Tile activities

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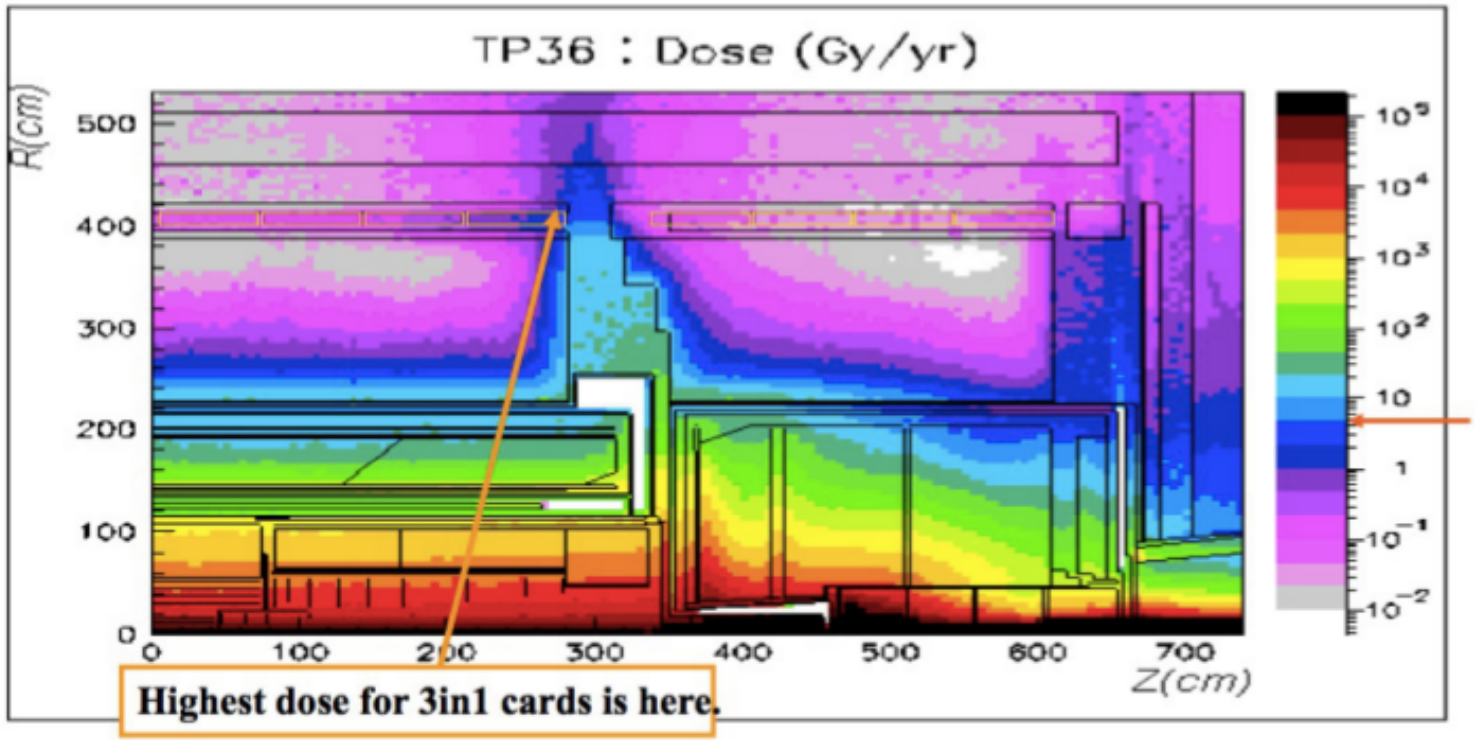
Overview of TileCal activities

- updates/studies for Data Taking 2
- maintenace team is consolidating Tile modules
- new monitoring tools are being developed
- stuck bit studies
- other activities not related to Data Quality:
  - Condition Database updated for reprocessing
  - approval for public plots

Updates for Data Taking Run II

- laser II: Laser will most probably contribute to DQ and DP as before
- radiation studies for scintillators:

K.Anderson



General Data Quality

- during LS1, should reinforce the work to improve the monitoring for Run 2
- name of Tile representatives: Tibor and Carlos
- provide use cases that are missing on the monitoring (reconfigure a module based on DQ results)
- requirements for the new DQM configuration: https://edms.cern.ch/document/719917/1.0

Module consolidation

Consolidation on modules means that:

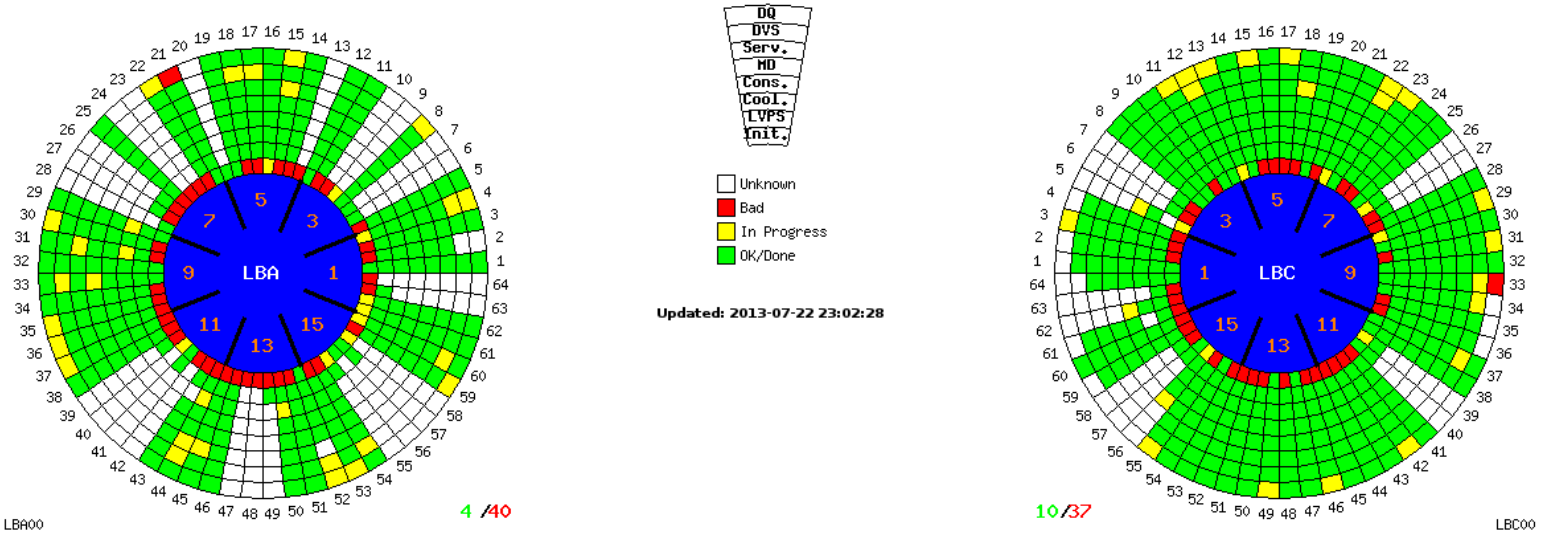
- the connections between DMUs are enforced
- the InterFace board connection to Digitizer #4 is enforced
- it is also used when a new Voltage Power Supply is changed
- digitizers with severe errors are repaired/substituted
- consoidation rate is about $3-5$ modules per week

These are the main interventions on the modules in this period.
Consolidation scheme:

- a module is tested (Mobidick4)
- it is consolidated
- it is tested again (Mobidick4)
- it is re-connected
- calibration runs are taken by Tile Run Cordinator
- DQ leader reports the results and prepare a priority list for second iteration

TileCal current status

Only LB (EB still to be accessed):



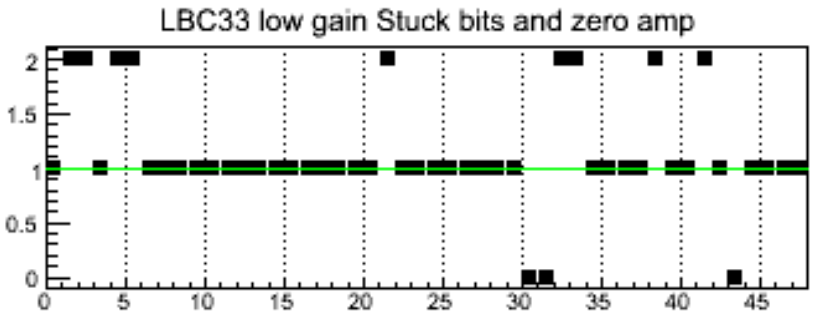
DQ leader job now:

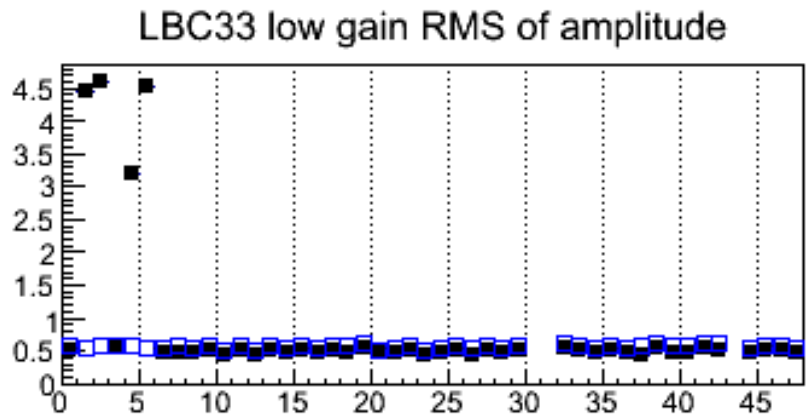
- summarized in the outer wheel
- set the final status for each module
- check calibration runs (Las, CIS, CISmono, ped) before consolidation
- check list of known problems
- check calibration runs after consolidation
- check known problems, find new ones
- re-check already consoidated modules

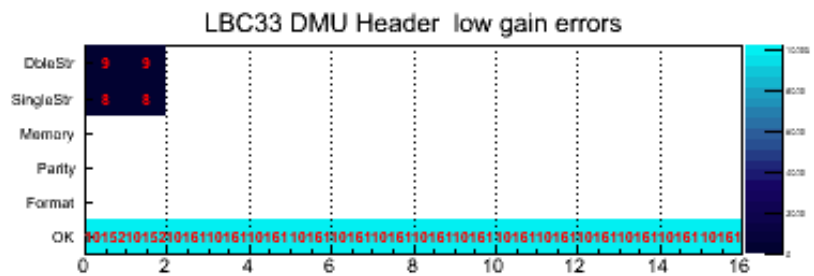
Policy: Tile powered AMAP (as much as possible).

DQ checks (I)

- DQ granularity is now at level of single channel
- this means that we need at least an idea of the channel history
- no tools yet for that, just go through calibration runs
- an (unfortunate) example:
  - before consolidation, digitizer 4 had problems
  - it was substituted
  - after consolidation:







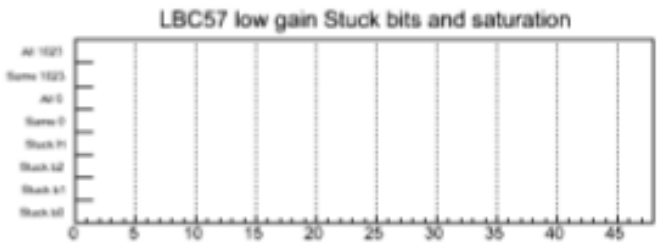
DQ checks (II)

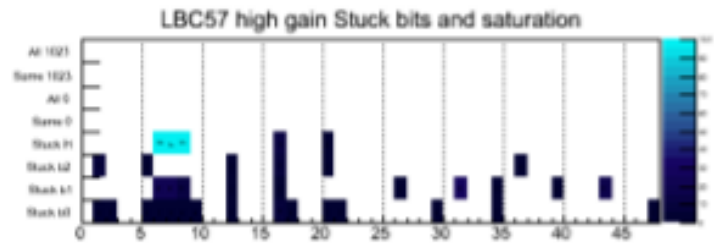
- similar errors in other calibration runs after consolidation
- LBC33 is on top of priority list for next iteration
- in the meanwhile, it should be monitored
- 4 channels out of 6 affected, always in the same position
- problem seems related to digitizer 8 (CRC, SStrobe and DStrobe errors in both DMUs)
- during tests, this digitizer looked fine
- corresponding cells: D0, A1, BC1, A2
- seems to be a real problem in a critical detector region
- digitizer 4 was substituted, nothing strange seen
- looking in ntuples for these DMUs

Stuck bits

Each summer, stuck bit is the hot topic!

- this summer is not an exception
- we somehow "forced" Tibor to make public his *magic code* for stuck bit search
- we have new plots to monitor!

