Update of activity at AUTH

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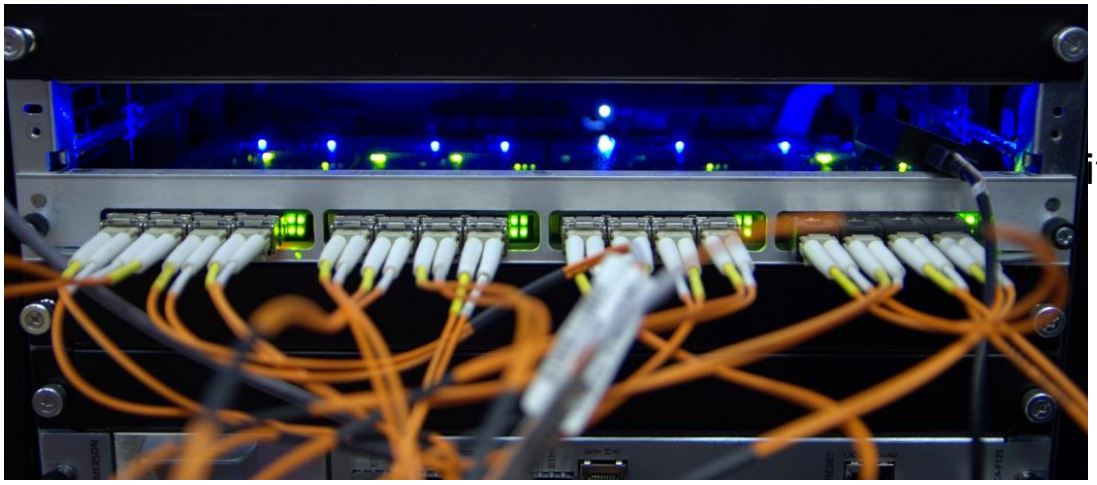
AUTH

FTK Integration status

- All FTK fiber for SCT and Pixel were connected.
- We are checking fibers (~90% done)
- 1 DF board with 4 IMs can check 16 fiber (8SCT and 8 Pixel) at USA 15.

Over weekend spy run

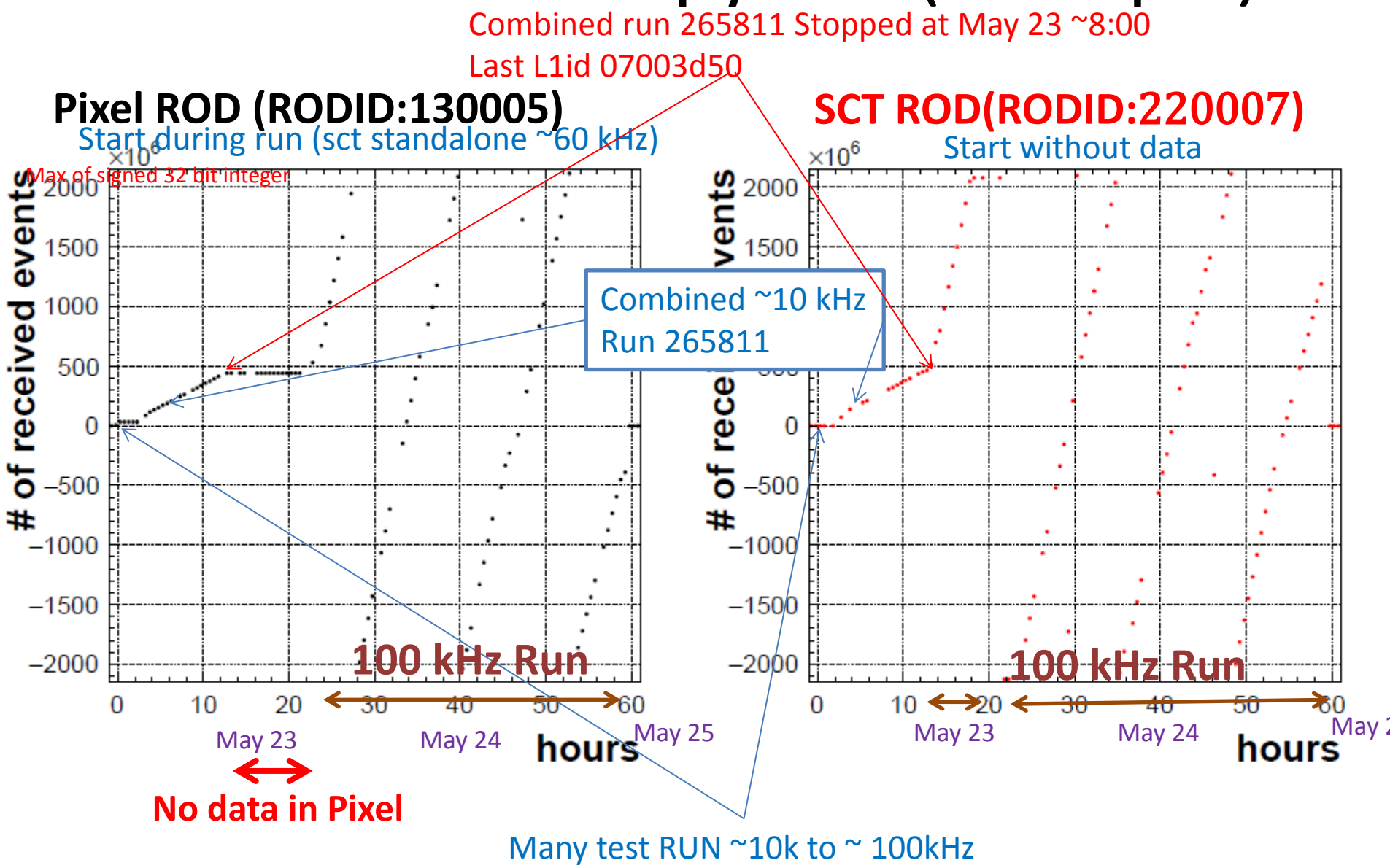
- We spyed usual 16 fibers ~60 hours
  - May 22 20:00 to May 25 10:00
  - 8 SCT RODs and 8 Pixel RODs
  - Saved IM Status Mon half-hourly
  - Over the several ATLAS run
  - No reset for IM-DF



itoring.

ch00	0x00130005
ch01	0x0022010e
ch02	0x00130007
ch03	0x0022010a
ch04	0x00130012
ch05	0x0022010f
ch06	0x00130008
ch07	0x00220007
ch08	0x00130120
ch09	0x0022010c
ch10	0X00130106
ch11	0X00220108
ch12	0X00130105
ch13	0X00220000
ch14	0X00130006
ch15	0X00220005

Over weekend spy run (example)

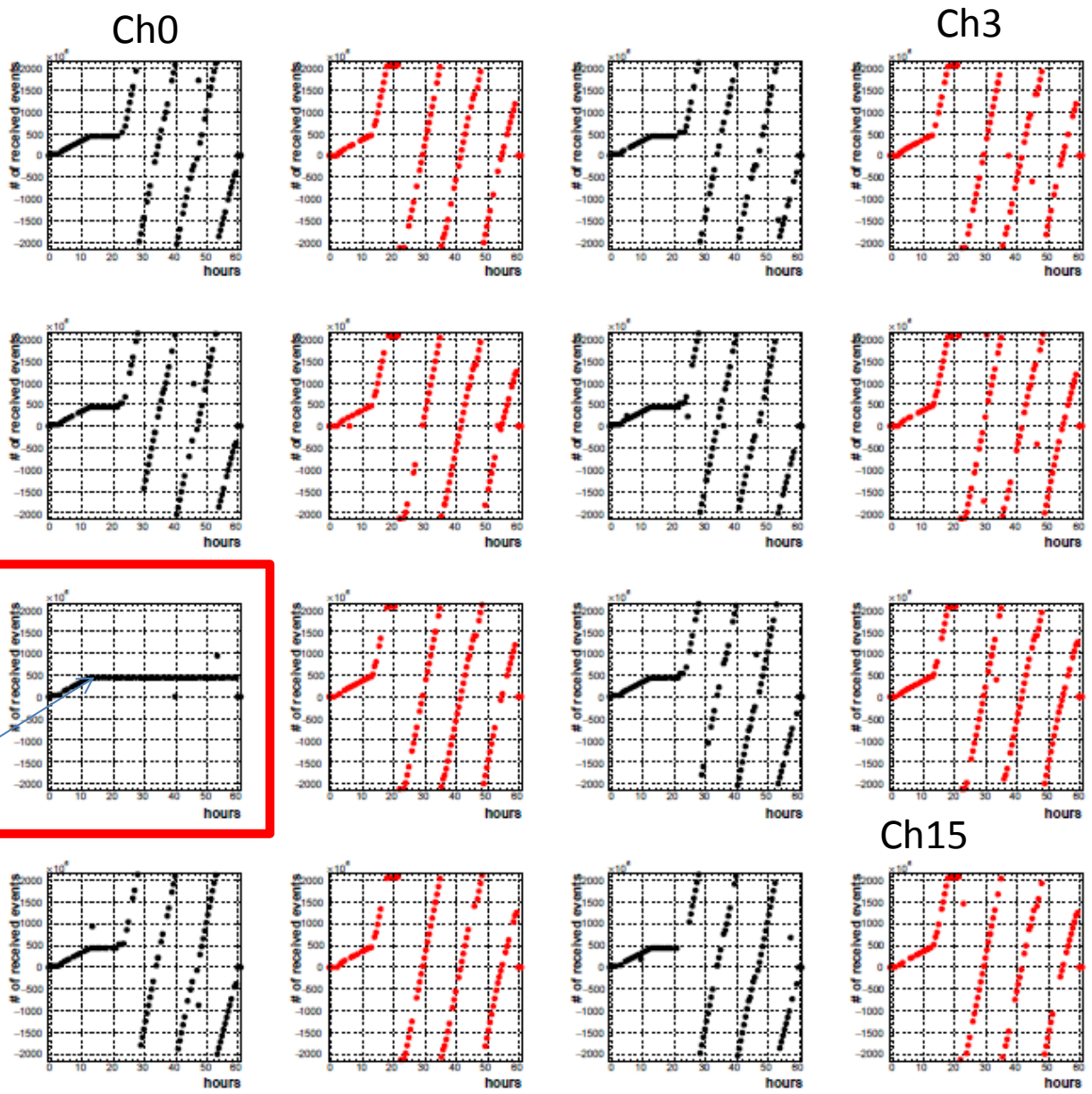


Over weekend run (all ch)

Without ch08, basically data looks good as same.

Data stopped at IM inside and then IM lost many words.

Something happened here (next page)



Stopped ch 08 PixROD 0x00130120

Last L1ID of Run 265811 (same in all ch)

May23 12:46

Event information:

	Run#	L1ID	#words	word	time(CLK,40MHz)	#LostWords
Current event (on going)	265811	0X07003d50	29	0X1d1e1d1e	343219700	0
Previous event (done)	265811	0X07003d4f	27	0Xe0f00000	362	0

Flow of word state:

	1st	2nd	3rd	4th	5th	6th
			RAILER	---	---	---
			RAILER	IDLE	---	---

Ch08 got very strange data at ~13:00.

- Strange Run #and Li1D
- 18154 words
- IM main FSM move to data state by these strange data

May23 13:17

	Run#	L1ID	#words	word	time(CLK,40MHz)	#LostWords
Current event (on going)	-1054017423	0X733ea02f	18154	0X987c63bf	-119983175	284176567
Previous event (done)	265811	0X07003d50	27	0Xe0f00000	-1073348942	0

Flow of word state:

	1st	2nd	3rd	4th	5th	6th
Current event (on going)	HEADER	DATA	---	---	---	---
Previous event (done)	HEADER	DATA	TRAILER	IDLE	---	---

Guess :

Fiber is re-connected once?

ROD FW downloaded?

ROD restarted?

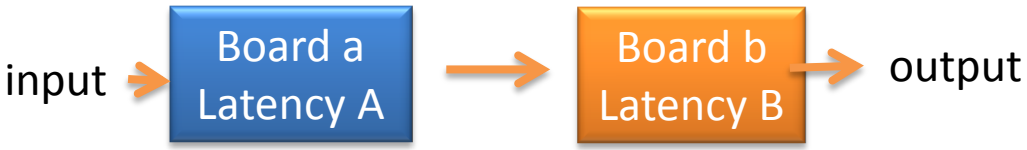
ROD reseted? Etc

In any case, it is not real problem!

