

Run Plan

2023/7/22

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Timing Re-tune Procedure

STEP1: 5 minutes runs x 3 with `n_collision=127`. Confirm 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 hours).

STEP3: Execute fine delay run around the sweetspot of the modebit scan in STEP2.

Timing Peaks As of now

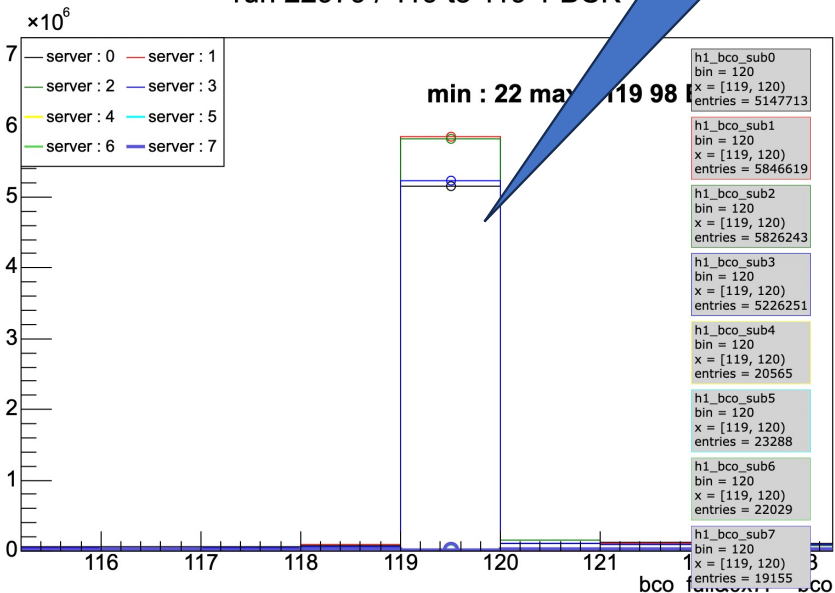
Data from July 21st
run 22979 / 119 to 119 1 BCK