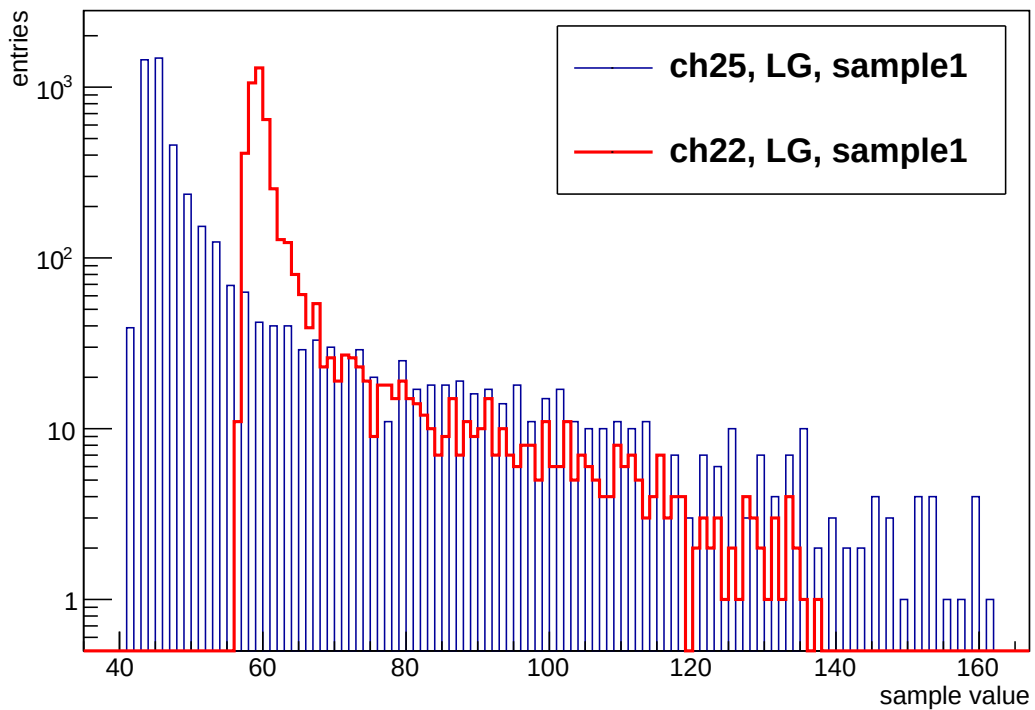




- strong feedback on this from DQ side
- no data corruption checks
- not validated
- seems to work
- maintenance team is left blind!!

Why stuck bit?

- before: a channel is affected if a MSB is affected in LG
- now this Weltanshauung is changing: we showed that:
  - in HG, there may be gain switch problems also with LSB
  - in LG, problems in transition region with LSB
- ok, but how many? we found about 55 channels with stuck bit (see back-up)
- a *reverse* example: this stuck bit was found by hand, and confirmed later by the new monitoring tool