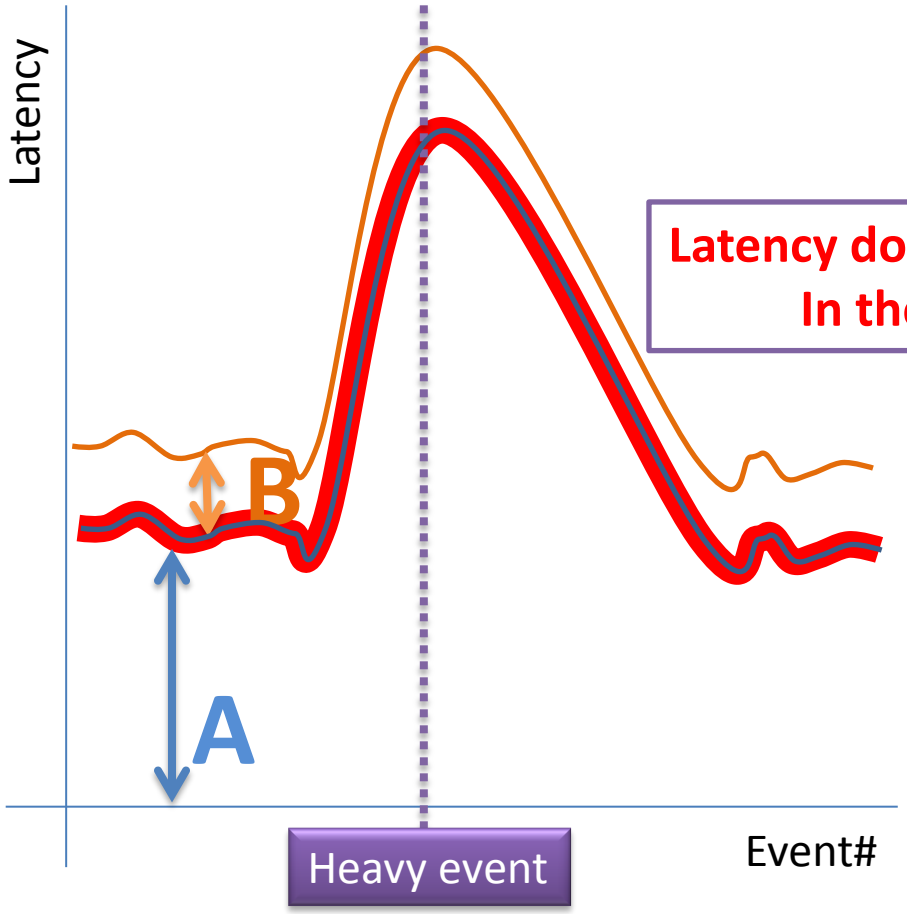
Timing Simulation update

- Need to study about the buffer size on latency study.
  - What is the enough size for each boards?
  - How match latency will increased?

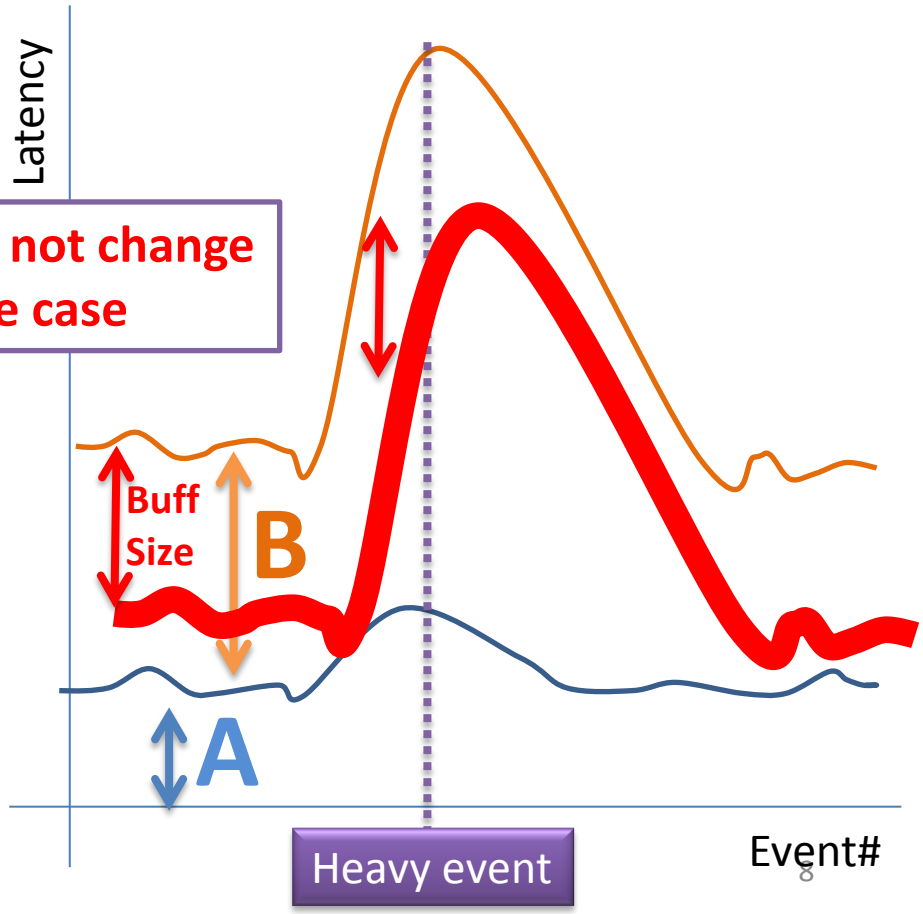
What happen by limited buffer?



Latency B < A



Latency A < B

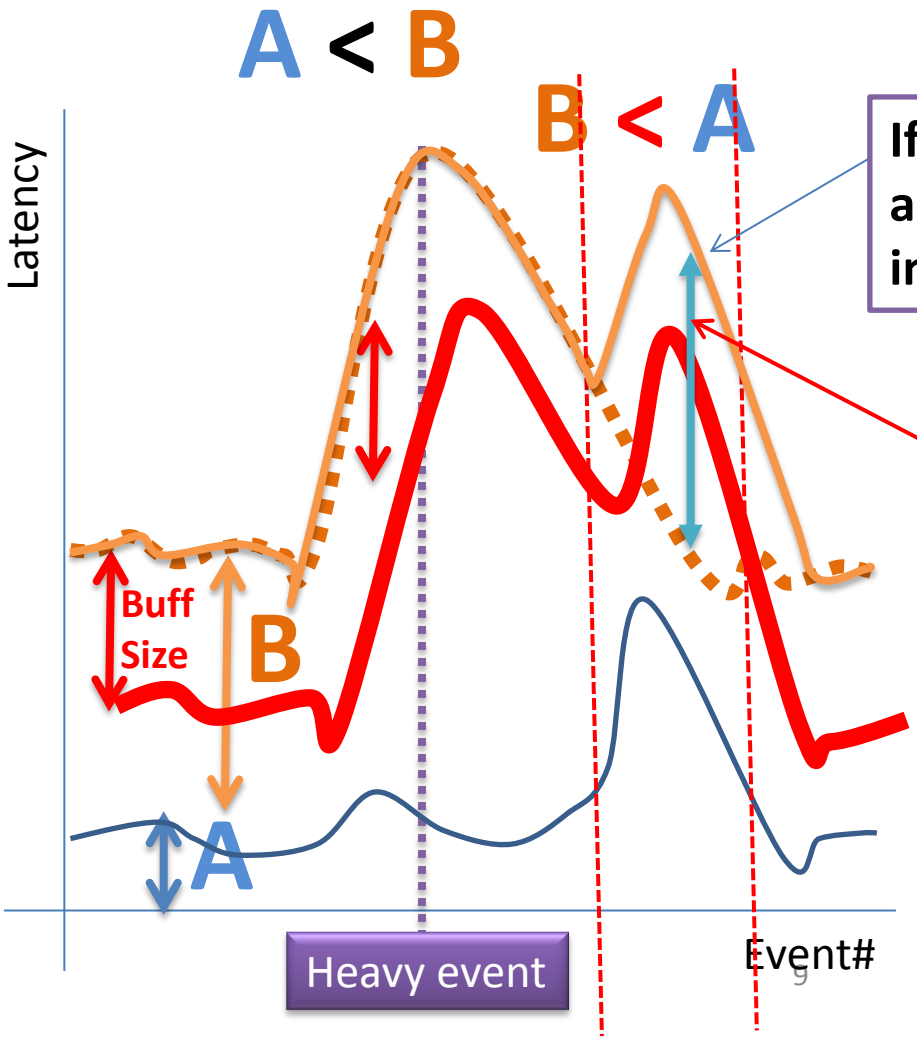


Latency does not change In these case

What happen by limited buffer?

Board a Latency A → Board b Latency B

The case which a latency increase



If Latency A>B when A is already pulled by B, Latency is increased.

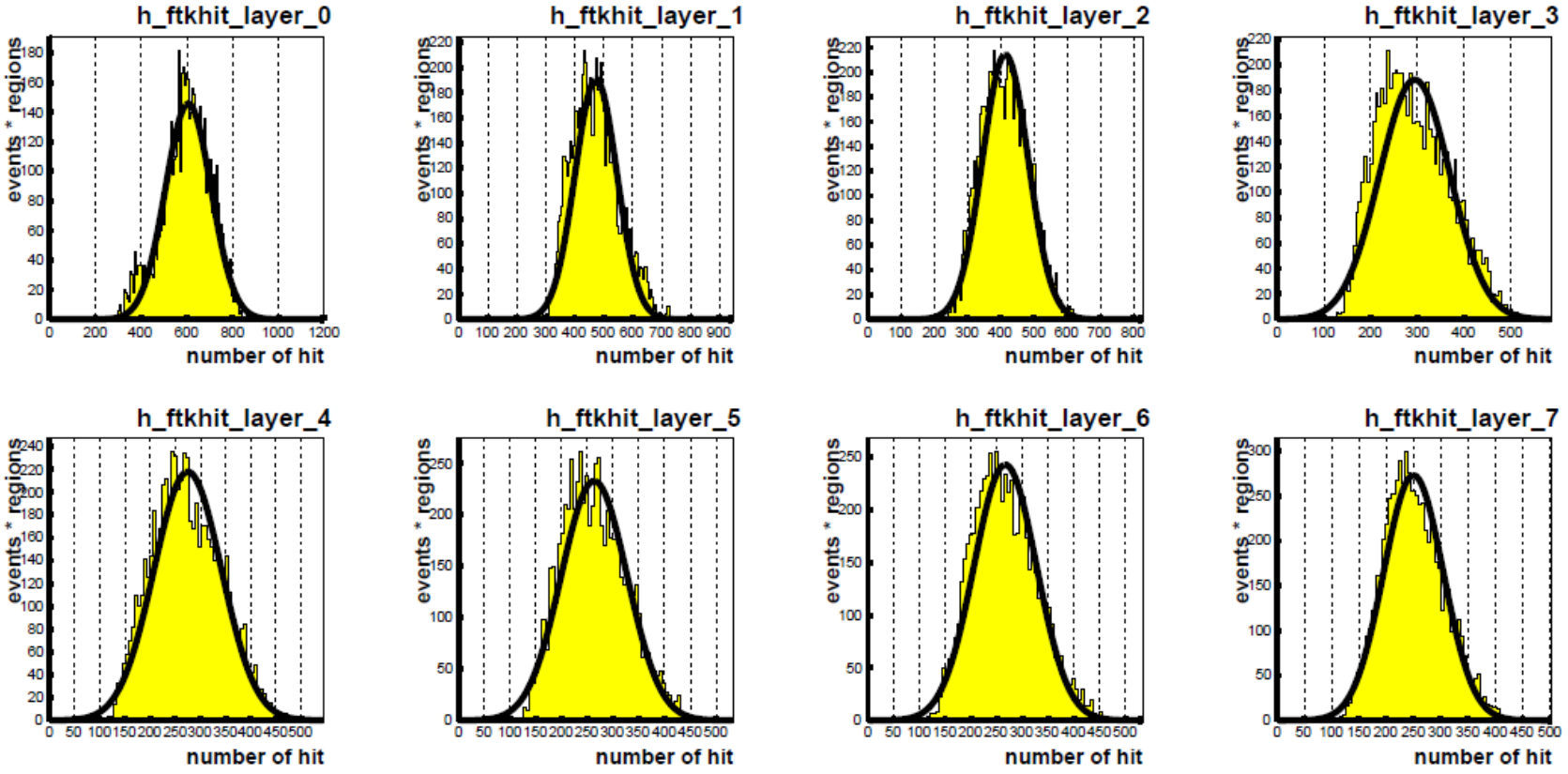
Additional Latency

Buffer size for TF

hits / layer , tower
(same as PU)

pixel 0 = ~600 (max ~1000)

SCT 0 = ~300 (max =500)



Fifo size of TF for each layers are 2048 for Pixel and 1024 for SCT (Mel)

i.e. even if all hit are sent to TF, ~ 3 event , at least 2 event. (assume all hit are sent to TF…)

How to implement?