North 4 felix servers

South Zoom in

run 22979 / 119 to 119 1 BCK



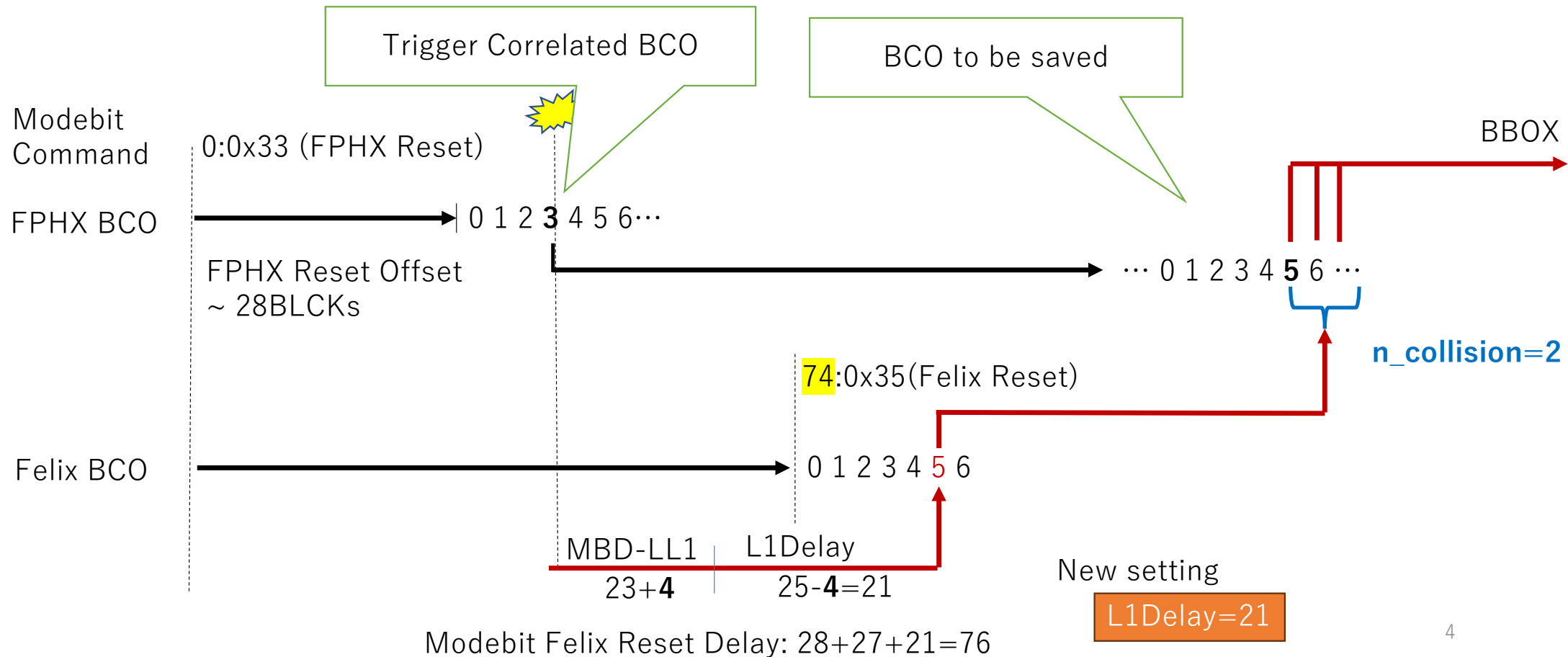
Good
timing
peaks in
South

South 4 felix servers

Raul installs the same firmware with South to the North this afternoon. Following scan programs are to be done after this North firmware upgrade.

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.



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
- 60 kEvents (1minutes @ 1kHz) /setting x 11 setting ~ 1 hours

Execution and Analysis:

- Script : edit ~/operations/INTT/intt.scheduler and execute modebits.sh
- Time in plots are to be made in felix-by-felix basis: Jaein / **Other volunteer?**

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
- Use script
~/operator/INTTT/L1FineDelay.sh

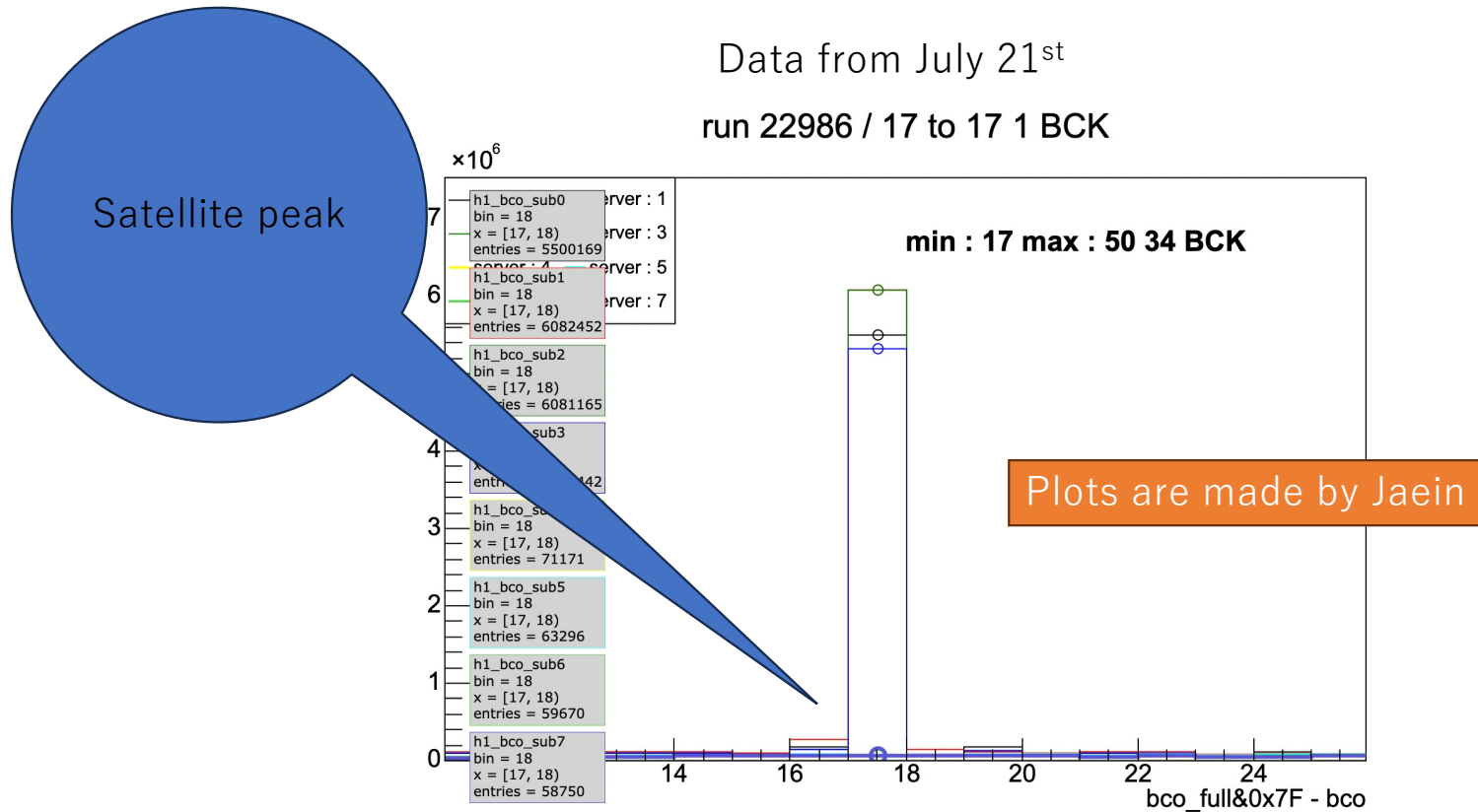
command	explanation
gtm_set_l1delay n value	set the L1 delay for vGTM n 17.76ns
gtm_get_l1delay n	get the L1 for vGTM n
gtm_set_finedelay n value	set the fine delay for vGTM n 80ps
gtm_get_finedelay n	get the fine delay for vGTM n