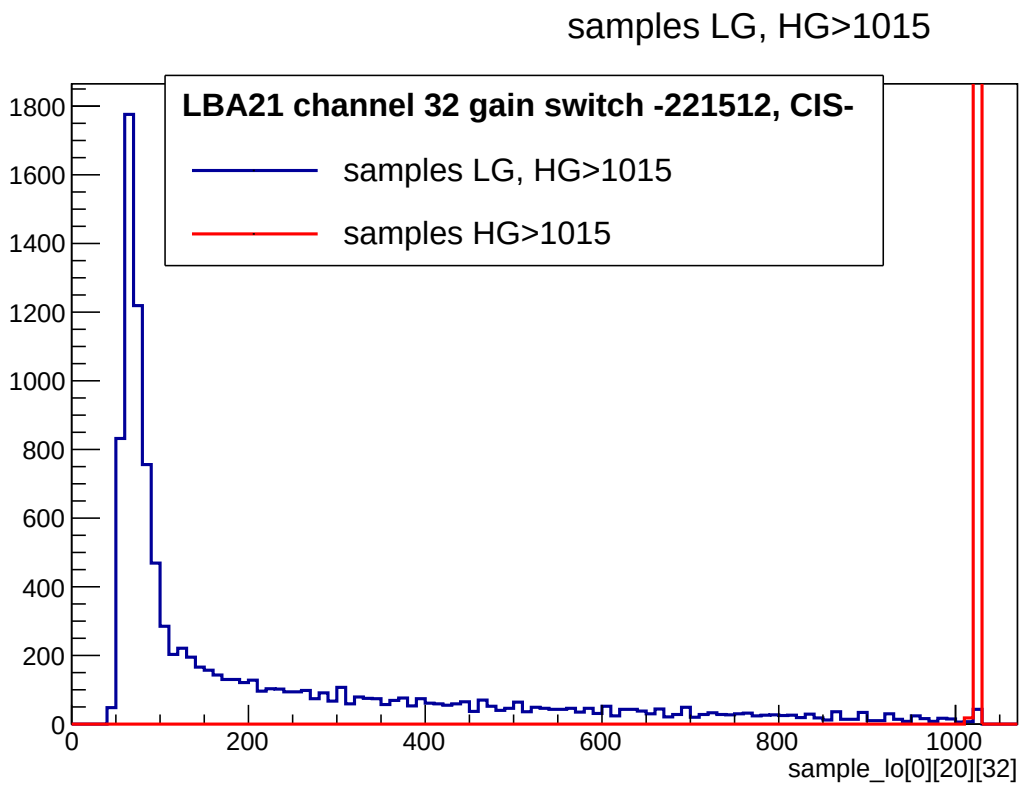


Solutions for stuck bit

- before: sever stuck bit $\longrightarrow$ mask both gains
- substitution: we need to substitute the whole digitizer (6 channels)
- repair: Stockholm
- what is the rate of a bit becoming stuck? unknown
- other moderated solutions:
  - currently: switch to LG when high gain ADC value < 2 or > 1022
  - any stuck bit interferes with gain switching
  - change the thresholds
  - change is at digitizer level (6 channels)
  - another handle is the pedestal, which can be any between 0 and 255
- for the moment: check list of existing stuck bit channels
- reconstruct older runs with new TileMonitoring plots
- look by hand in ntuples

Gain switch problems

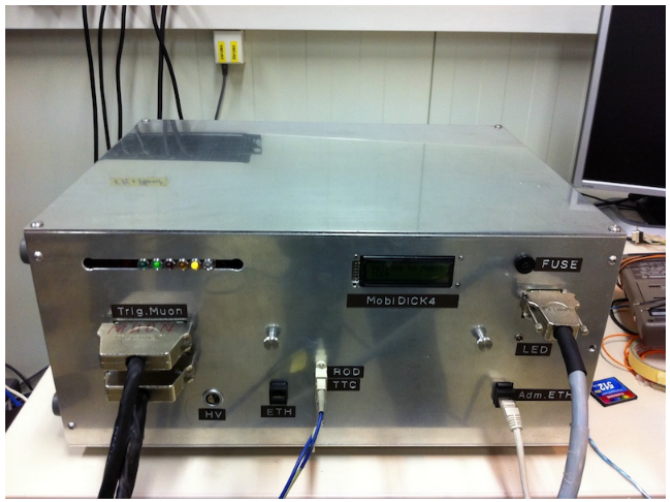
- looking at stuck bit channels, other problems have been found
- high rate of digital errors
- gain switch problem
- a channel without stuck bit has always HG only, also when reaching saturation
- a preliminary list circulated
- item looking at the ntuples for these channels:



Other ideas (I)

ATLAS rule for consolidation in the pit: as fast as reasonably possible (AFARP), with balance and safety.

- Mobydick4:



- Mobydick emulates all online ROD functionalities for a single module
- the problem is that in the new monitoring tools are not helpful for people in the pit
- in the pit what is needed is:
  - a fast test (TileMonitoring need h2000 ntuples, Athena)
  - reliable (new stuck bit tool is not validated)
  - easy to use (new tool is quite easy, but severity is arbitrary, and has too low-level information)
- thinking about the possibility to implement a quicker test on MD4

Other ideas (II)

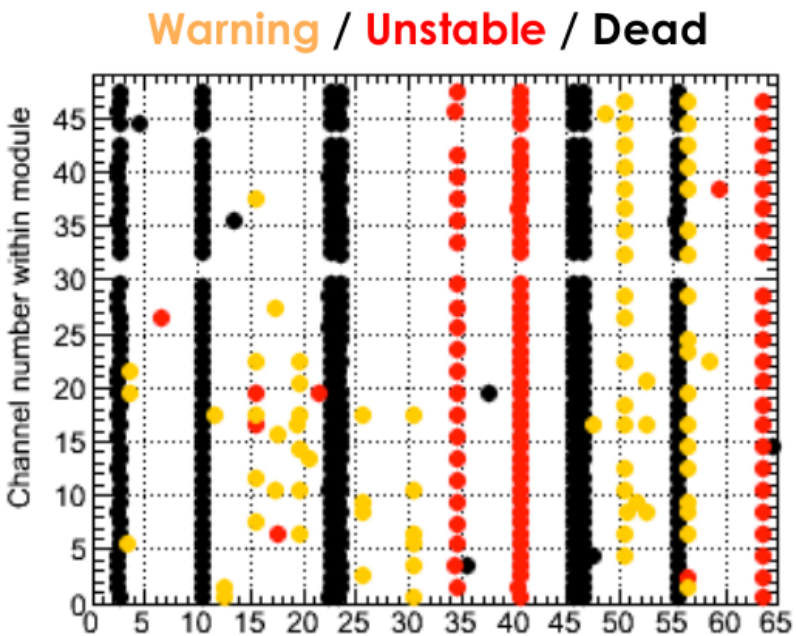
The recipe is (should be):

- inject a CISscan-like signal in the drawer
- injection configurations:
  - 3-4 DAC values should suffice
  - introduce 3in1-phase shifts (steps of 104 ps)
  - move up and down the digitized DAC value for pedestal (roughly between 0 and 100 ADC)
- if injected charge is quite large, then a small shift in phase can help scan different bits
- the question is: how many events should be injected for the test to be sensitive and usable in the pit?
- doing an MC-toy for this
- in the meanwhile: nobody has asked Stockholm!!

