Trigger Rate Dependence

RIKEN/RBRC

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Trigger Rate Stress Test (2023/6/10)

- Issue: There are many reports point out suspicious data contamination or structures in data we took so far.
  - Unphysical hits
  - Clone hits
  - FULL_FPHX, FULL_ROC True
  - Multiple BCO outside of n_collision window hits contamination…
  - Etc
- Test: Take data with various trigger rates. See if above bad data has any rate effect.

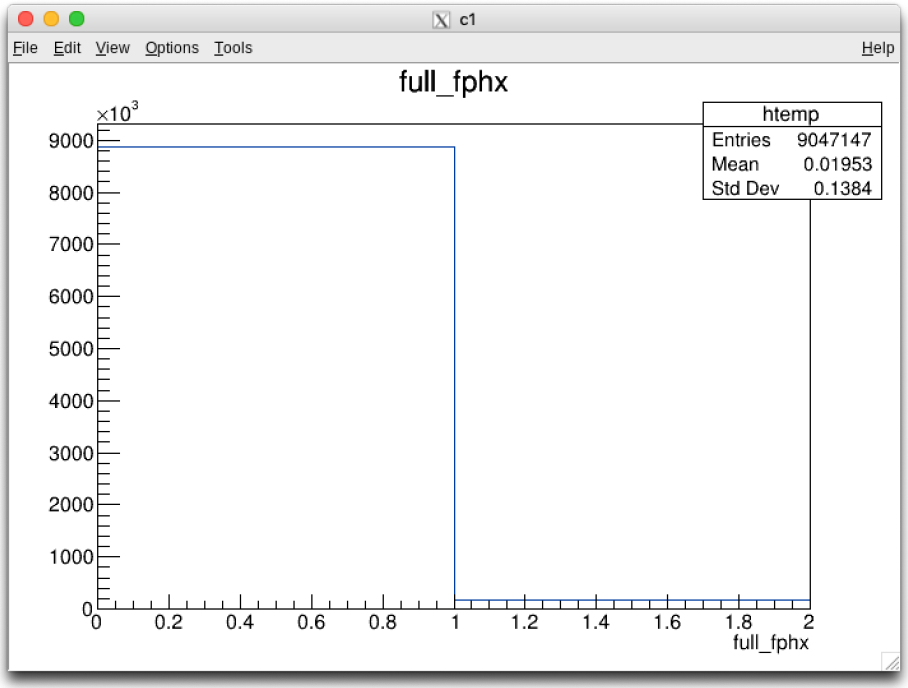
Trigger Rate Stress Test (2023/6/10)

