Detected DIF output bugs

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DIF output format

** Read out data format

section	subsection	word	hex	ascii
SPILL header		marker	FFFC	
		<ACQid> MSB		
		<ACQid> LSB		
			5053	SP
			4C49	IL
		blank space	2020	' '
	CHIP header	marker	FFFD	
		FF <id>	FF..	
			4843	CH
			5049	IP
		blank space	2020	' '
	DATA			
	CHIP trailer	marker	FFFE	
		FF <id>	FF..	
		blank space	2020	
		blank space	2020	
SPILL trailer		marker	FFFF	
		<ACQid> MSB		
		<ACQid> LSB		
		00 <nbchip>	00..	
		<SIZE> MSB		
		<SIZE> LSB		

The SPILL header is pushed in the buffers when receiving a FCMD startSPILL.
The SPILL trailer is pushed in the buffer when the signal end_readout from ROCs is caught by the DIF.
The CHIP header and trailer correspond to the falling and rising edges of transmit on.

<ACQid>	identifier of spill, incements on start acquisition
<id>	a number of chip which sends data, incements on transmitON falling edge
<nbchip>	total number of chips having sent data
<SIZE>	total number of raw data words (16b)

Short spill readout time (10 msec)

- Short spill readout time (t=10 msec):

A. One (most often) or to up to 40+ missing spills (no spill header/trailer + data). Almost absent with t=50 msec.

ex.: run114 DIF0 ACQ:15584->15586, 18957->18969

B. Next spill header is written before spill trailer. DIF2 is strongly affected

run 114 DIF0 #problems 833 #ACQ 33470
run 114 DIF1 #problems 415 #ACQ 33470
run 114 DIF2 #problems 3196 #ACQ 33470

ex.: run 114 DIF0 ACQ: 15594->15595

SPILL header
…
CHIP X header
CHIP X data <- NEW SPILL header
CHIP X trailer (part of data is missing & FFid is broken)
…
NEW SPILL trailer (NEW SPILL physics is missing)

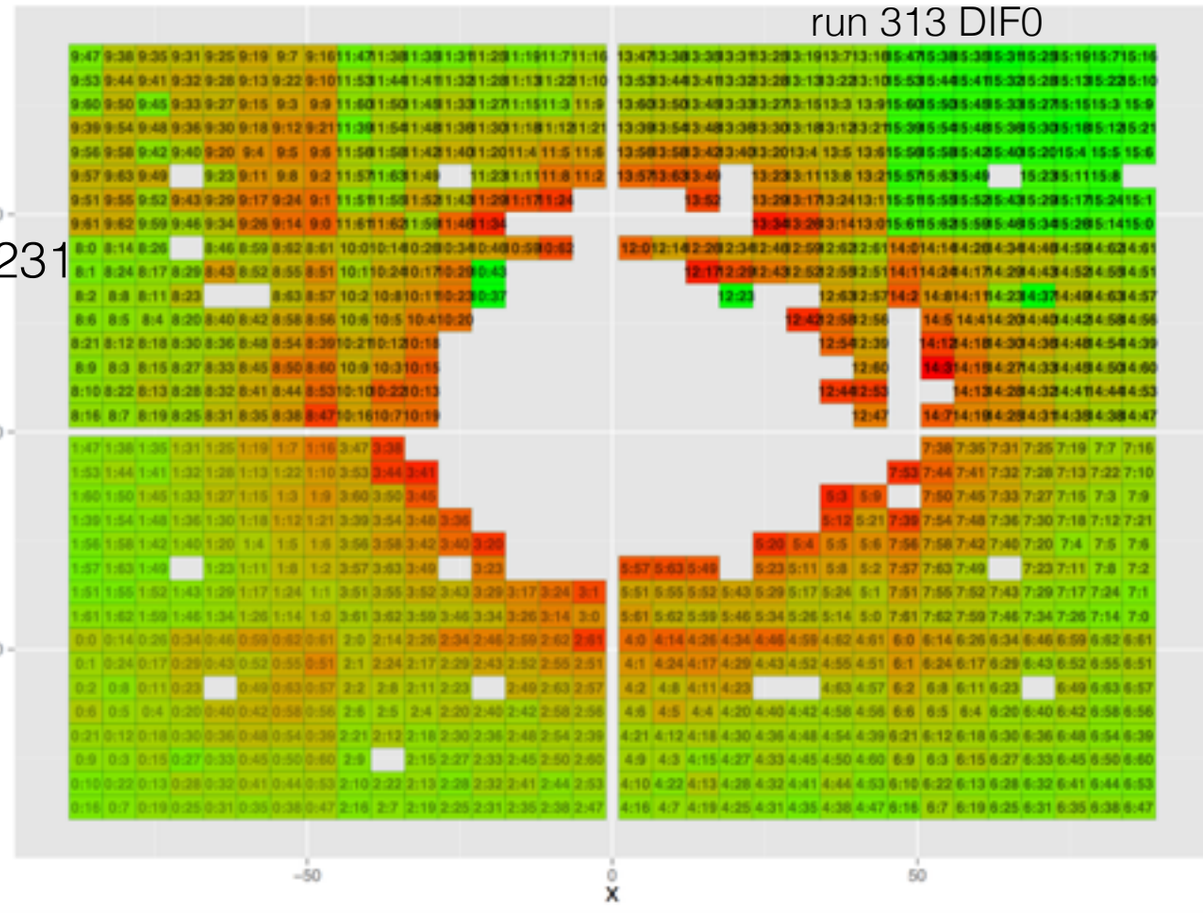
Next spill header is written inside chip X=0(mostly);1;2… data block. It seems that data in CHIP blocks after NEW SPILL are not affected, but FFid counter is broken