Assumption: There is buffer size to store quantity of data taking 10 micro sec for data processing in that board.

Buffer for 10 micro sec for TF :
- maxim processing data in a LVL1 gap.
- hits for 10 k fits

e.g.
- Each layer 2hits -> 256 fits /road
  40 road / TF -> 10 usec. i.e. 80 hits/layer
- Each layer 1hits -> 1 fits/ road
  10000 road/ TF -> 10 usec i.e 10k hits / layer….
- Bigger than average 1ev @PU60.
- Smaller than heavy ev @ PU60

timing of hold release for current board =
Next boards Ew_out timing (i.e. no data in buffer) – 10 usec(next event) – 10 usec(buffersize)

General part of timing equation:

FwIn(k) = Max(Min(PreBoard_FwOut(i)), Max(LastEv_EwOut(k)) – LVL1GAP))

EwIn(k) = Max(Max(PreBoard_EwOut(i)), INTIME x Max(Nin(i)) + FwIn(k))

FwOut(k) = Max (FwIn(k) + DELAY, **Max(LastNextBoard_EwOut(j)-LVL1GAP-10usec)**)

EwOut(k) = Max(FwOut(k) + PROCTIME x Nout(k),EwIn(k) + DELAY)

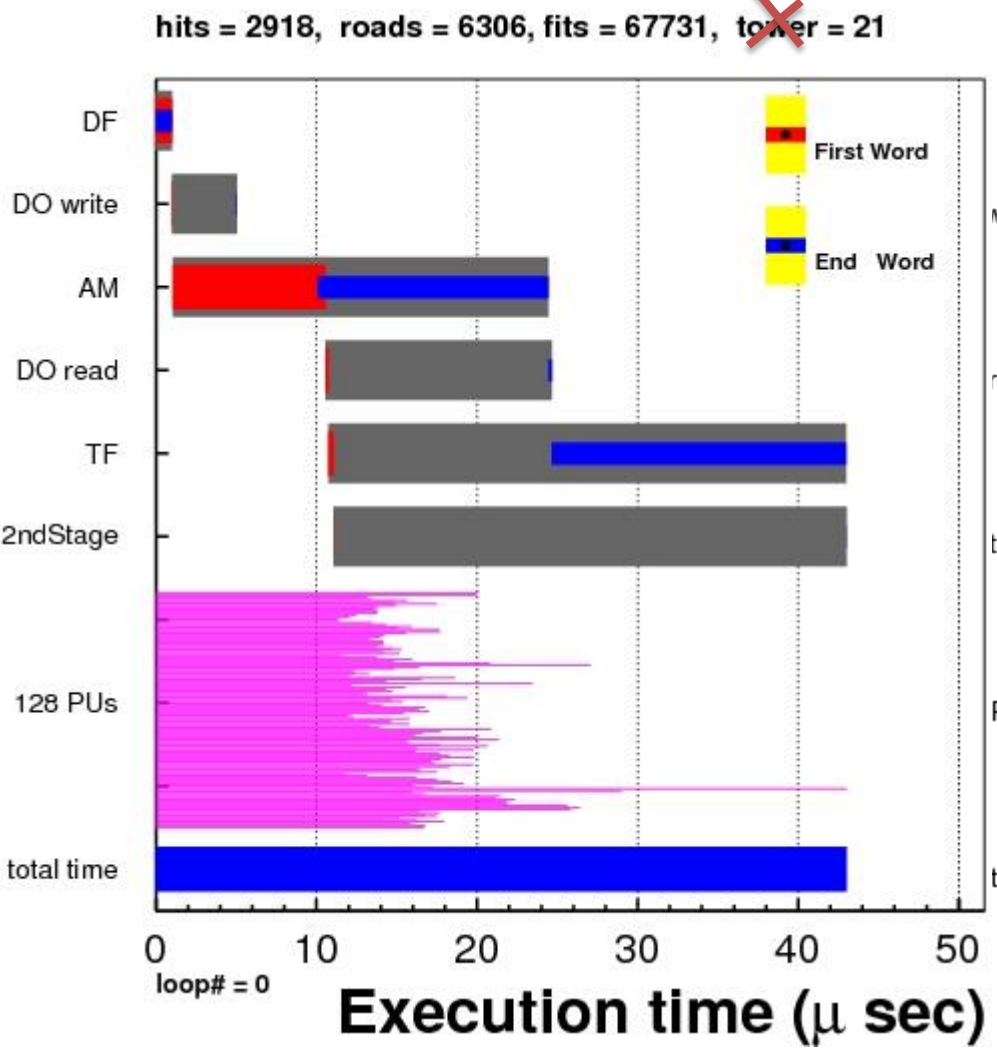
I added 10 usec buffer limit for **AM, DO_read, TF** this time.