1		date	run #	ROC	Run Type calib/ped/ beam/cali bration	Duration [min.]	DAC0	Purpose	Purpose	L1 Delay	n_collisions	open_time	
378	369	2023/06/10	10417	intt0-6		30	15	Trigger Rate Study. MBDL1 Scaledown=25, Trigger rate ~ 1kHz, INTT e-log 198		25	4	35	78
379	370	2023/06/10	10418	intt0-6		5	15	Trigger Rate Study. MBDL1 Scaledown=20, Trigger rate ~ 1.2kHz		25	4	35	78
380	371	2023/06/10	10419	intt0-6		5	15	Trigger Rate Study. MBDL1 Scaledown=15, Trigger rate ~ 1.4kHz		25	4	35	78
381	372	2023/06/10	10420	intt0-6		5	15	Trigger Rate Study. MBDL1 Scaledown=10, Trigger rate ~ 35kHz? -Suspicious		25	4	35	78
382	373	2023/06/10	10423	intt0-6		2	15	Trigger Rate Study. MBDL1 Scaledown=30, Trigger rate ~ 700Hz		25	4	35	78
383	374	2023/06/10	10424	intt0-6		1	15	Trigger Rate Study. MBDL1 Scaledown=40, Trigger rate ~ 500Hz		25	4	35	78
384	375	2023/06/10	10425	intt0-6		2	15	Trigger Rate Study. MBDL1 Scaledown=100, Trigger rate ~ 0Hz		25	4	35	78
385	376	2023/06/10	10426	intt0-6		1	15	Trigger Rate Study. MBDL1 Scaledown=60, Trigger rate ~ 0Hz -> Beam lost likely junk		25	4	35	78
386	377	2023/6/9/10	10430	intt0-7			15	MBDL1 Scaledown 25, Trigger rate ~ 400Hz, INTT e-log entry 200		25	4	35	78
387	378		10431	intt0-7			15	MBDL1 Scaledown 25, Trigger rate ~ 400Hz		25	4	35	78
388	379		10432	intt0-7			15	MBDL1 Scaledown 25, ~500Hz.		25	4	35	78
389	380	1:00	10433	intt0-7			15	MBDL1 Scaledown 40, Trigger Rate ~ 250Hz		25	4	35	78
390	381	1:04	10434	intt0-7		4	15	MBDL1 Scaledown 50, Trigger Rate ~ 200Hz		25	4	35	78
391	382	1:13	10435	intt0-7		9	15	MBDL1 Scaledown 50, Trigger Rate ~ 200Hz		25	4	35	78
392	383	1:15	10436	intt0-7		2	15	MBDL1 Scaledown 60, Trigger Rate ~ 200Hz		25	4	35	78
393	384	1:19	10437	intt0-7		5	15	MBDL1 Scaledown 70, Trigger Rate ~ 150Hz		25	4	35	78
394	385	1:24	10439	intt0-7		6	15	MBDL1 Scaledown 80, Trigger Rate ~ 120Hz		25	4	35	78
395	386	1:31	10441	intt0-7		4	15	MBDL1 Scaledown 90, Trigger Rate ~ 100Hz		25	4	35	78
396	387	1:35	10442	intt0-7		3	15	MBDL1 Scaledown 100, Trigger Rate ~ 100Hz		25	4	35	78
397	388	1:38	10443	intt0-7		15	15	MBDL1 Scaledown 120, Trigger Rate ~ 85Hz		25	4	35	78
398	389	1:53	10444	intt0-7		7	15	MBDL1 Scaledown 200, Trigger Rate ~ 50Hz		25	4	35	78
399	390	1:59	10445	intt0-7		10	15	MBDL1 Scaledown 400, Trigger Rate ~ 25Hz		25	4	35	78
400	391	2:10	10446	intt0-7		30	15	MBDL1 Scaledown 800, Trigger Rate ~ 10Hz		25	4	35	78
401	392		10447	intt0-7		5	15	MBDL1 Scaledown 800, Trigger Rate ~ 10Hz, DAC setting 15, 30, 50, 70, 90, 110, 130, 150, INTT e-log entry		25	4	35	78
402	393	2:50	10448	intt0-7		35	15	MBDL1 Scaledown 800, Trigger Rate ~ 10Hz, DAC setting 15, 30, 50, 70, 90, 110, 130, 150, INTT e-log entry		25	4	35	78
403	394	3:30	10449	intt0-7			15	MBDL1 Scaledown 25, Trigger Rate ~300 Hz, DAC setting 15, 30, 50, 70, 90, 110, 130, 150, INTT e-log entry		25	4	35	78
404													

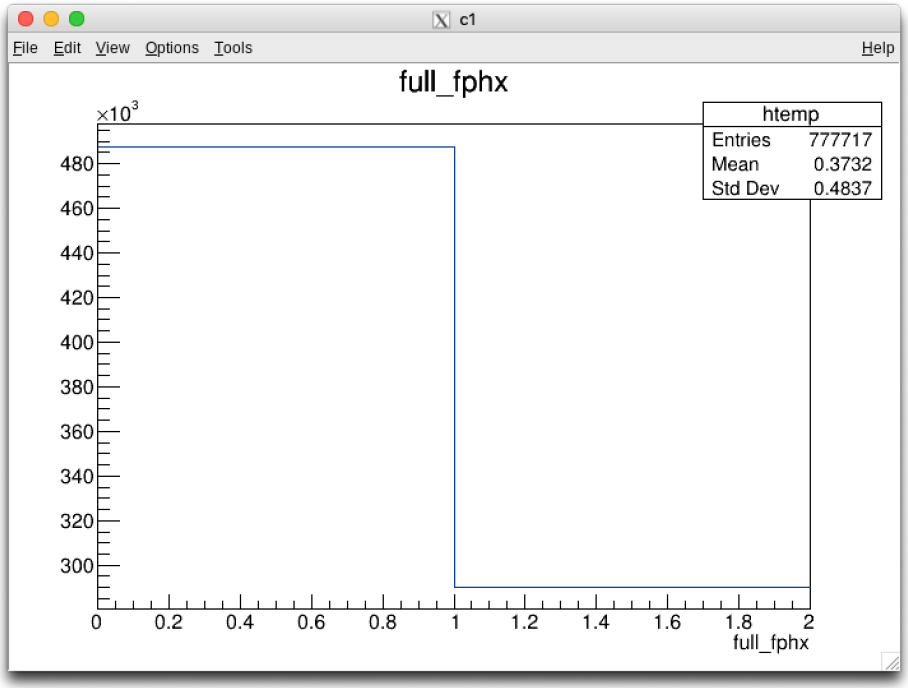
Root files are available in `:~/INTT/commissioning_6_6/hit_files`

