

# Post Timing Issue Fixed Run Plan

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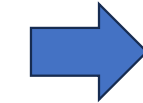
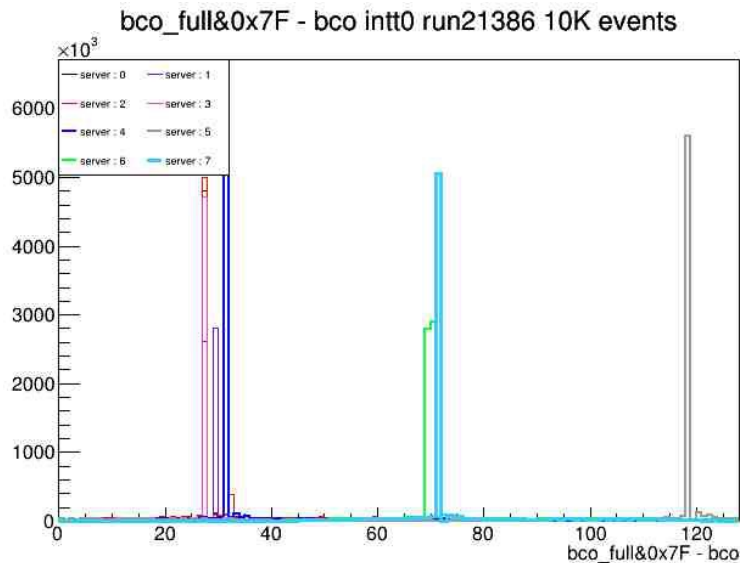
# Pedestal run without beam (7/19 day)

- Pedestal Run
  - Remove all masks (no masks except for no-bias).
  - DAC0=15
  - Run pedestal with the clock trigger  $\sim 1\text{kHz}$
  - If the felix hangs, then retry with DAC0=25 without masks.
- Once the pedestal run is successful, then create moderate and tighter versions of mask files.

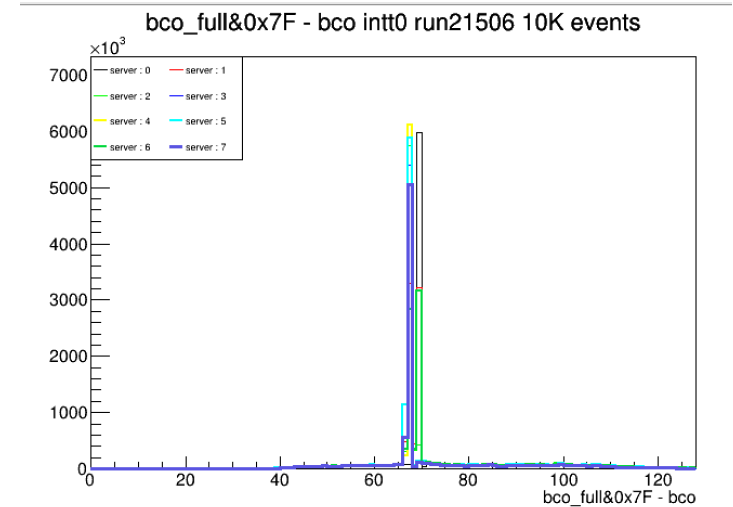
# Commissioning with Beam

# Interfelix Timing Issue Resolved

Run # 21386 (global)