Event 0

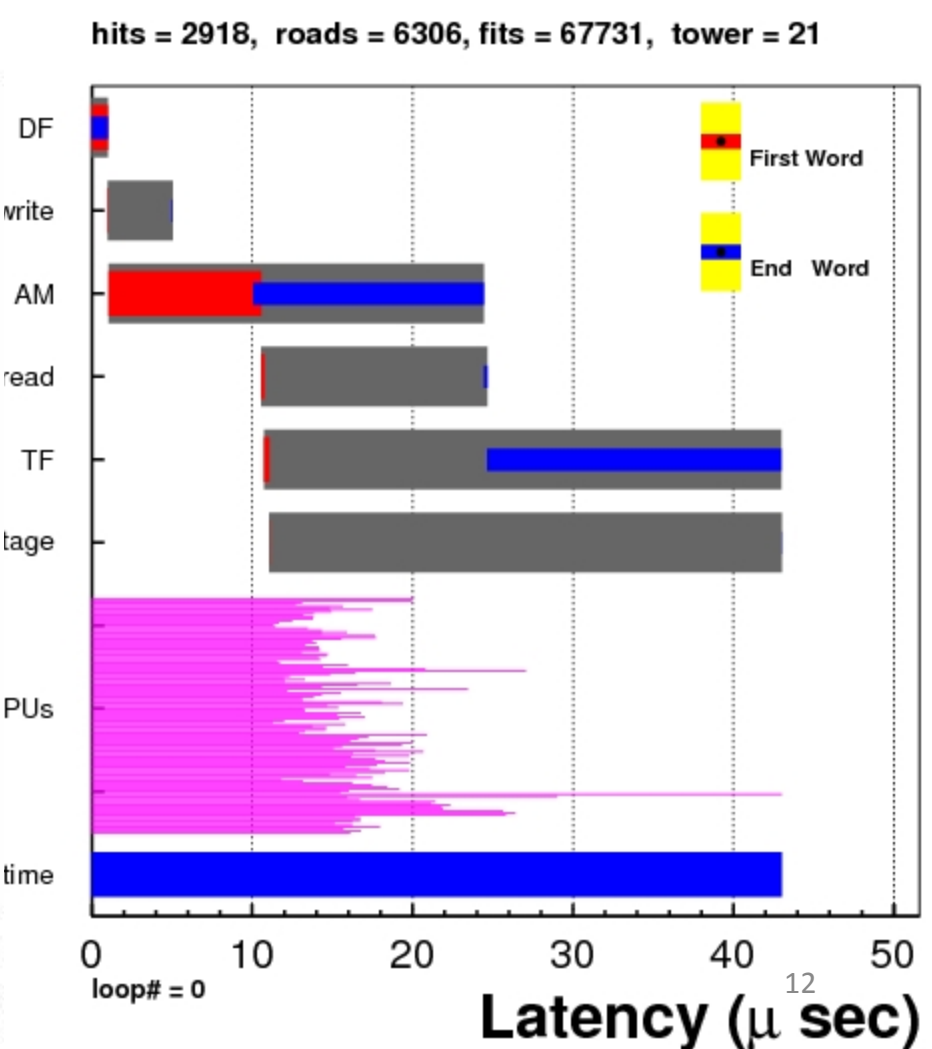
PU60 ZHnunubb

Infinity buffer

PU



10 usec buffer



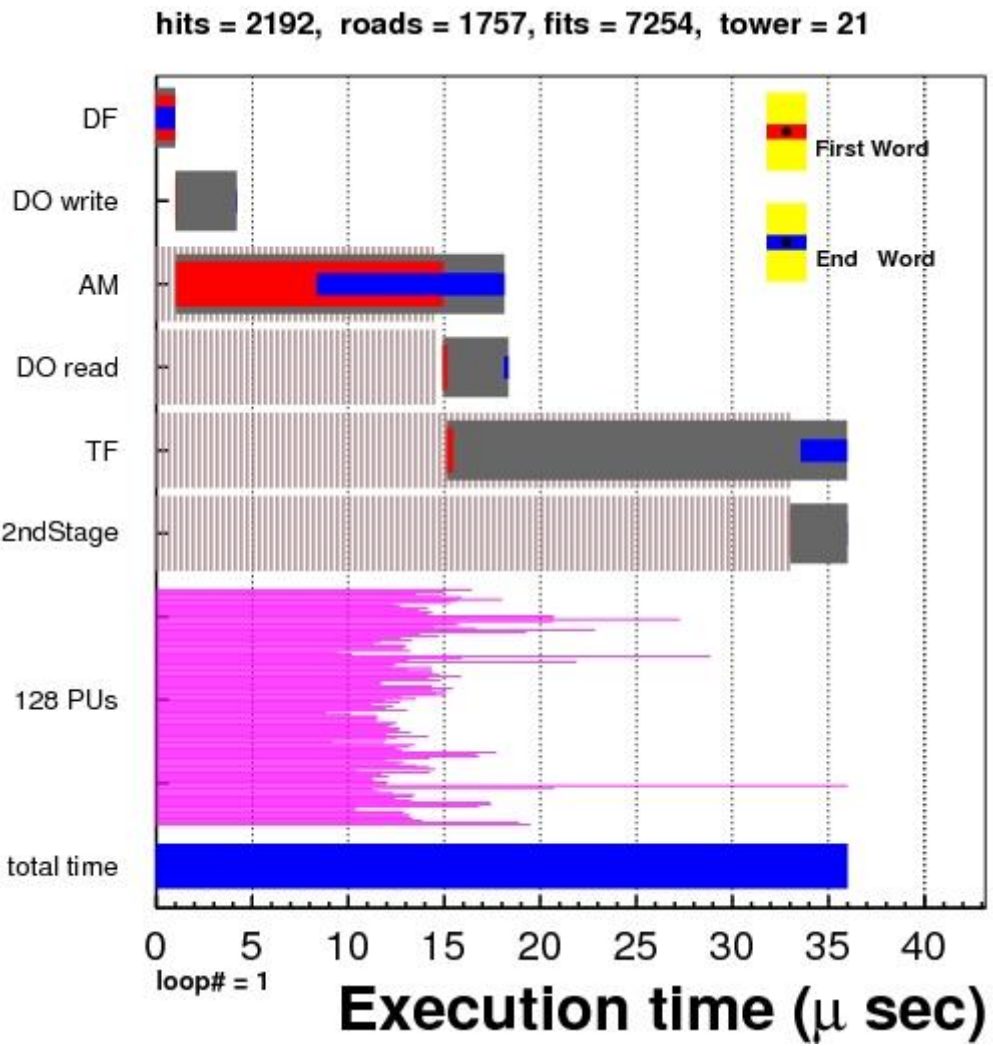
Event 1

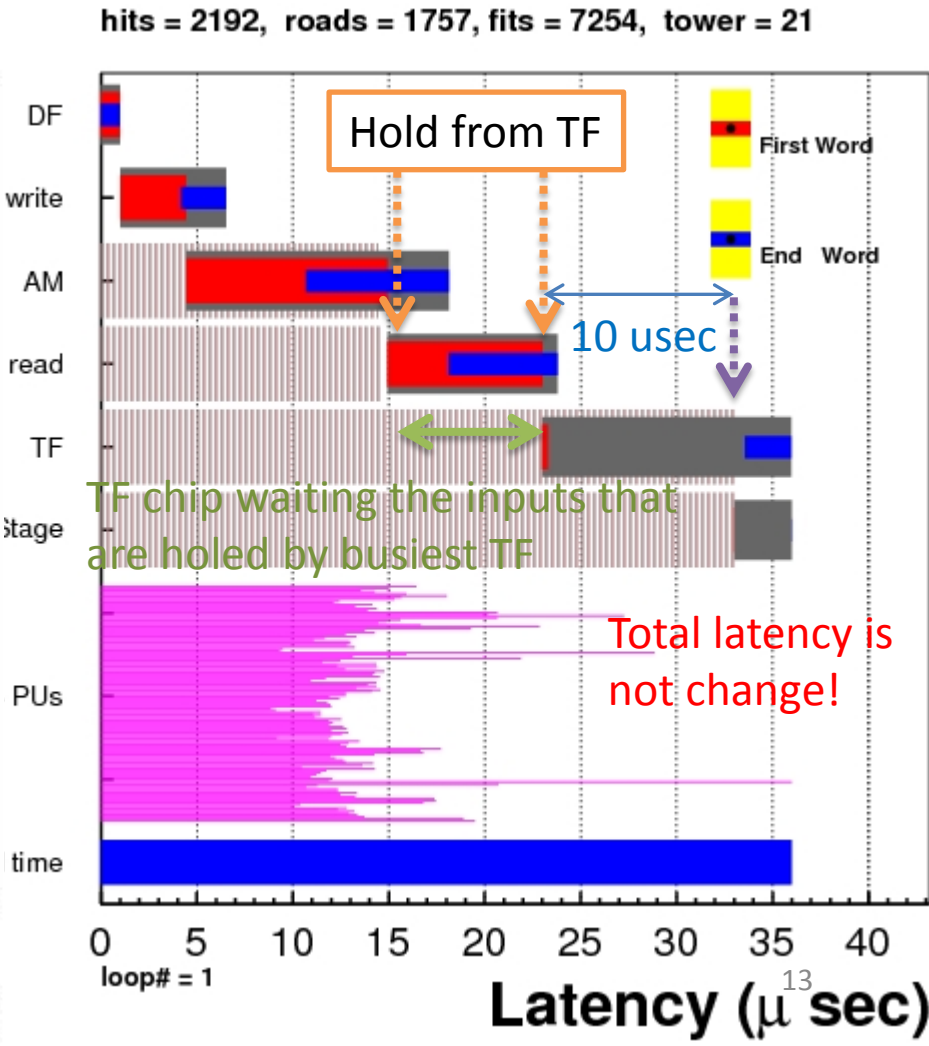
In global view A is AM and B is TF

Case A<B

Infinity buffer

10 usec buffer



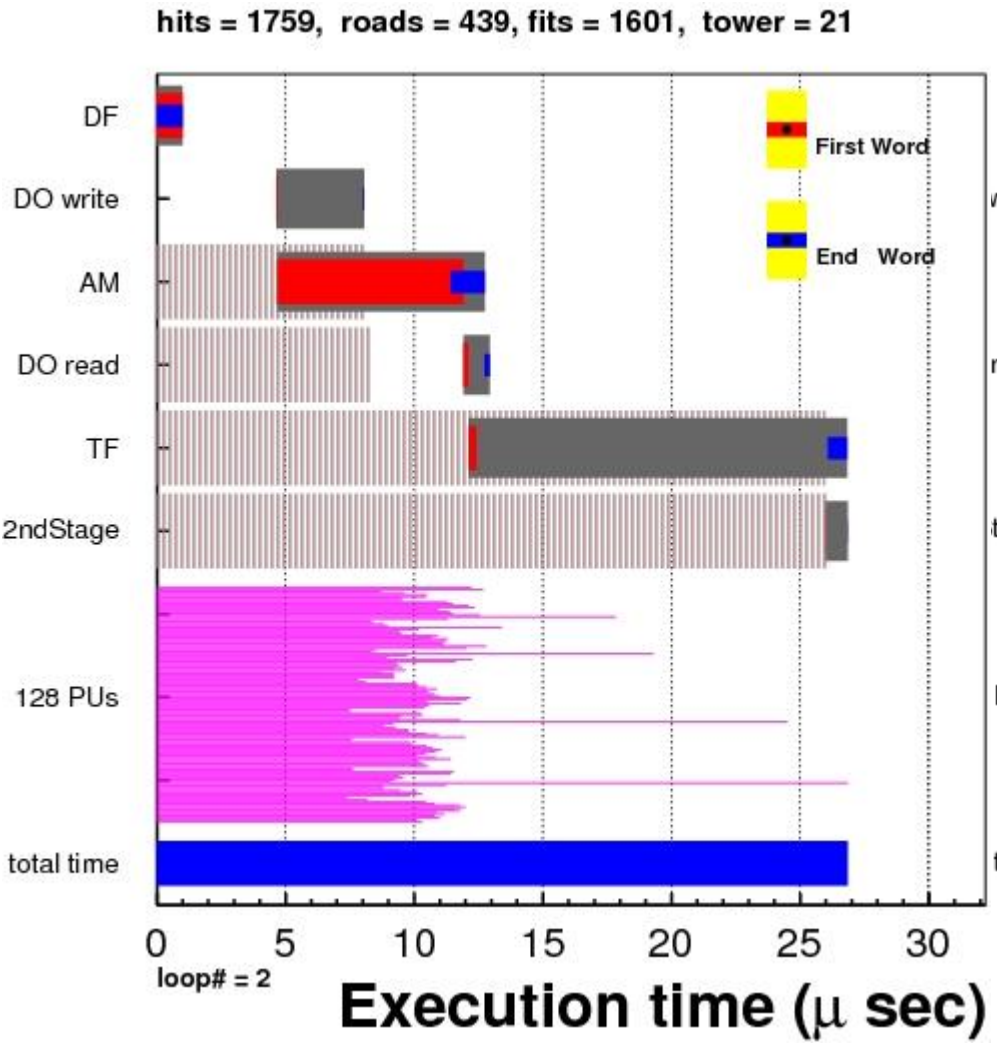


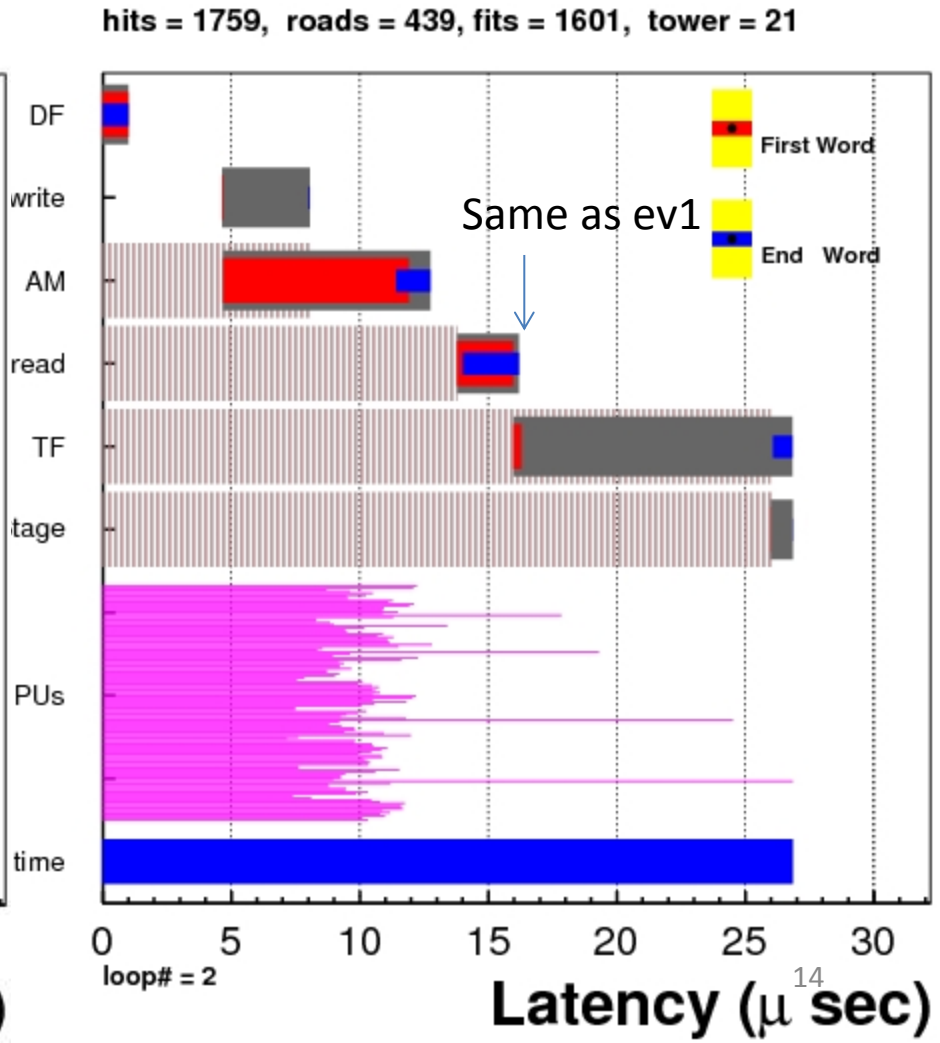
Event 2

Infinity buffer

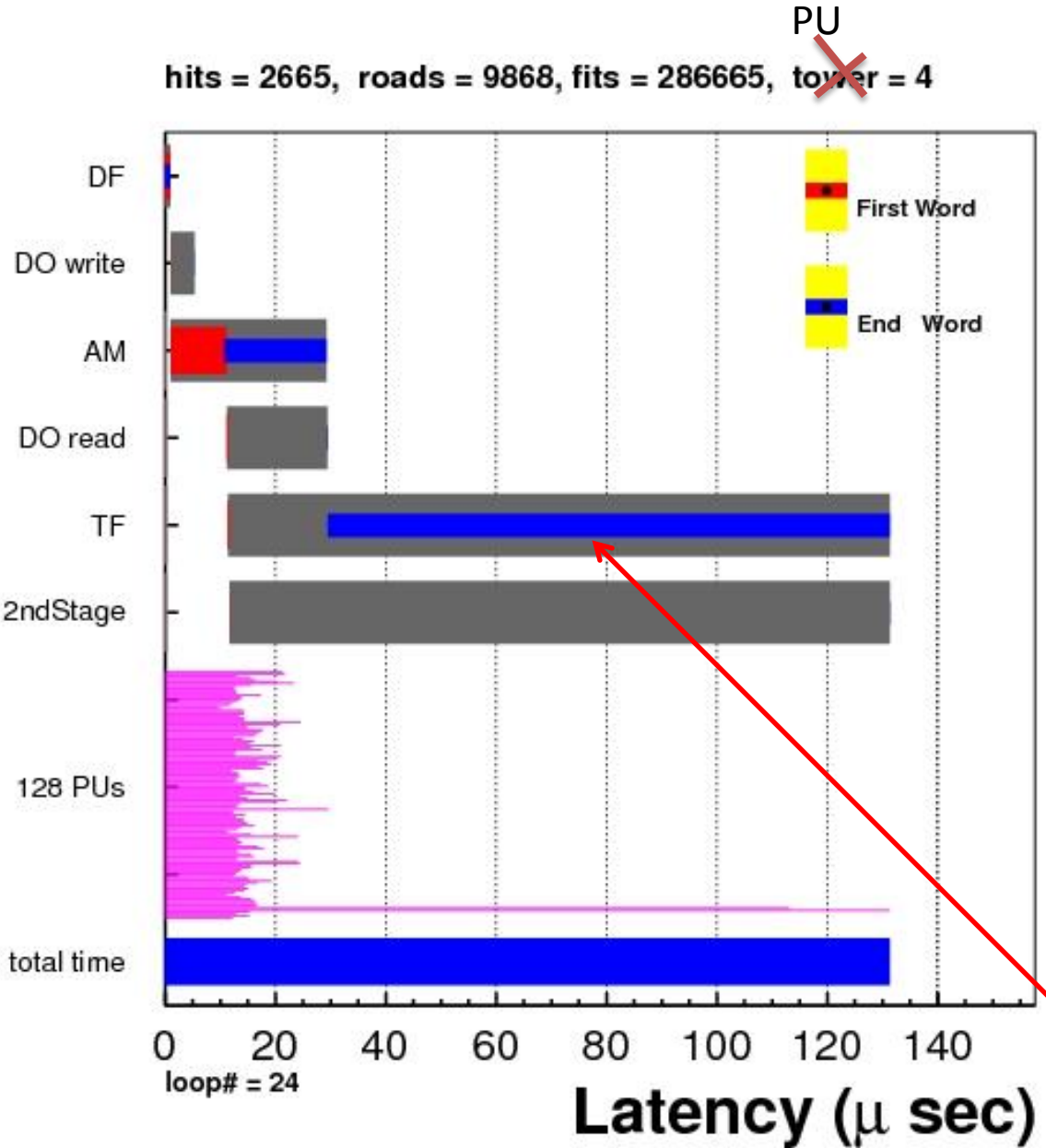
10 usec buffer

Case A<B





Event 24 (busiest event)