No readback available now

BCO Phase Scan

Data from July 21st

run 22986 / 17 to 17 1 BCK



Adjust phase to squeeze in satellite peak into the main peak

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	21.00	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
- 60 kEvents (1minute @ 1kHz) x 42 runs ~ 2 hours

Execution and Analysis:

- Script : Execute ~/operations/INTT//L1FineDelay.sh (need to be tested)
- Time in plots are to be made in felix-by-felix basis: Jaein / **Other volunteer?**

FVTX Performance

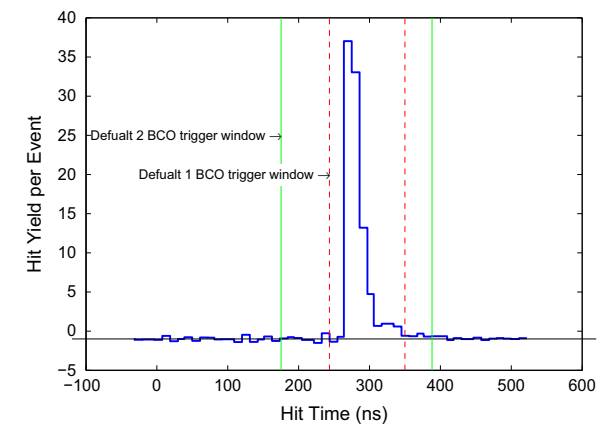


Fig. 32. Timing distribution of the FVTX hits relative to the RHIC beam clock.

BCO Phase Scan

Delay Set #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
L1 Coase Delay	123	123	124	124	125	125	126	126	127	127	128	128	129	129
Fine Delay	0	111	0	111	0	111	0	111	0	111	0	111	0	111
Total Delay [BCLK]	20.50	20.58	20.67	20.75	20.83	20.92	21.00	21.08	21.17	21.25	21.33	21.42	21.50	21.58
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	2296.11
Delay Set #	15	16	17	18	19	20	21	22	23	24	25	26	27	28
L1 Coase Delay	116	116	117	117	118	118	119	119	120	120	121	121	122	122
Fine Delay	0	111	0	111	0	111	0	21	0	111	0	111	0	111
Total Delay [BCLK]	19.33	19.42	19.50	19.58	19.67	19.75	19.83	19.85	20.00	20.08	20.17	20.25	20.33	20.42
Total Delay [ns]	2056.74	2065.62	2074.47	2083.35	2092.20	2101.08	2109.93	2111.57	2127.66	2136.54	2145.39	2154.27	2163.12	2172.00
Delay Set #	29	30	31	32	33	34	35	36	37	38	39	40	41	42
L1 Coase Delay	130	130	131	131	132	132	133	133	134	134	135	135	136	136
Fine Delay	0	111	0	111	0	111	0	19	0	111	0	111	0	111
Total Delay [BCLK]	21.67	21.75	21.83	21.92	22.00	22.08	22.17	22.18	22.33	22.42	22.50	22.58	22.67	22.75
Total Delay [ns]	2304.96	2313.84	2322.70	2331.58	2340.43	2349.31	2358.16	2359.70	2375.89	2384.77	2393.62	2402.50	2411.35	2420.23

DAC0 Scan

Scan	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

Load the moderate mask file made by Jaein
 Total 3 hours (Scan#6, 7 can be done by shift crews)

Felix server geometry mapping diagnostic test

Data Set	1	2	3	4
South	INTT0	INTT1	INTT2	INTT3
North	INTT4	INTT5	INTT6	INTT7

- n_collision=127
- L1Delay=21 BCLKs (Value=126)
- Turn on LV/HV/bias powers only for given INTT servers
- Execute configure before every run (no intt server masking)
- Take data for 5 minutes each