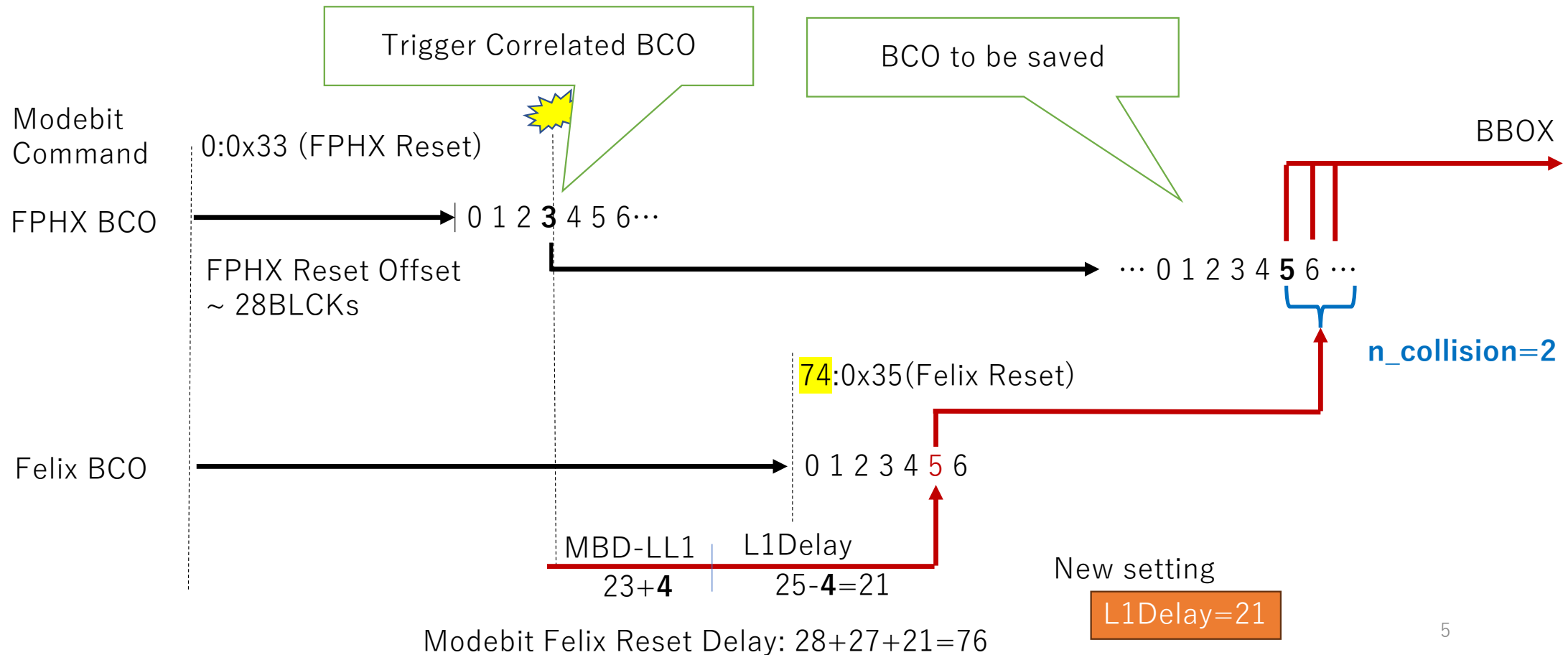
Run # 21506(global mode)



2023/7/14 Raul's new firmware which processes FPHX reset signal in the slow control

# L1Delay Change after MBD-LL1 Timing Tune

2023/7/13 Dan tuned MBD-LL1 timing to match with ZDC trigger by introducing additional delay to MBD-LL1 by 4BCLKs. The compensation is to subtract 4 from the L1Delay 25 for the INTT GTM.



# Timing Re-tune Procedure

**STEP1:** Run runs with present `n_collision=127` configuration for 3 runs (~5 minutes/run). Check if all 8 servers line up at the same spot of the `BCO_FULL&0x7F-FPHX_BCO` distribution. Make sure the consistency stable and doesn't change run-by-run.

**STEP2:** Execute modebit scan with `n_collision=0`. (~1 hour).

**STEP3:** Change the setting to be `L1Delay=21`, `modebit=78:0x35` and `n_collision=4`. If any of ROC is out of time, then adjust modebit value by +/-1 BCLK (77 or 79).

Run overnight and make sure any timing change. It should be monitored by the `BCO_FULL&0x7F-FPHX_BCO`. If timing change is > 4BCLK, the server may be dropped out.

# Modebit Timing Scan with 8 servers

- Purpose : Actual measurement of felix-to-felix timing difference with all 8 servers.

Scan #	1	2	3	4	5	6	7	8	9	10	11
Modebit delay	71	72	73	74	75	76	77	78	79	80	81

## Conditions:

- L1Delay=21
- n\_collision=0
- Open time=35
- DAC setting 15, 30, 60, 90, 120, 150, 180, 210
- 300 kEvents (5minutes @ 1kHz) /setting x 11 setting ~ 1.5 hour

## Preparation and Analysis:

- Script development to change modebits and log : Jaein
- Time in plots are to be made in felix-by-felix basis: Jaein

# DAC0 Scan

Run	1	2	3	4	5	6	7	8	9	10	11
minutes	5	5	5	5	10	20	60	5	5	5	5
DAC0	17	16	15	18	20	30	40	14	13	12	11
DAC1	44	44	44	44	44	44	44	44	44	44	44
DAC2	48	48	48	48	48	48	48	48	48	48	48
DAC3	52	52	52	52	52	52	52	52	52	52	52
DAC4	56	56	56	56	56	56	56	56	56	56	56
DAC5	60	60	60	60	60	60	60	60	60	60	60
DAC6	64	64	64	64	64	64	64	64	64	64	64
DAC7	68	68	68	68	68	68	68	68	68	68	68

Execute DAC0 scan. High threshold runs can be done by shift crews, but low threshold runs may be done by experts.