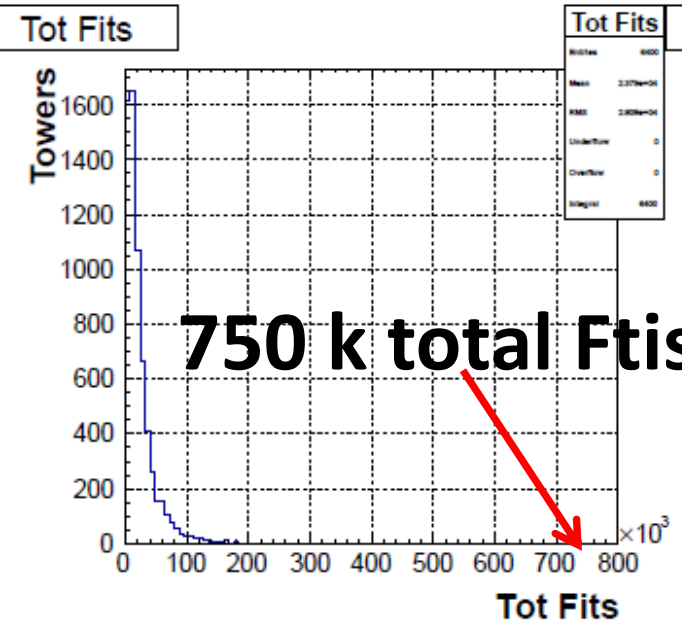
- Event 23 is very light
- Event 24 is very hard
  ~10 k roads (ave 1.5k
  ~300 k fits (ave 10k

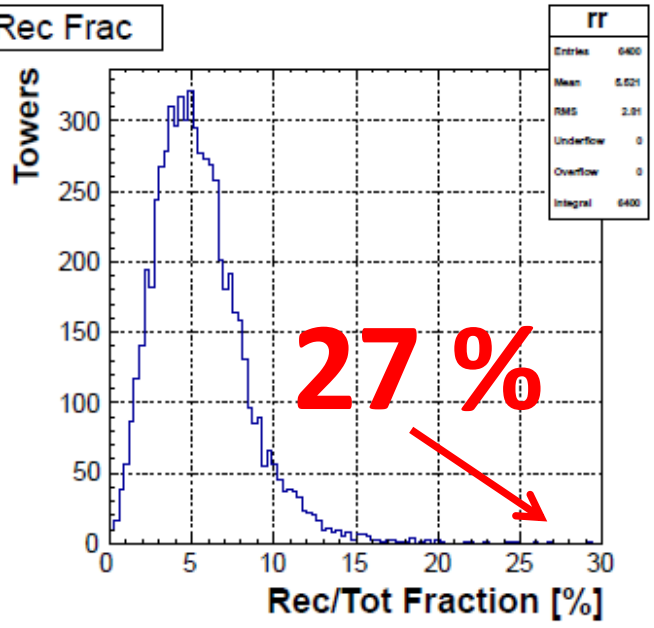
- Event detail :
- Total 764442 fits/tower
- After Jordan's cuts **705757**

- PU0 TF 0 **159534** fits
- PU0 TF 1 100284
- PU0 TF2 52884
- PU0 TF3 55430
- PU1 TF0 24883
- PU1 TF1 78453
- PU1 TF2 99099
- PU1 TF3 135190

- After rebalance (25%) true?
- PU0 TF0 120,000 fits
- i.e. **120 u sec**

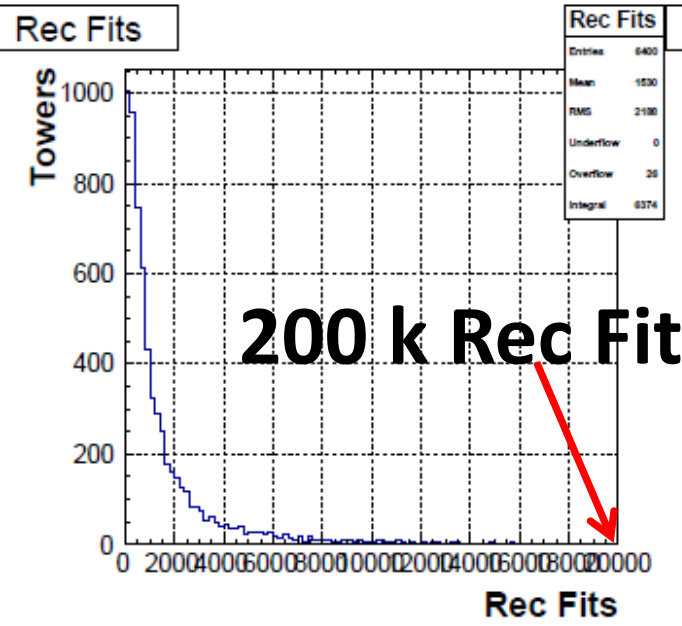
Event 24

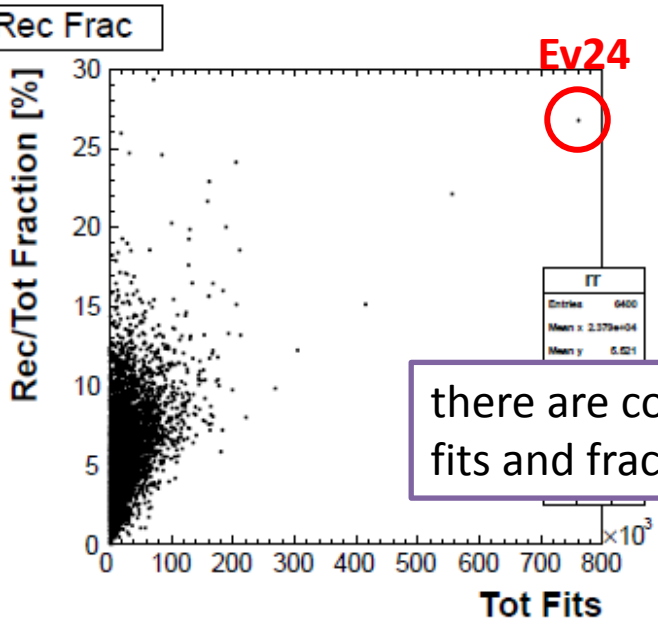




Raw Tower info
i.e.

- Per tower (not PU)
- Before BEC rebalance
- Jordan's cut on
- FTK explorler's
  getNFits()
  getNFitsMajority()
  getNFitsRecovery()





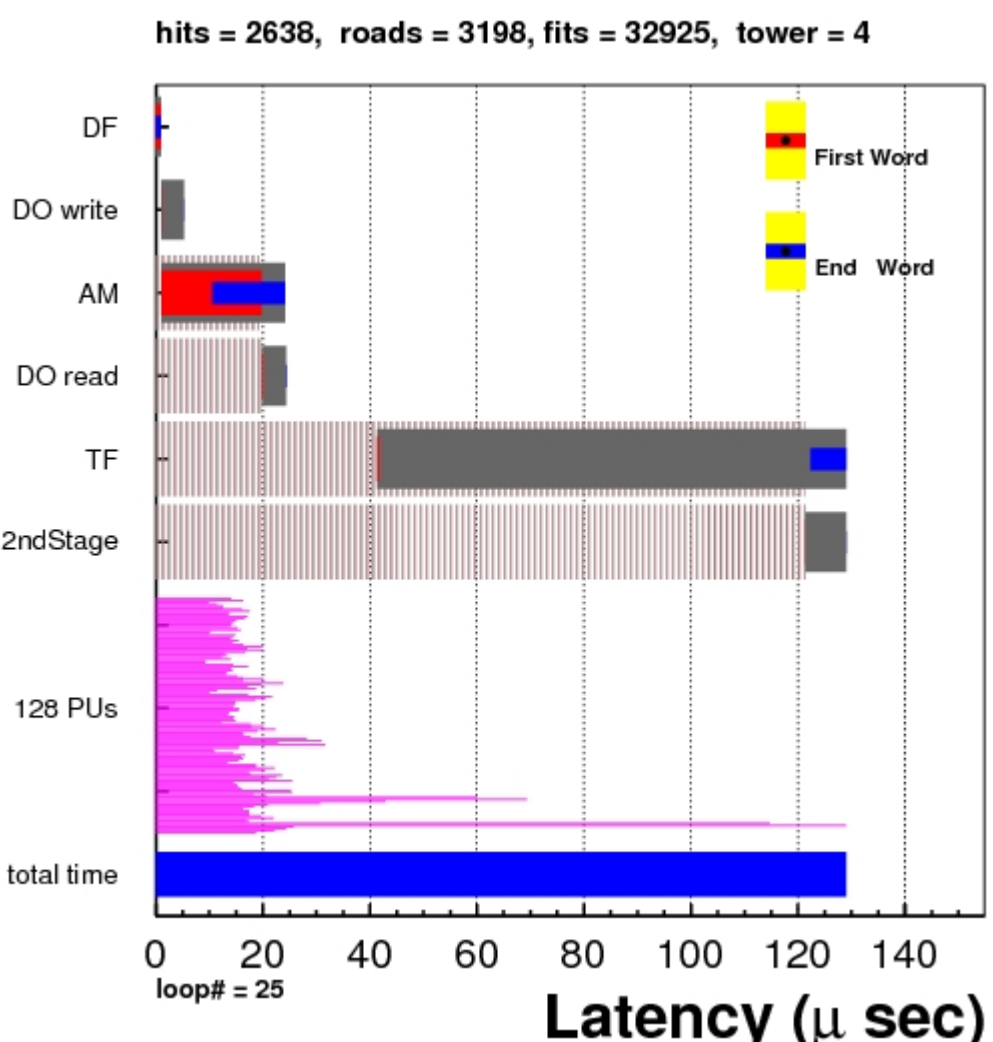
there are correlation between total fits and fraction of Rec fits?

