Laser work and status

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Overview

- Some summary
- problems still there
- next steps

Small summary

We focused on different aspects in these last months... nothing seems really effective:

- Pisa method: how to go on?
- Laser calibration contribution: all constants = 1!!
- during Monday meetings, it is frequently highlighted that people want to put Laser constants in COOLdb
- results with Pisa methods: not precise
- results with Clermont-Ferrand methond: very precise, but data show jumps not yet understood
- the two methods are **not** comparable

Last effort was on using the Laser interbunch runs: link to long presentation at Monday meeting.

InterBunch ideas

During data-taking, it is possible to fire the Laser in the PMTs in empty bunches. If the event is accepted by the L1 trigger, all the Tile PMTs are illuminated.

- High Gain (signal spreads between 2 and 10 pC)
- very important: stuck bits may be neglected!!
- apart fibers and voltage problems, recontructed signals should be the same
- using Fit/OF2-Iter methods, so do not care about corrections and timing settings
- dedicated runs$\rightarrow$dedicated BCID, so it should be easy to check
- potentially, it is a very powerfull online monitor-profiler for TileCal

InterBunch: pros and cons

Pros:

- online monitor for TileCal
- if TileCal has a problem, this should affect data and Laser runs
- Laser input light is (should be) under control
- it would be nice to have an online Laser tool (another one) for the shifter

Cons:

- low statistics: now gain monitoring with the Pisa method!
- rate is reduced by L1 acceptance by a factor ~ 5
- each time, we need databases access and so on...

Problems still there

Urgent problems in Tile:

- negative energies!!
- PMT gain stability
- mysterious timing jumps and instabilities

Results from data and Laser seem inconsistent. See next slide.

Timing issues

from Giulio's slide 2 weeks ago:

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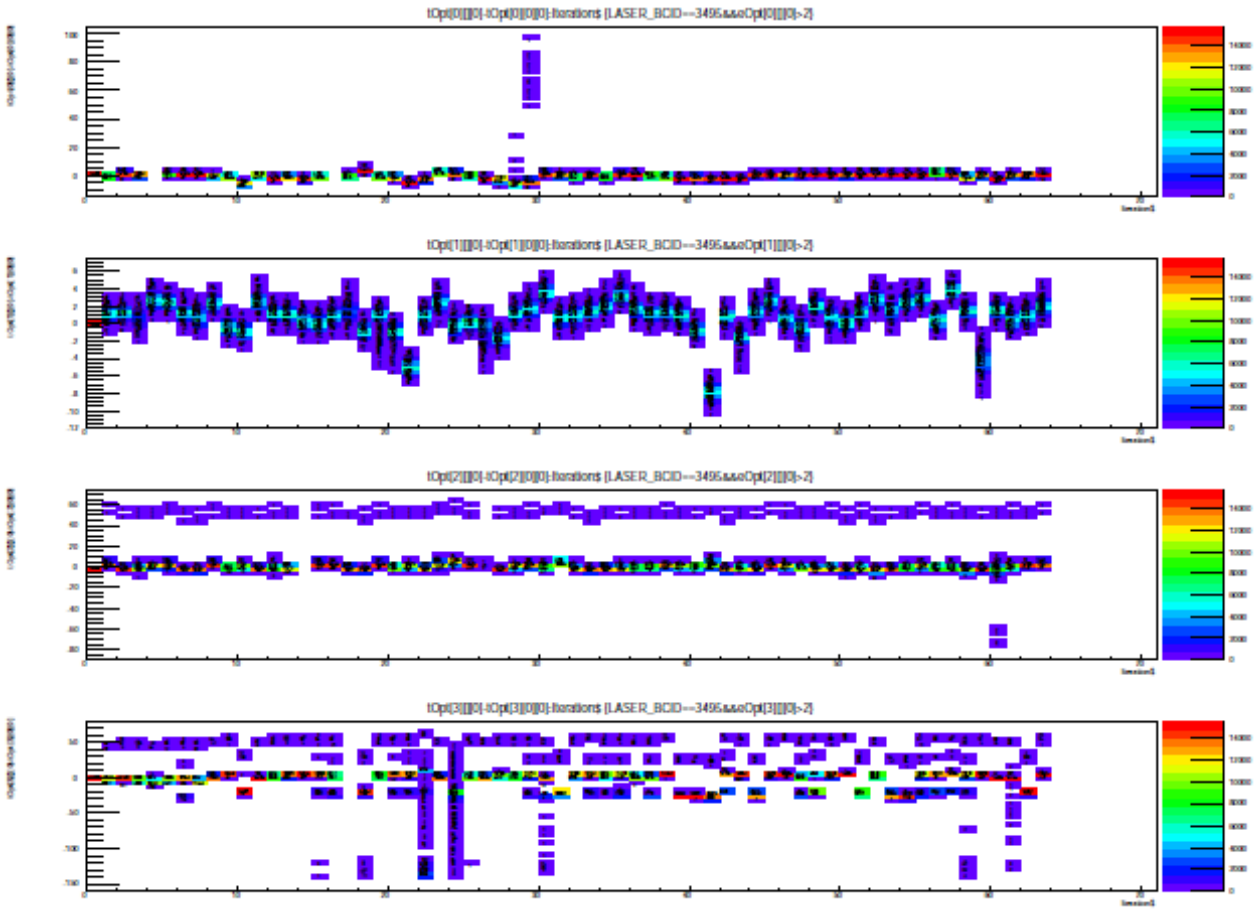
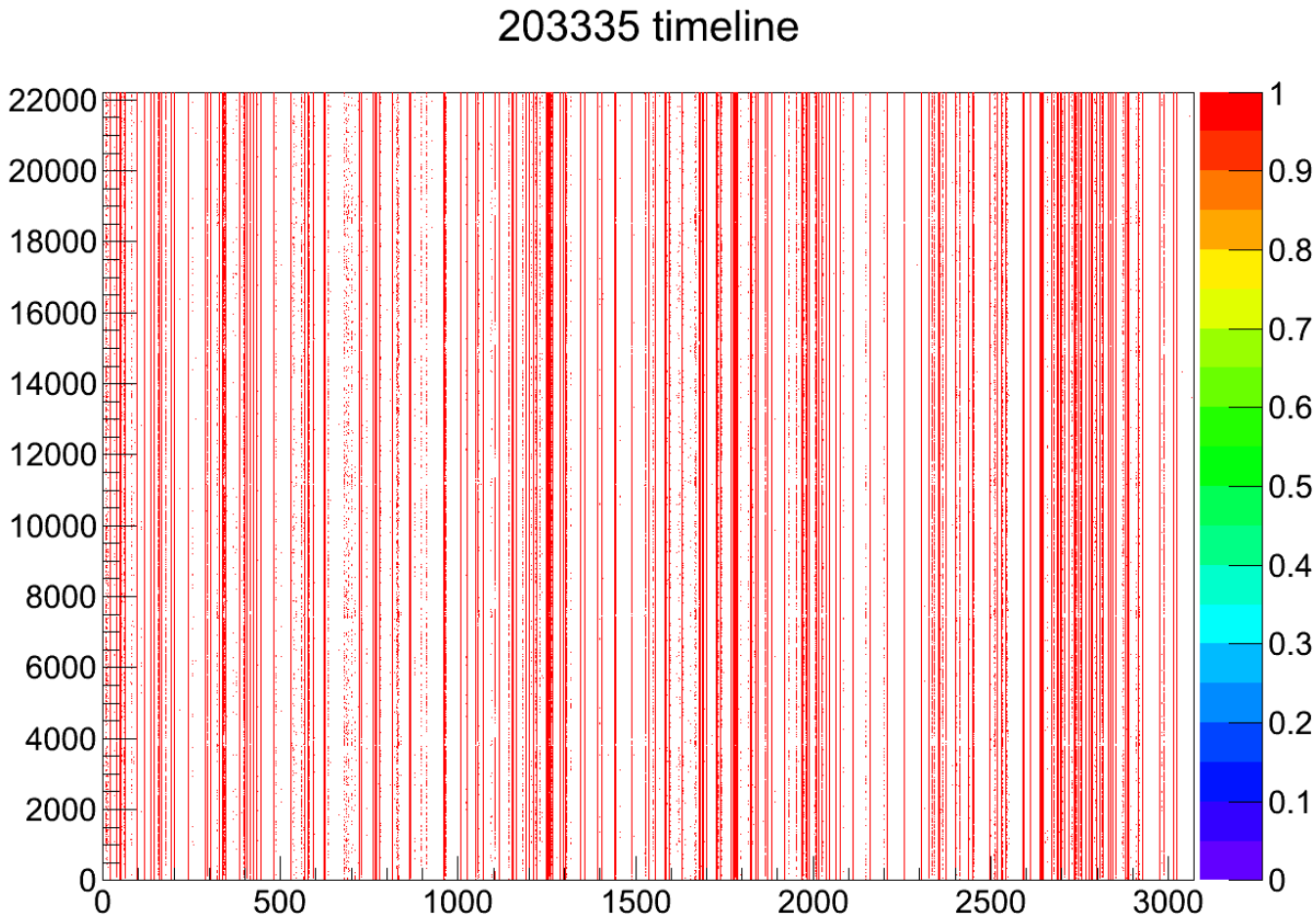


$\sim$ 60 ns jumps in EB!! (no DQ checks)

