DAQ support for the second Photonics laser

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Introduction

- In the DAQ laser parameters have been referring to the wavelength
  - No distinction between two lasers of the same model
- We would like now
  - to have the option to take data in the same run with two lasers of the same model, the Photonics
  - to keep a reliable track of which laser was used for which run (and which event in the run)

Changes required in the ECAL DAQ (database and laser supervisor) and the local laser control.

Past

Ancient days

- Two blue Quantronix, one IR Quantronix.
- DAQ parameters (sequence, attenuation, timing) declined in two sets and distinguished with keywords BLUE and IR.
- Second blue Quantronix considered as a spare: single parameter set for the BLUE wavelength.

Old days

- Two Blue Quantronix, one IR Quantronix, one blue Photonics, one green.
- Four DAQ parameter set distinguished with keywords BLUE, BLUE2, IR, and GREEN.
  - BLUE = Blue Quantronix.
 - BLUE2 = Blue Photonics (Photonics I).

Present-day

Nowadays

- One blue Quantronix, one IR Quantronix, two blue Photonics (I and II), one green.
- Trigger code written into data header has room for only 4 different wavelengths.
- Cannot run with both Photonics in the same run.
- If we decide to use Photonics II in place of Quantronix without changing the parameter names, then:
  - we get the **inconsistency**: BLUE = Photonics **II**; BLUE**2** = Photonics **I**;
  - if Quantronix is used in a special run, its substitution to Photonics will not be tracked.

Proposals

- Minimal proposal:
  - Deprecate BLUE and BLU2 parameter names
  - DAQ parameters referred as BLUE_PHOT_1, BLUE_PHOT_2, BLUE_QUANT, IR, GREEN
- Baseline proposal:
  - Minimal + the following
  - DAQ parameter SECOND_BLUE_LASER set to "Photonics" or "Quantronix"
  - Add a colour code '5' in the Laser supervisor - Local laser control protocol to refer to the second Photonics.
  - Benefit: blue Quantronix can be used without losing track of which laser was used in a given run.

Required changes

- Sequence configuration: done
- Attenuation and timing configuration:
  - Six (seven) parameters to be added to the configuration database and Laser supervisor. Expected time: one or two days.
- Laser control:
  - See next slide
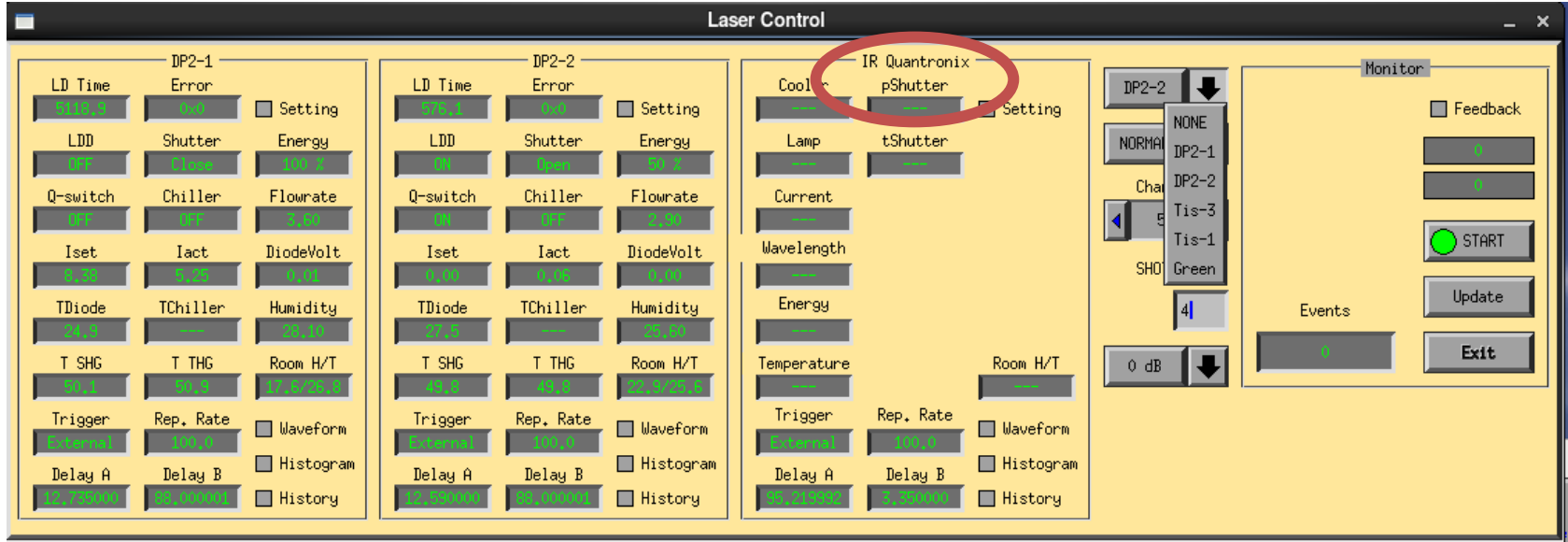
Trigger Code:

440(0)/green(1)/DP2(2)/800(3)

Design to have one DP2 online, one as spare:

Laser 3= Quatronix blue or IR

2 Photonics ok but → no more Quantronix !
440(0)-> DP2x running as laser3 + optical
switch redirection (config file)

```
ATTENUATOR       1       Attenuator       8

* LASER, which, set, wl, da, db, dc, dd, ecy, ect, al, po, spare(spare
* set: set 1 of 2 wavelength for each laser
* wl:  wavelength
* da, db, dc, dd: delay A, B, C, D of DG535
* ecy: calibration of YLF laser
* ect: calibration of TIS laser
* al:  attenuator limits
* po:  pcm offsets
```

Main

Spare

```
  LASER  1  1  440  12.735  88.00  86.00  88.00  1.0  1.8  99 0 0
  LASER  2  1  440  12.590  88.00  86.00  88.00  1.0  1.8  99 0 1
  LASER  3  1  800  95.350  3.26   0.00   0.00  25.00  300   50  0 0
  LASER  3  2  700  95.350  1.00   0.00   0.00  29.7   86.4  50  0 0
* LASER  3  1  440  95.350  3.26   0.00   0.00  25.00  300   50  0 0
* LASER  4  1  440  95.00   3.00   0.00   0.00  1.0  1.8  99 0 0

* laser 1-2 = DP2s, laser 3=IR 800; this is the position on the GUI (sw
* laser 4 for 440 cannot work, only one TiS at once ! (so only number 1
* so laser 3 1 440 for the TiS blue. and optical switch channel_map to

* feedback on the energy only , mode not in used, as the slope
*            which   on/off  mode   count N  slope   current_min
```

.02   40

Review the code to have :
- the 2 DP2 online associate to a separate trigger code
- the second Quantronix control on the GUI

Appendix

New parameters

New columns for the `LASER_SUPERVISOR` table:

Parameter	Model (1) or type	Old value (2)	New value (3)
BLUE_QUANT_LASER_POWER	BLUE_LASER_POWER	**NULL** or -1	50
BLUE_PHOT-1_LASER_POWER	BLUE_LASER_POWER	**NULL** or -1	5
BLUE_PHOT-2_LASER_POWER	BLUE_LASER_POWER	**NULL** or -1	9
BLUE_QUANT_LASER_LOG_ATTENUATOR	BLUE_LASER_POWER	**NULL** or -999	0
BLUE_PHOT-1_LASER_LOG_ATTENUATOR	BLUE_LASER_POWER	**NULL** or -999	0
BLUE_PHOT-2_LASER_LOG_ATTENUATOR	BLUE_LASER_POWER	**NULL** or -999	0
WTE_2_BLUE_QUANT_LASER	WTE_2_BLUE_LASER	**NULL** or -999	21
WTE_2_BLUE_PHOT-1_LASER	WTE_2_BLUE_LASER	**NULL** or -999	21
WTE_2_BLUE_PHOT-2_LASER	WTE_2_BLUE_LASER	**NULL** or -999	21
SECOND_BLUE_LASER	VARCHAR2(25)	**NULL** or ''	'Photonics'

(1) *Use column type of Model*
(2) *Old value to be used to fill existing configurations.* **NULL** *is our preferred option.*
(3) *Initial value to be used in the new configuration and to be entered with the dbGui.*

Laser codes

Codes to be used in:

- (1) the Laser supervisor - Local laser control communication
- (2) in the trigger (detailed trigger type and Test enable command).

Laser	Laser selection code (1)	Wavelength code (2)
Blue Quantronix	0	0
Green	1	1
Blue Photonics I	2	2
IR Quantronix	3	3
Blue Photonics II	4	2