Laser stability monitor for LS1 (I)

Clermont-Ferrand (Djamel) is preparing a new monitoring interface for the Laser:

- merge all tols in a single one, easy to use
- guide user with pre-selected problems
- Laser monitoring is done relatively, wrt a reference
- during maintenace, reference is updated monthly
- LBA only for the moment
- warnings for variation larger than 1.5%



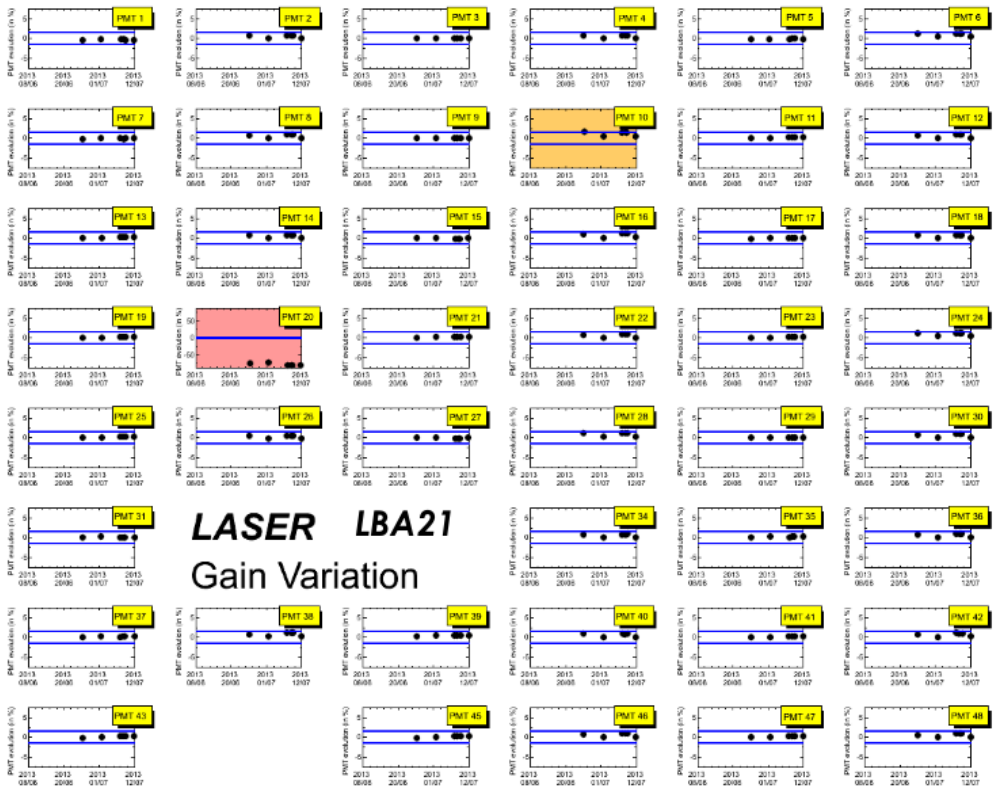
LBA01 45/0/0/0	LBA02 0/0/0/45	LBA03 0/0/0/45	LBA04 44/0/1/0	LBA05 45/0/0/0	LBA06 44/0/1/0	LBA07 45/0/0/0	LBA08 45/0/0/0
LBA09 45/0/0/0	LBA10 0/0/1/44	LBA11 44/1/0/0	LBA12 43/2/0/0	LBA13 0/0/0/45	LBA14 45/0/0/0	LBA15 14/0/31/0	LBA16 45/0/0/0
LBA17 38/4/3/0	LBA18 45/0/0/0	LBA19 38/7/0/0	LBA20 44/1/0/0	LBA21 43/1/1/0	LBA22 0/0/1/44	LBA23 0/0/0/45	LBA24 45/0/0/0
LBA25 41/4/0/0	LBA26 45/0/0/0	LBA27 45/0/0/0	LBA28 45/0/0/0	LBA29 45/0/0/0	LBA30 36/9/0/0	LBA31 45/0/0/0	LBA32 0/0/0/45
LBA33 0/0/0/45	LBA34 23/0/22/0	LBA35 44/0/0/1	LBA36 45/0/0/0	LBA37 44/0/1/0	LBA38 45/0/0/0	LBA39 44/0/0/1	LBA40 0/0/45/0
LBA41 45/0/0/0	LBA42 45/0/0/0	LBA43 45/0/0/0	LBA44 45/0/0/0	LBA45 0/0/0/45	LBA46 0/0/6/39	LBA47 22/16/7/0	LBA48 37/0/8/0
LBA49 45/0/0/0	LBA50 26/19/0/0	LBA51 44/1/0/0	LBA52 40/5/0/0	LBA53 0/0/0/45	LBA54 13/20/12/0	LBA55 0/0/0/45	LBA56 0/0/0/45
LBA57 45/0/0/0	LBA58 45/0/0/0	LBA59 44/0/1/0	LBA60 45/0/0/0	LBA61 45/0/0/0	LBA62 45/0/0/0	LBA63 22/0/23/0	LBA64 45/0/0/0