FULL_FPHX

Run#10419 Trigger Rate ~ 1.4kHz



beam_intt6-00010419-0000_event_base.root

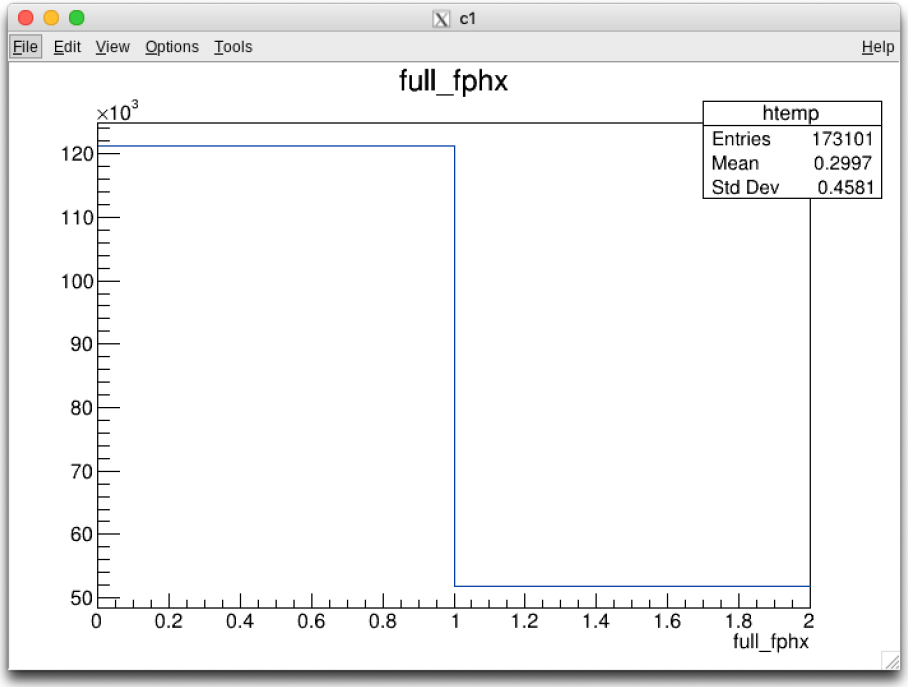


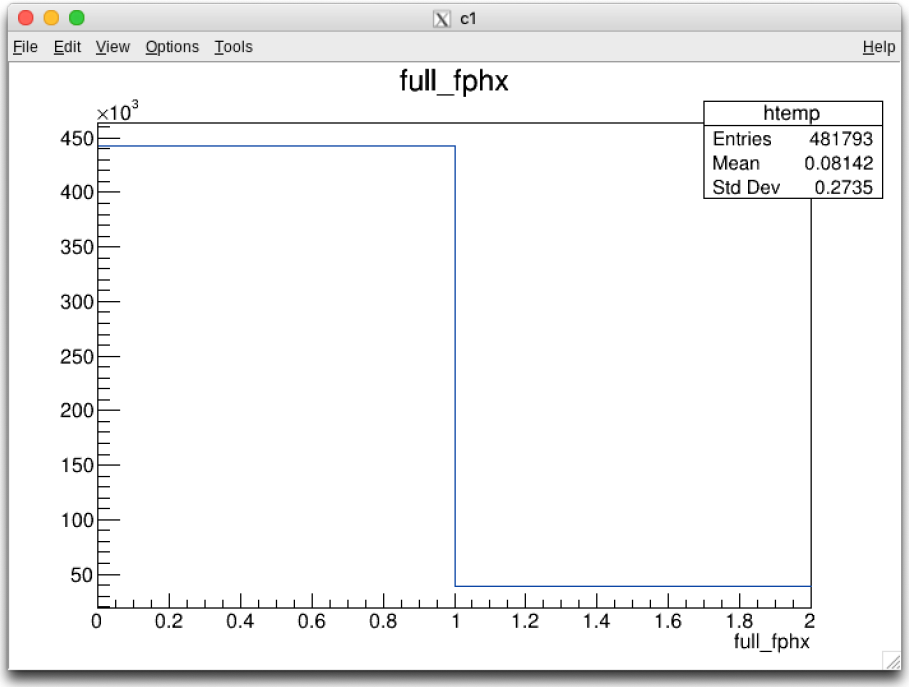
beam_intt4-00010419-0000_event_base.root