Amplitude issues

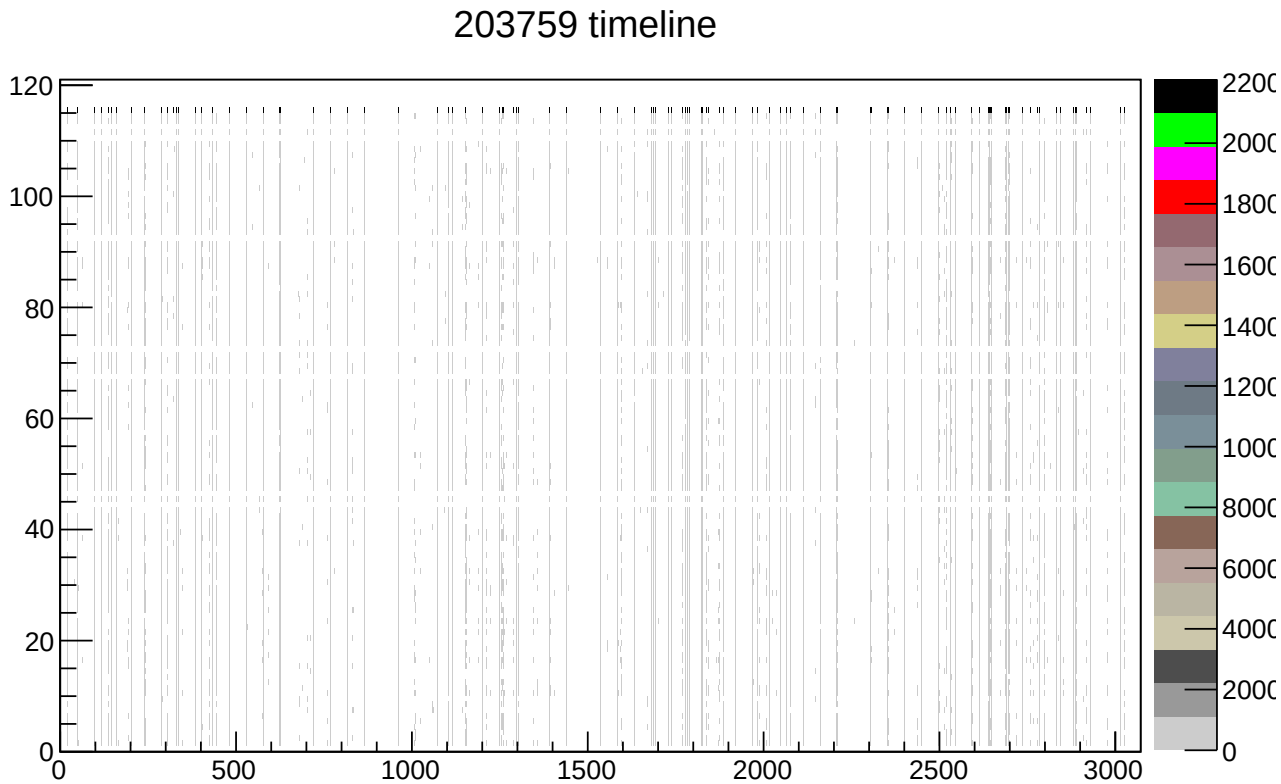
For the same run, consider amplitude instead of timing. Red points are events for which $eFit > 10\ pC$ or $eFit < 2\ pC$. Only EBA.



DQ checks implemented, but no BAD channels masked!! but only 851 channels are masked in whole TileCal.

A different run

The same check has been performed on a different run, apparently without any problems; z-axis is wrong, do not care about color codes.



- same structure as in previous run
- DQ, empty channels and special cells checks implemented
- with a lower threshold ($eFit < 0.2$ pC), map is clean

Ongoing work

One of most important problems is how to interface with the database. This is what we are implementing now:

- calibration ntuples have 2 trees: *h2000* and *Tile_DCS*
- loop over *Tile_DCS* events:
  - save the event number at which a LB starts, and the LumiBlock
  - query the COOLdb for a list of bad channels in this LB: Athena script
  - dump the text file in a root file
- merge the files: for 1 RunNumber, 1 file with the map of BAD channels for each LB
- now analyse your *h2000*
- for each event:
  - associate this event with its LB
  - load the BAD channels map
  - check DQ errors
  - mask channels marked as bad and with DQ errors in this event
  - do what you want

And possibly run over all 2012 runs. The procedure is quite error-prone: moreover, Athena settings change Root version, paths, variables...

Conclusions

- different approches have been tried
- Laser constants are not yet in the database
- the proposed checks imply anyway a machinery which is $\sim$ necessary to deal with these ntuples
- energy threshold is somehow arbitrary
- should look to energy distribution, which is not unique among channels