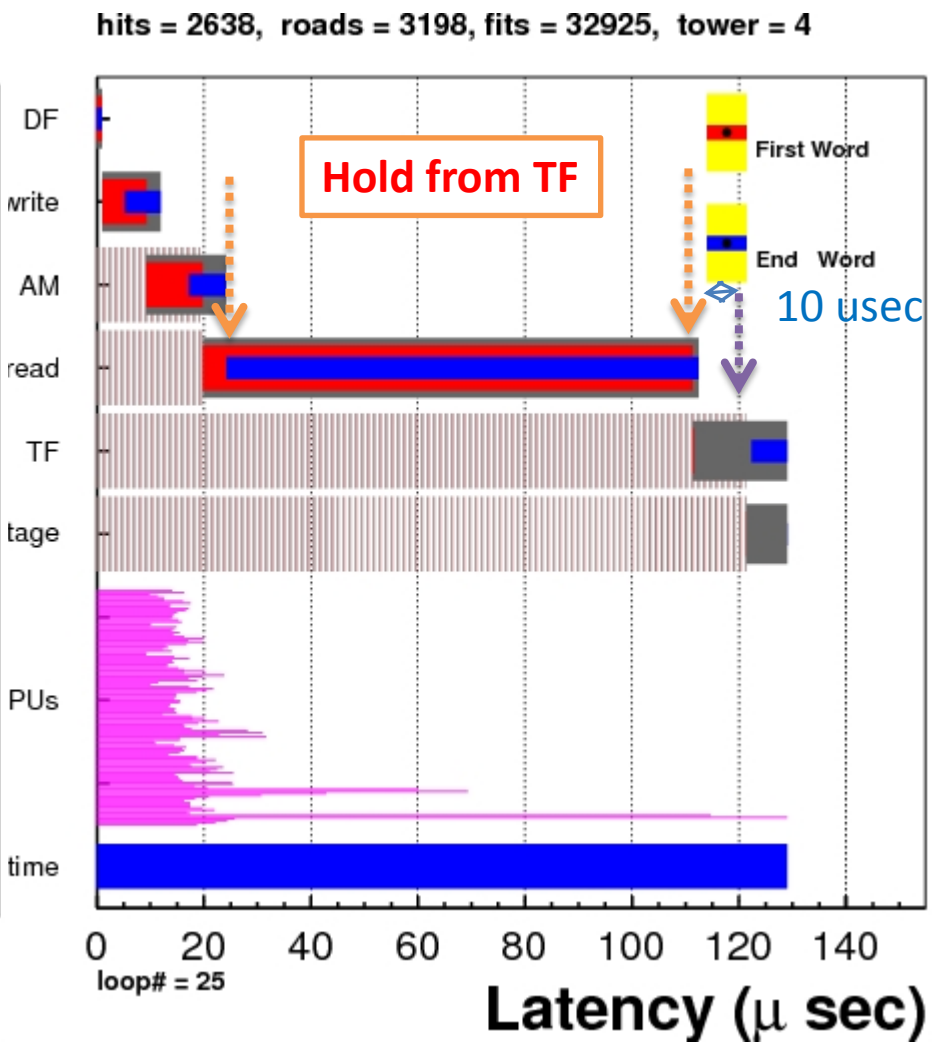
Event 25

Infinity buffer

10 usec buffer

Case A<B



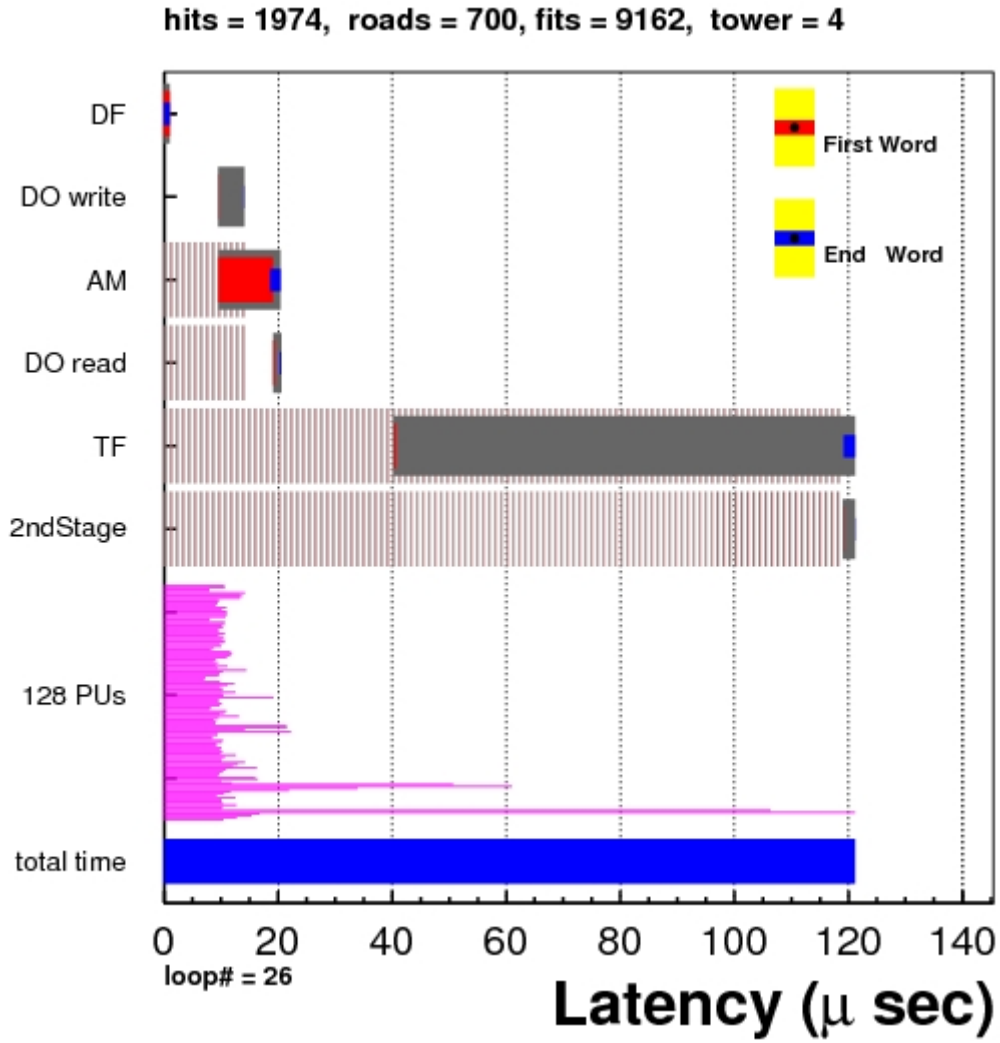


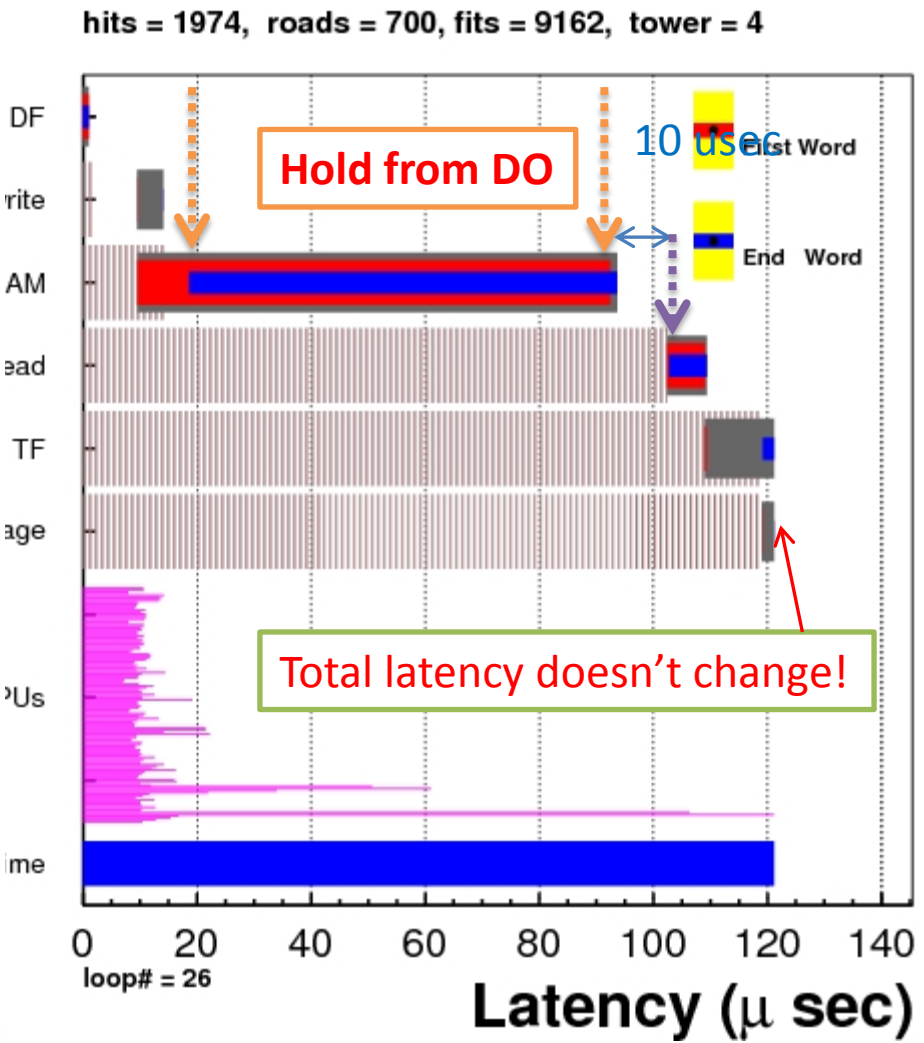
Event 26

Infinity buffer

10 usec buffer

Case A<B



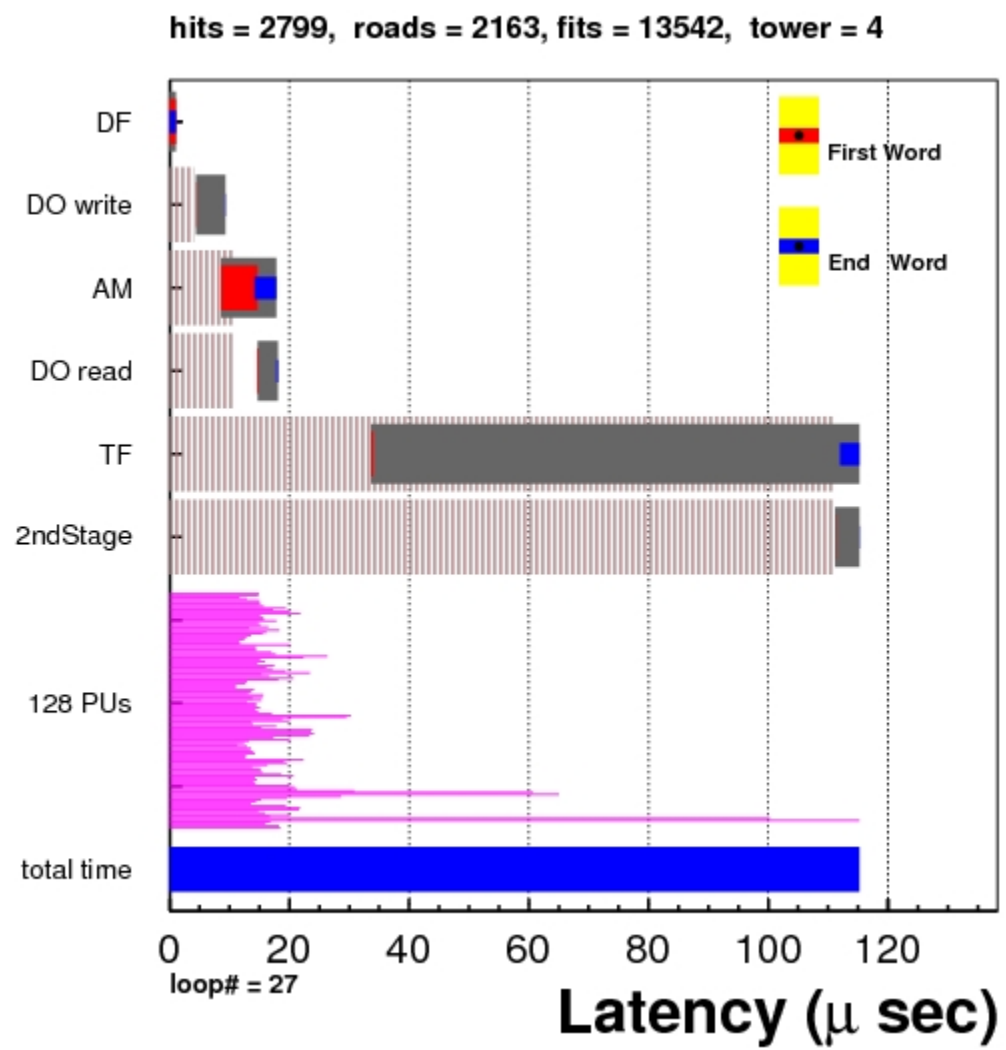


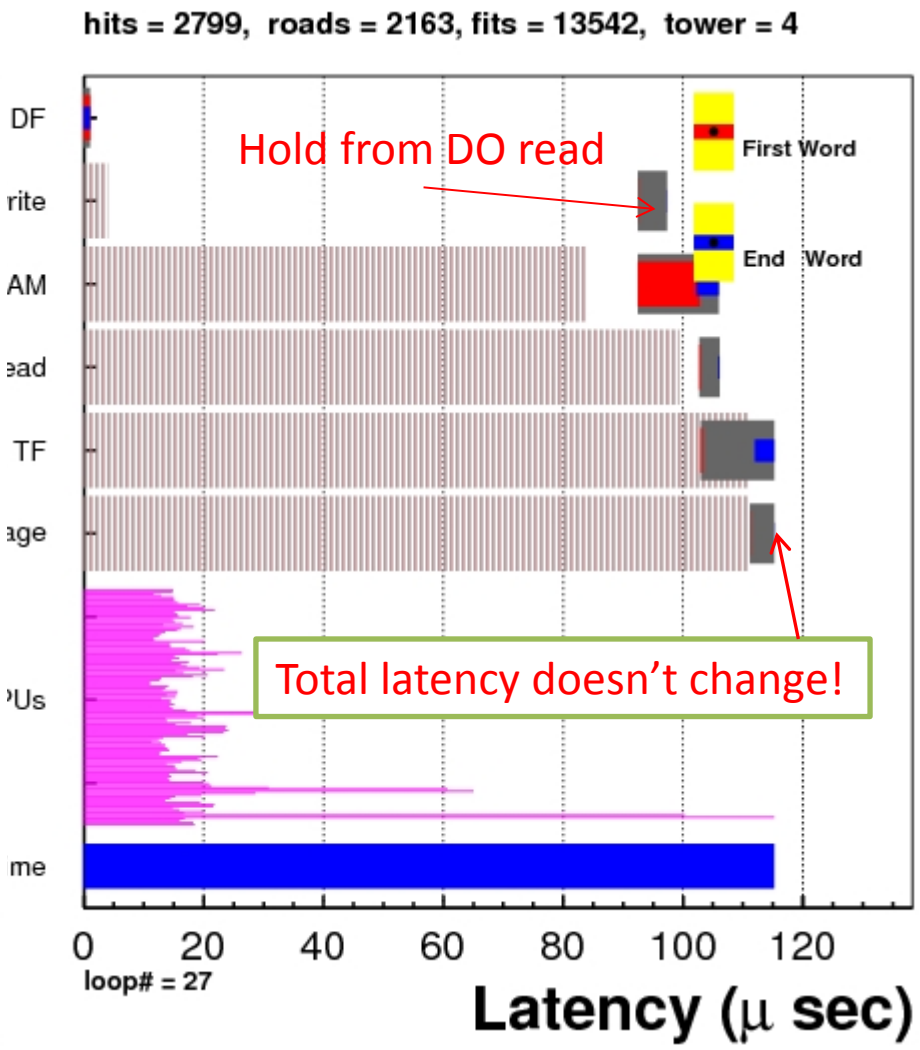
Event 27

Infinity buffer

10 usec buffer

Case A<B