56x56, ZDC rate ~ 10kHz

FULL_FPHX

Run#10449 Trigger Rate ~ 10Hz





beam_intt6-00010449-0000_event_base.root

beam_intt4-00010449-0000_event_base.root

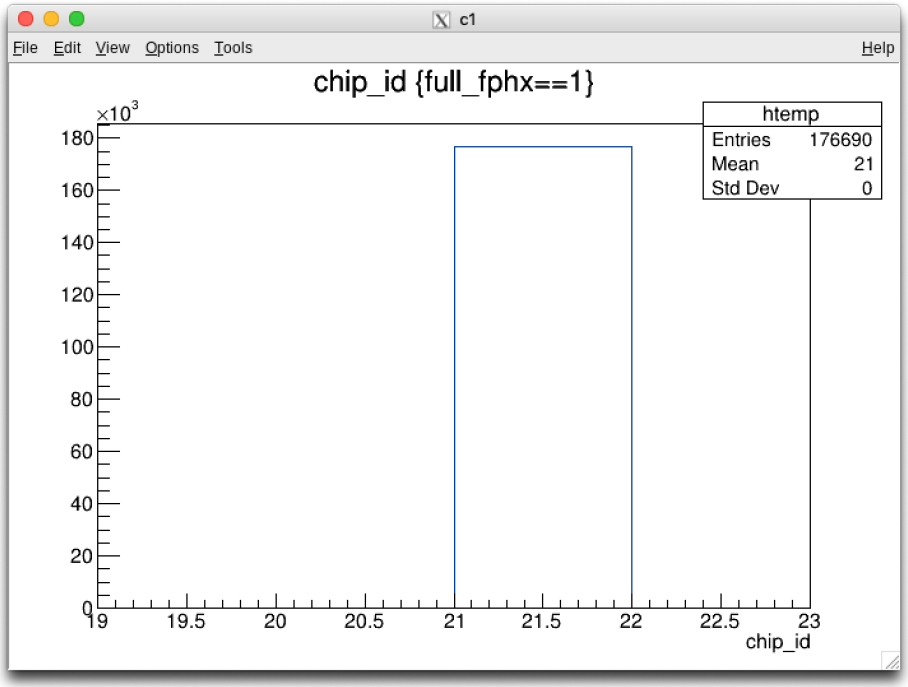
56x56, ZDC rate ~ 10kHz

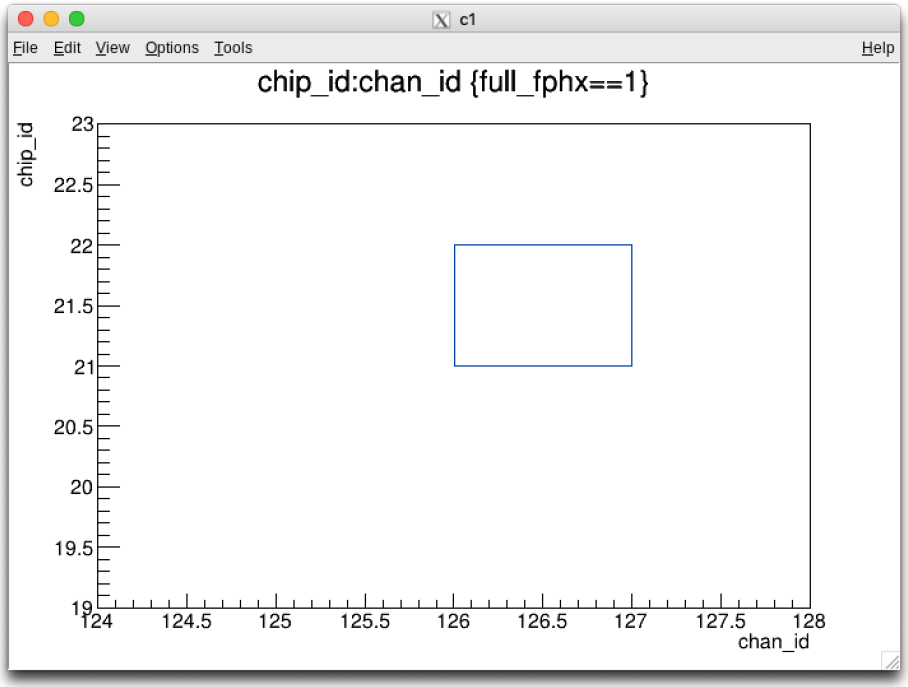
No trigger rate effect is seen, which is expected since FPHX functions triggerlessly.

FULL_FPHX