Stable / Warning / Unstable / Dead

http://atlas-tile-laser.web.cern.ch/atlas-tile-laser/Welcome.php?n=Work.LowGainStability

Laser stability monitor for LS1 (II)

details for a single module:



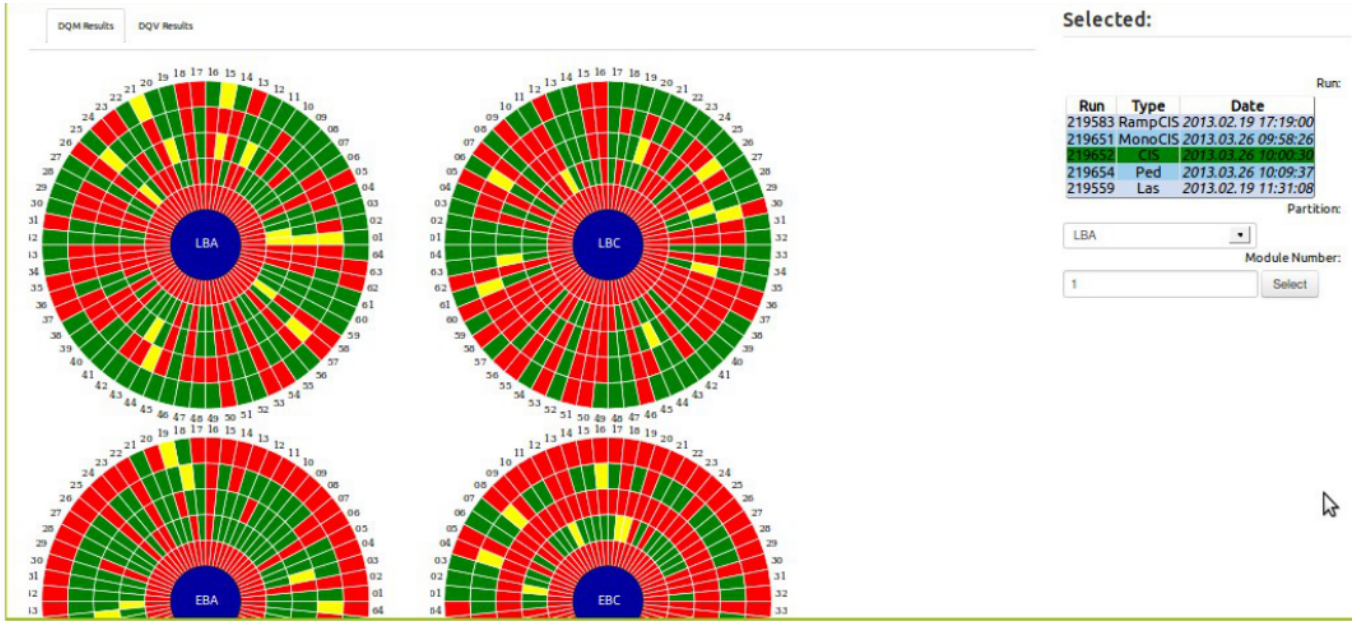
3. List of channels with BAD LASER (which are not on BC list):
LBA03 : Channel 5 : 2.16%
LBA03 : Channel 19 : -1.56%
LBA03 : Channel 21 : 1.52%
LBA11 : Channel 17 : 2.06%
LBA12 : Channel 0 : -1.79%
...
4. List of KNOWN channels with NO LASER:
LBA10 : Channel 16 : KNOWN : Stuck bit
LBA13 : Channel 35 : KNOWN : No CIS calibration
LBA23 : Channel 36 : KNOWN : No CIS calibration
LBA23 : Channel 45 : KNOWN : No CIS calibration
...
5. List of KNOWN channels with BAD LASER:
LBA06 : Channel 26 : -79.94%
LBA15 : Channel 17 : 1.58%
LBA15 : Channel 19 : -51.74%
LBA17 : Channel 6 : -31.64%
...