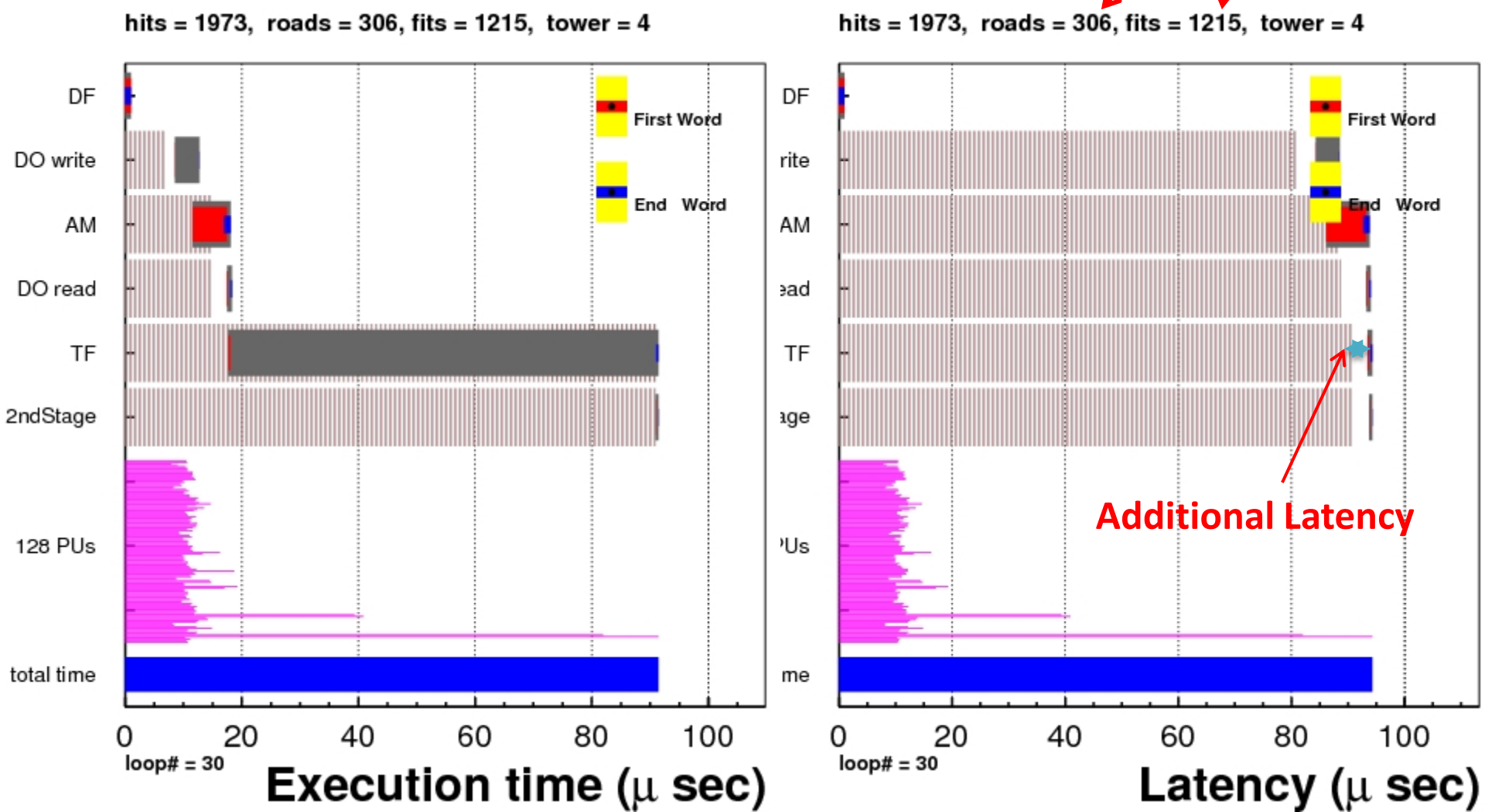
Event 30

Case B<A

#nfits<5*#roads

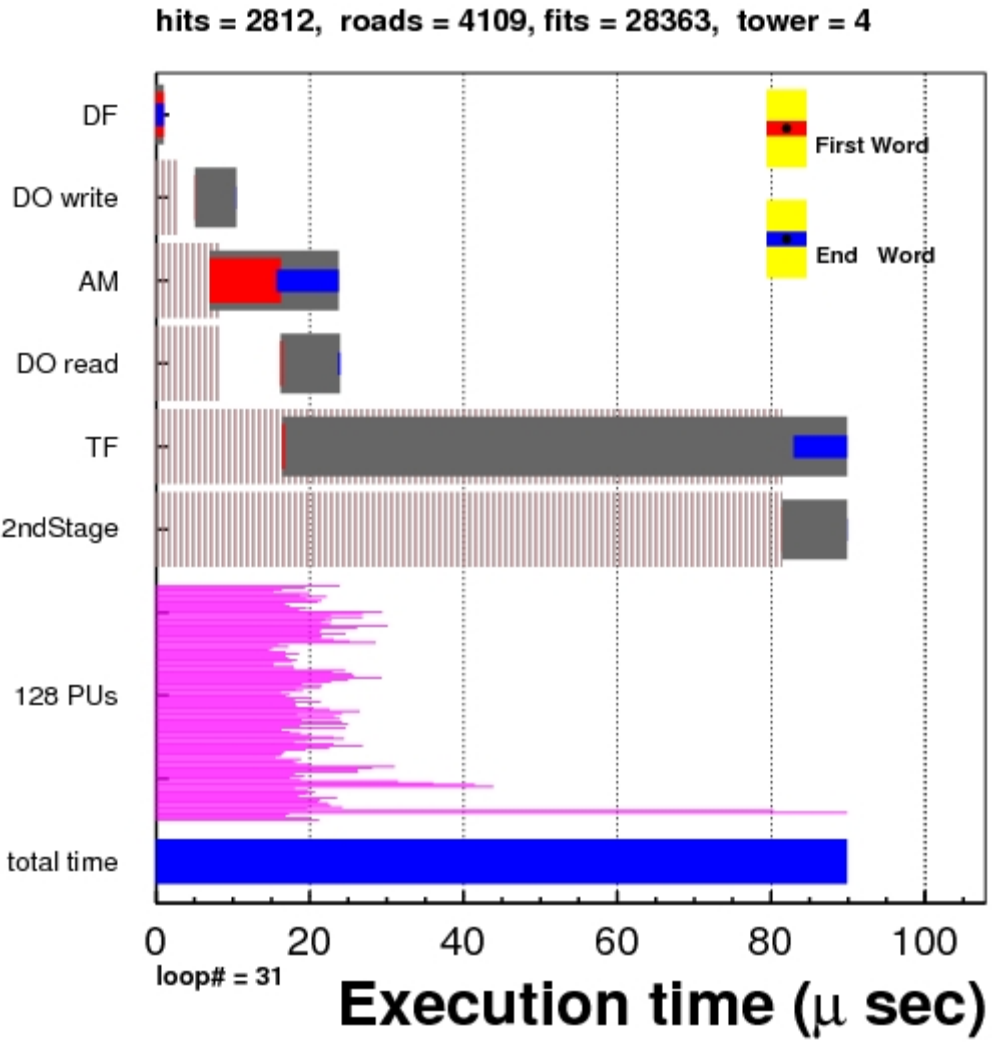
Infinity buffer

10 usec buffer

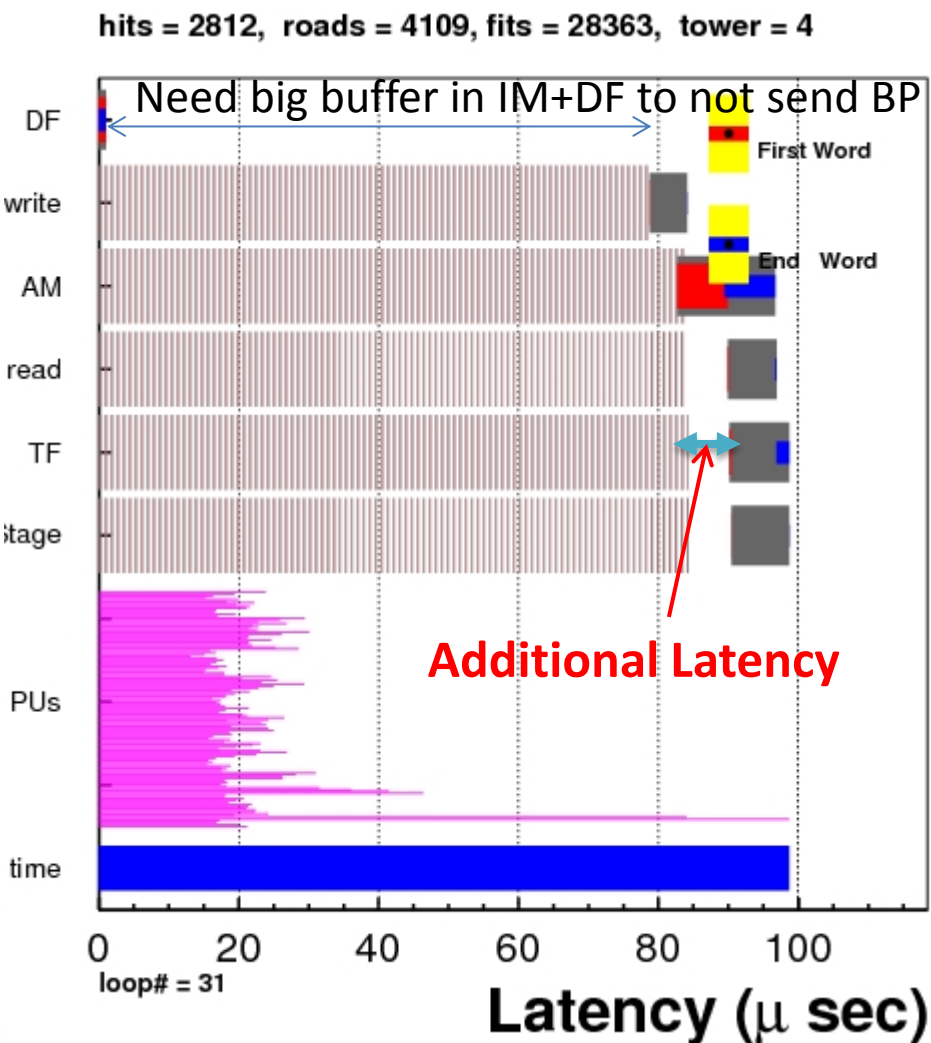


Event 31

Infinity buffer



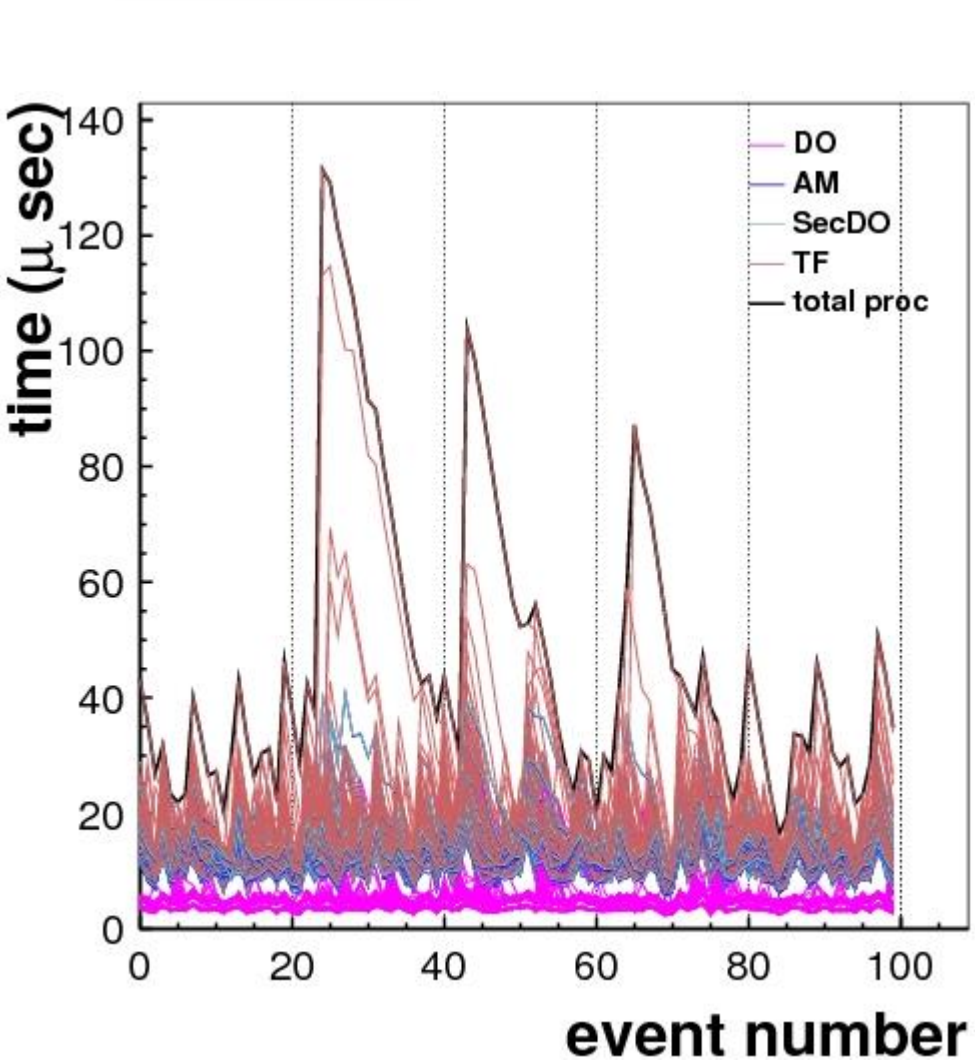
10 usec buffer

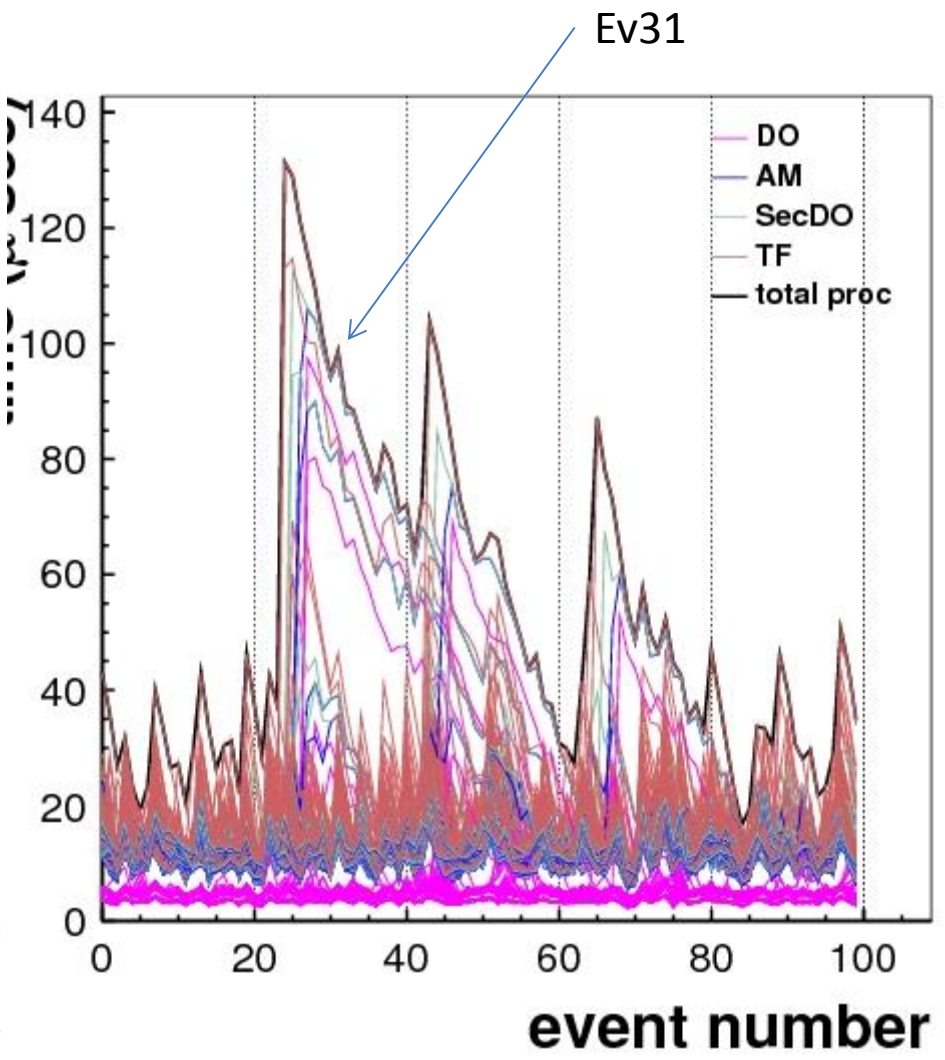


Latency

Infinity buffer

10 usec buffer

