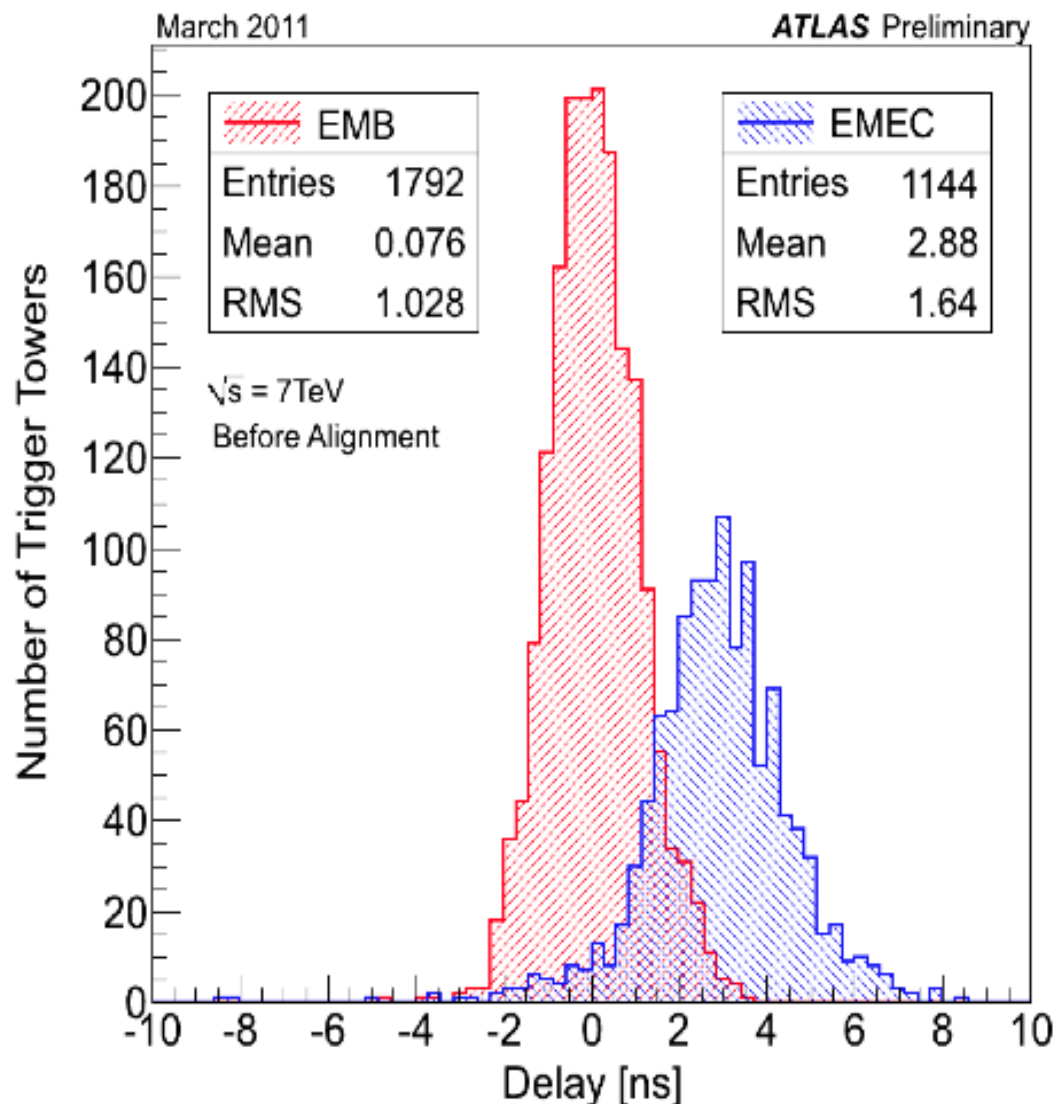
- More details from Valerie
- Summary of changes:
 - General timing update in early 2011
 - Few towers changed by more than 1-2 ns
 - Updates of LAr TBBs and L1Calo timing in EM overlap
 - Large (10-20 ns) changes of barrel component
 - Got it wrong first time round, second attempt cross checked by Damien and Katy
 - Seems OK in data
 - But would be good to check with another special run



Updates of Timings: LAr EMEC TBBs

- EMEC TBB delays:
 - In May, LAr changed the relative timing of front (strips) layer (by 3 ns) compared to the rest in TBBs for the EMEC
 - No adjustment in L1Calo yet: pulse shape will change slightly as strips have ~20-30% of the energy (middle layer timing was not changed)