http://atlas-tile-laser.web.cern.ch/atlas-tile-laser/Images/Stability/Daily/problem_list_lg.txt

- for the moment, experts only are using it
- plus DQleader
- but the idea is to extend it for any user

New WIS interface

Raffaela is implementing a new WIS interface:



- it is intended to be a general, easy-to-use tool
- it is not yet (in my opinion)
- it should give the same results as the old interface
- it should be improved $\longrightarrow$ feedback on this
- but I am not using it for validation, checks, studies

Conclusions

- too many meeting to be useful
- what is really missing for DQ, is a quick-and-dirty timeline of problems
- it is a waste of time each day to check the same channel for multiple runs, looking back to 2011, and then hear at some meeting that *the problem was known*, but there is no logbook
- Eirini and me we are pushing to have some timeline-tool
- Tibor tool need to be at least validated (eff VS rej)
- preparing a hot list for modules to be checked a second time by maintenance team
- if useful, add new Mobydick tests
- new tools/interfaces $\longrightarrow$ testing them before ask validators/users to use them
- gain switch problem and stuck bit rate are still not understood/unknown
- we should focus on these if we want to work also in view of next run

Bonus

- next Tile project leader: Claudio, Sasha, Eirini, Giulio
- no rumors by other groups
- Claudio:
  - coordinates DQ and DP general activities with Carlos
  - my opinion is that he has not a large visibility
  - as long as I known, he is working only on TileCal
- Eirini:
  - following Ana step-by-step
  - she is trying to help in many fields
  - she has experience in leading groups
  - involved also in Physics
- Giulio:
  - it seems to me that he is doing more work than other, but with less visibility
  - pragmatic
  - do not know whether he is interested
- Sasha:
  - maybe the most involved person ever
  - he knowns and do everything
  - it seems to me that he is not trying to share work

Back-Up

First draft of list (I)

EBA02 channel_4 bit_5 LG +++
EBA06 channel_16 bit_0_1 LG +++
EBA12 channel_31 bit_5 HG +++
EBA18 channel_21 gain switch +++
EBA57 channel_22

EBC13 channel_8 bit_3 HG ++
EBC20 channel_0 bit_0 HG +
EBC22 channel_16 bit_6 LG +++
EBC24 channel_8 bit_0 LG ++
EBC27 channel_16 bit_0_1 LG +++
EBC33 channel_33
EBC46 channel_1 bit_4 LG +++
EBC54 channel_36 bit_0 LG ++
EBC54 channel_37 bit_0 LG ++
EBC54 channel_38 bit_0 HG +
EBC54 channel_40 bit_0 LG ++
EBC63 channel_14 bit_4 HG +++
EBC64 channel_3
EBC64 channel_4
EBC64 channel_5

First draft of list (II)

LBA02 channel_35
LBA05 channel_8
LBA10 channel_16 bit_0 LG ++
LBA14 channel_6
LBA21 channel_30 gain switch +++
LBA21 channel_31 gain switch +++
LBA21 channel_32 gain switch +++
LBA30 channel_32 bit_0_4 LG +++
LBA34 channel_47 bit_2 HG ++
LBA49 channel_15
LBA49 channel_16
LBA49 channel_17
LBA50 channel_42
LBA50 channel_43
LBA50 channel_44
LBA50 channel_45
LBA50 channel_46
LBA50 channel_47
LBA58 channel_22
LBA64 channel_14

First draft of list (III)

LBC03 channel_25 bit_0 LG ++
LBC07 channel_29
LBC17 channel_38
LBC22 channel_29 bit_2 LG +++
LBC26 channel_38 bit_7 LG +++
LBC37 channel_21 bit_5 LG +++
LBC39 channel_7 bit_2_3 LG +++
LBC39 channel_39 bit_0 HG +
LBC46 channel_37 bit_7 HG +++
LBC51 channel_32
LBC51 channel_33
LBC51 channel_34
LBC51 channel_35
LBC53 channel_34 bit_3 HG ++
LBC55 channel_27 bit_4 HG +++
LBC62 channel_32 bit_6_7 HG +++