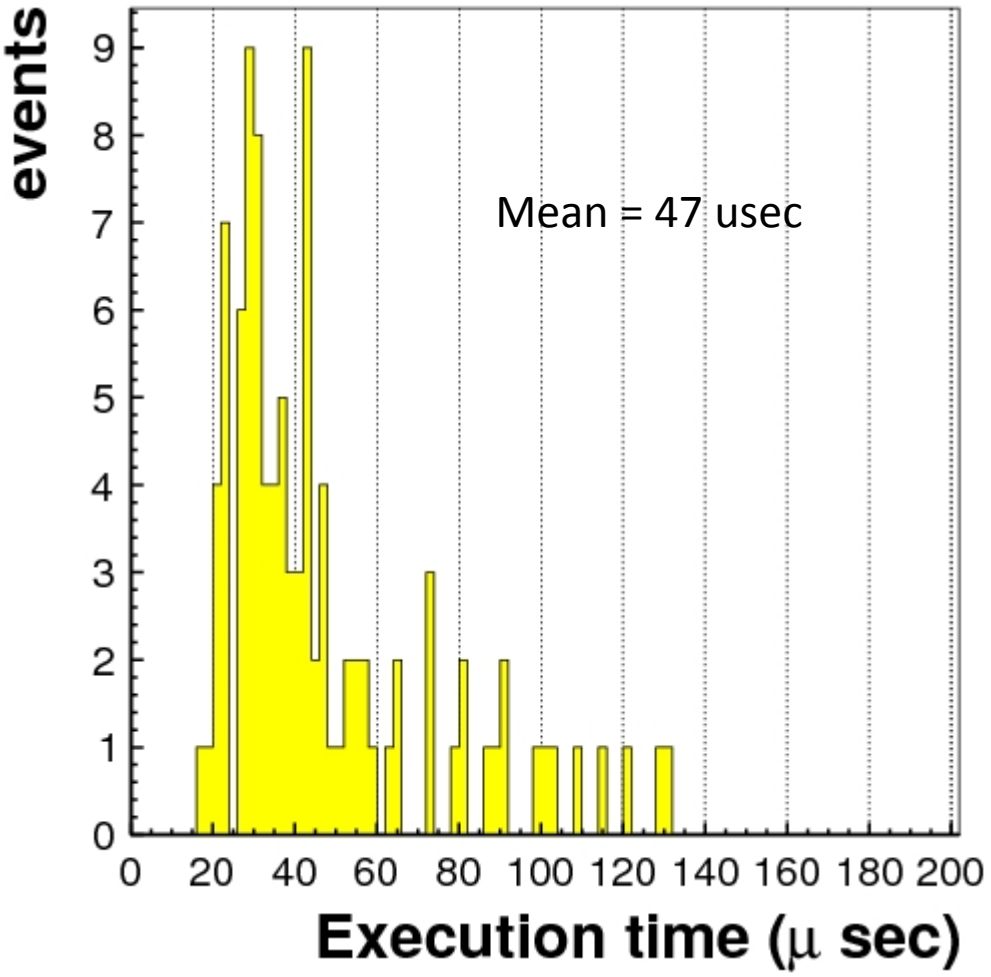


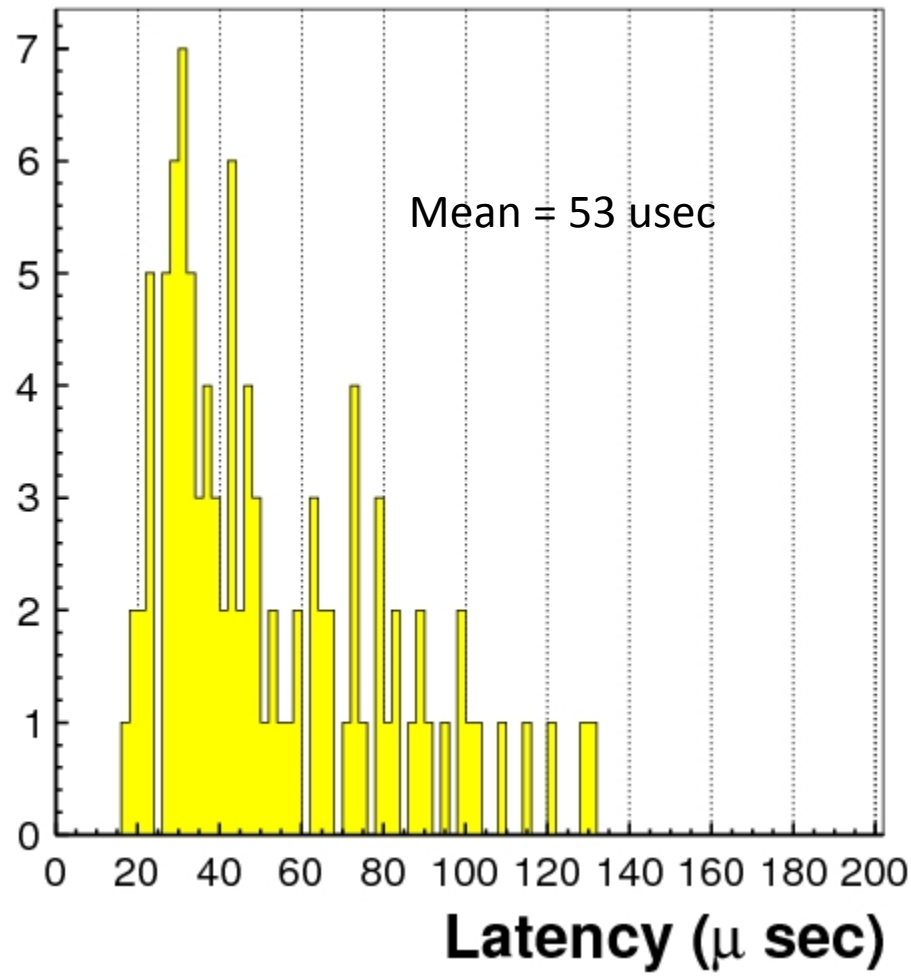


Latency

Infinity buffer

10 usec buffer





Summary

- Buffer size was incremented to latency study, and we will have enough buffer size.
- FTK commissioning is going smoothly.
- We can test 16 inputs fiber continually.
- We got many feed back from the test.
- We will improve the FW .