Trigger Pulse Time Delay (Sum of all Layers - Layer 1)





Tools We Have & Progress Made

- Smooth operational schedule
 - Runs taken by calorimeter shifters
 - Automatic analysis of runs
 - At point 1 for standalone DAC and pedestal runs
 - At the CAF for calibrations with LAr and Tile
 - Summaries and plots available quickly on the web:
 - P1: <https://atlasop.cern.ch/l1calo/CalibRunsP1.php>
 - CAF: <http://cern.ch/atlas-l1calo/calib/CalibRunsCAF.php>
 - Machinery generally works smoothly
 - And now also have CAF testbed at Birmingham (thanks to Pete)
- Full receiver mapping
 - Two receiver channels per tower for FCAL23 & EM overlap
 - Now have procedures for calibrating those gains separately



Tools in Development (1)

- L1Calo calibrations taken by LAr and Tile shifters
 - Will merge to single Calo shifter from August(?)
- L1Calo GUI tool being extended to take all Calo calibrations in parallel
 - Current L1Calo panels moved to "Subdetector Views"
 - Default: click "Do All" button for appropriate weekday
 - Tile added successfully
 - LAr and LUCID still to come...

Calo Calibration Panel Expert 16-5213

☒ Yes, I have checked its OK to do a calibration now

Daily Shifter Schedule **Subdetector Views**

Mon Tue Wed Thu Fri Sat Sun **Test**

Set of Calibrations for TESTING

Do All Selected Calibrations

<input checked="" type="checkbox"/>	L1Calo	▼	RUNNING	4/33 Mins, 0/2 Runs	Abort
<input checked="" type="checkbox"/>	Tile CIS	▼	RUNNING	8/16 Mins, 1/3 Runs	Abort

Messages

```
16:05:20> Created log file /det/l1calo/takeCalib/2011/0620_1602_02281.log
16:05:20> Starting L1Calo calibration
16:05:20> Starting Tile CIS calibration
```

Clear 0/2 Calibrations Abort All



Tools In Development (2)

- Tracking of HV changes
 - Store HV status for each run in sqlite file
 - HV plots in monitoring of physics runs
 - Compare HV status now with that of last calibration update
 - But still needs CAF results to be transferred to online DB
- Better CAF plots
 - Clearer display of gain changes



Developments Needed (1) [from March]

- Tower builder board (TBB) delay database
 - LAr still has a single set of TBB delays (text files)
 - Physics & calibrations need different TBB delays
 - Only solution up to now:
 - Overwrite physics delays before doing a calibration
 - Overwrite them again afterwards with the correct Physics delays
 - Somewhat hazardous...
 - Risk of taking next ATLAS stable beams run with wrong delays if the calibration is aborted without the correct delays being restored
 - Longstanding request to LAr SW experts to improve this!
 - Plan is to put separate physics & calibration delays into COOL
 - LAr aiming to do this by mid April [now mid July - before Paolo goes]
 - Until this, “shifter” calibration needs expert oversight



Developments Needed (2) [from March]

- New version of calibration results folders?
 - Outputs of calibrations are stored in "Results" folders
 - Separate folder for each type of calibration
 - These are single version folders, indexed by timestamp
 - Time stamp is just when the results were uploaded
 - Not when the calibration run was taken
 - Better to have multiple version folders, indexed by Run/LB
 - Time stamp would always be the calibration run number
 - Could upload new versions of results for the same run
 - This would need:
 - Changes to various software tools
 - Complete new set of folders
 - Suitable time to make the change (not while running)



Developments Still Needed (3)

- Monitoring for pulser runs
 - Extra automatic plots from CAF analyses to show problems
- CAF results need to be transferred to online DB
- Monitoring of trends of calibration results
 - Another long term wish list entry
- Analysis of pulse shape in pulser and physics runs
 - Plenty of ideas exchanged about physics "PHOS4" scan
 - Development of software has started
- More attention to TileCal
 - Correlating gain changes with known issues



Open questions

- Dead material corrections
 - In some deliberate scheme
- Rapid response to HV changes?
- Understanding of "ADC droop"
 - Talk by Yuriy?



Summary

- Calibration most fairly stable during this years run
 - Although databases in constant flux!
- Progress with tools and understanding
 - Regular Wednesday morning (technical!) phone meetings
 - Good communication with LAr and Tile experts
 - Next L1Calo/LAr/Tile calibration workshop 12 July
 - <https://indico.cern.ch/conferenceDisplay.py?confId=143303>
- But there are still many things to do...
 - So if you need an ATLAS qualifying task, just ask Juraj!