Run#10419 Trigger Rate ~ 1.4kHz

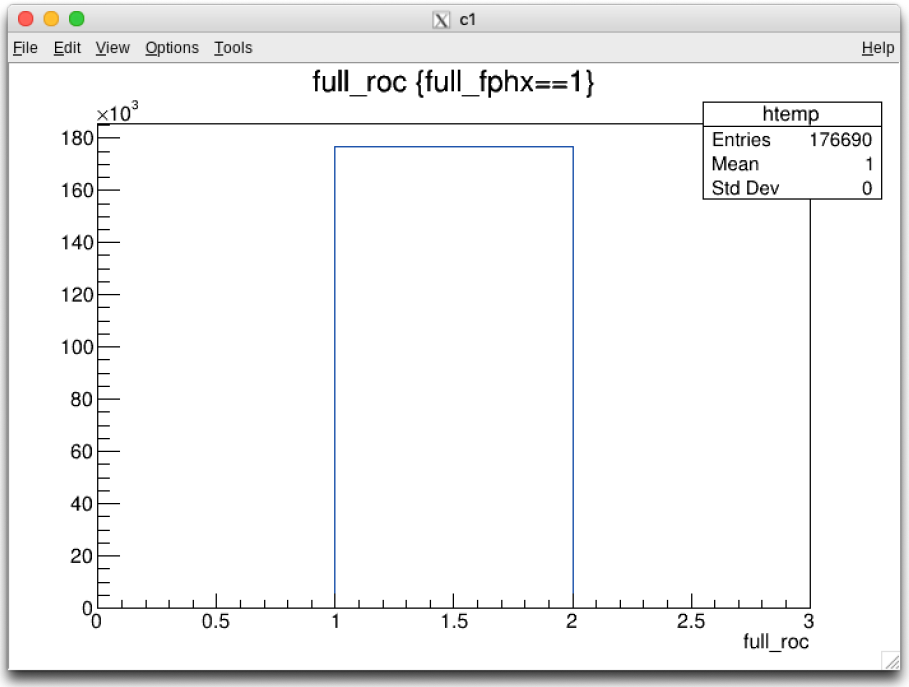
`beam_intt6-00010419-0000_event_base.root`





When FULL_FPHX=1 then always chip_ID=21 and chan_id=126.
Looks like this is common to all chips

FULL_FHPX vs FULL_ROC



- They are perfectly correlated. Looks like FULL_ROC is exact copy of FULL_FPHX.
- How about BCO contamination?