# Fine delay scan

If the timing peak of each ROC is  $< 2\text{BLKS}$ , then move on to this program

# Fine Scan

- Once  $n_{\text{collision}}=0$  is established, then we would like to execute the timing scan again for  $\pm 5$  BCLKs around modebit=76 and then scan the fine L1 delay.
- Once fine delay scan is completed, Itaru will come up with further studies such as bias scan, gain parameter studies, etc.

# Changing LV1 Delay from the command line

```
phnxrc@opc0:~$ gli_gtm_client help
help                show this help text
fgpaversion          show firmware version
gtm_status           returns a convenient status bitmap

gtm_start            GTM global start
gtm_start n          GTM n start in local mode
gtm_startrun         All-in-one reset counter/scheduler, and start
gtm_startrun n       gtm_startrun for vGTM n when in local mode
gtm_stop             GTM global stop
gtm_stop n           GTM n stop in local mode

gtm_enable n         enable vGTM n
gtm_disable n        disable vGTM n

gtm_set_dcmbusymask n value set the busy mask for vGTM n
gtm_get_dcmbusymask n   get the busy mask for vGTM n

gtm_set_l1delay n value set the L1 delay for vGTM n
gtm_get_l1delay n       get the L1 for vGTM n

gtm_set_finedelay n value set the fine delay for vGTM n
gtm_get_finedelay n     get the fine delay for vGTM n

gtm_set_meb n        set GTM multi-event buffering value
gtm_get_meb          get GTM multi-event buffering value

gtm_set_accept_l1 n value set the GTM to accept global L1 triggers
gtm_get_accept_l1 n   get the accept value

gli_set_scaledown trigger value set the scaledown for trigger n to value
gli_get_scaledown trigger get the value of trigger n

gtm_set_mode value    set the operating mode (global=1/local=0)
gtm_get_mode          get the operating mode

gtm_load_modebits n file load modebits
gtm_show_modebits n   show an interpreted view of the loaded modebits

gtm_reset_counters    Reset Counters
gtm_reset_schedulers  Reset Schedulers
gtm_reset_scheduler n Reset Scheduler n in local mode

gli_set_counterenablemask high32bit low32bit set the counter enablemask
gli_get_counterenablemask get the counter enable masks

gli_set_register addr value set the GLI address to value (dangerous!)
gli_get_register addr   get the value of GLI address

gtm_set_register n addr value set the GTM n address to value (dangerous!)
gtm_get_register n addr   get the value of GTM n address

gtm_fake_trigger       generate a GTM trigger

gtm_fullstatus         for the benefit of GUIs - get a full status report with one call

-- client version is    0x5a2d584d
```

- No GUI is available
- Change the LV1 delay from command line

command	explanation
gtm_set_l1delay n value	set the L1 delay for vGTM n 17.76ns
gtm_get_l1delay n	get the L1 for vGTM n
gtm_set_finedelay n value	set the fine delay for vGTM n 80ps
<del>gtm_get_finedelay n</del>	<del>get the fine delay for vGTM n</del>

No readback available now

# BCO Phase Scan

L1 Coase Delay= L1Delay

Delay Set #	1	2	3	4	5	6	7	8	9	10	11	12	13
L1 Coase Delay	123	123	124	124	125	125	126	126	127	127	128	128	129
Fine Delay	0	111	0	111	0	111	0	111	0	111	0	111	0
Total Delay [BCLK]	20.50	20.58	20.67	20.75	20.83	20.92	<b>21.00</b>	21.08	21.17	21.25	21.33	21.42	21.50
Total Delay [ns]	2180.85	2189.73	2198.58	2207.46	2216.31	2225.19	2234.04	2242.91	2251.77	2260.65	2269.50	2278.38	2287.23

- L1Delay=21
- n\_collision=0
- Modebit 76:0x35
- 300 kEvents (5minutes @ 1kHz) x 13 runs ~ 1.5 hour

Perhaps we do this scan with n\_collision=4 at modebit=78 and analyze data in offline.