Missing chip 15

With t=50msec and f=5 Hz, chip 15 is missing because next spill header is written inside chip 15 data block. Could also be inside chip 14.

ex.: run211 DIF0 ACQ: 23309->23310

TB elog entry 618
(strange increasing of effect)
run312 #problemsDIF0,1,2=(32, 16, 52) #ACQ=13115
run313 #problemsDIF0,1,2=(3275, 3274, 3274) #ACQ=30231



SPILL header
- CHIP 0 header
- CHIP 0 data
- CHIP 0 trailer
- ...
- CHIP 15 header
- CHIP 15 data <- NEW SPILL header
- CHIP 15 trailer (part of data is missing & FFid is broken)
- NEW SPILL trailer (NEW SPILL physics is missing)

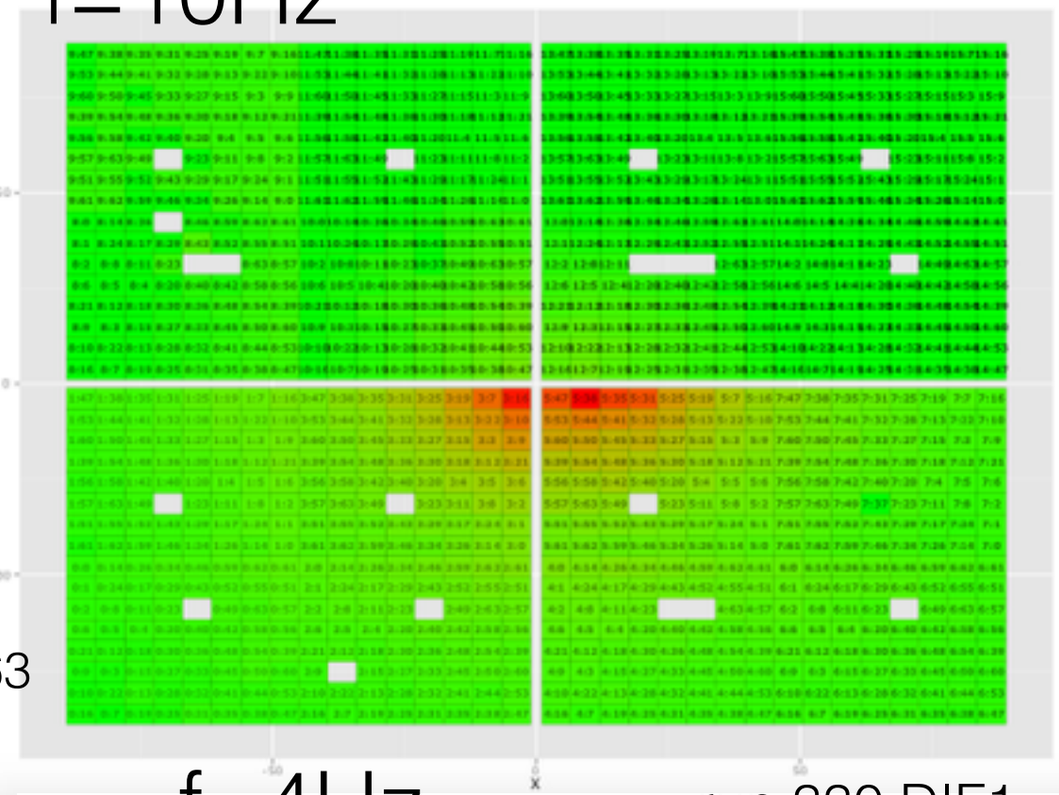
Missing chips

With t=97.5msec and f=10 Hz, more chips are missing because next spill header is written inside some chip data block (earlier than 15).

TB elog entry 650
run326 #problemsDIF0,1,2=(1528, 1494, 1580) #ACQ=13863

f=10Hz

run 326 DIF1

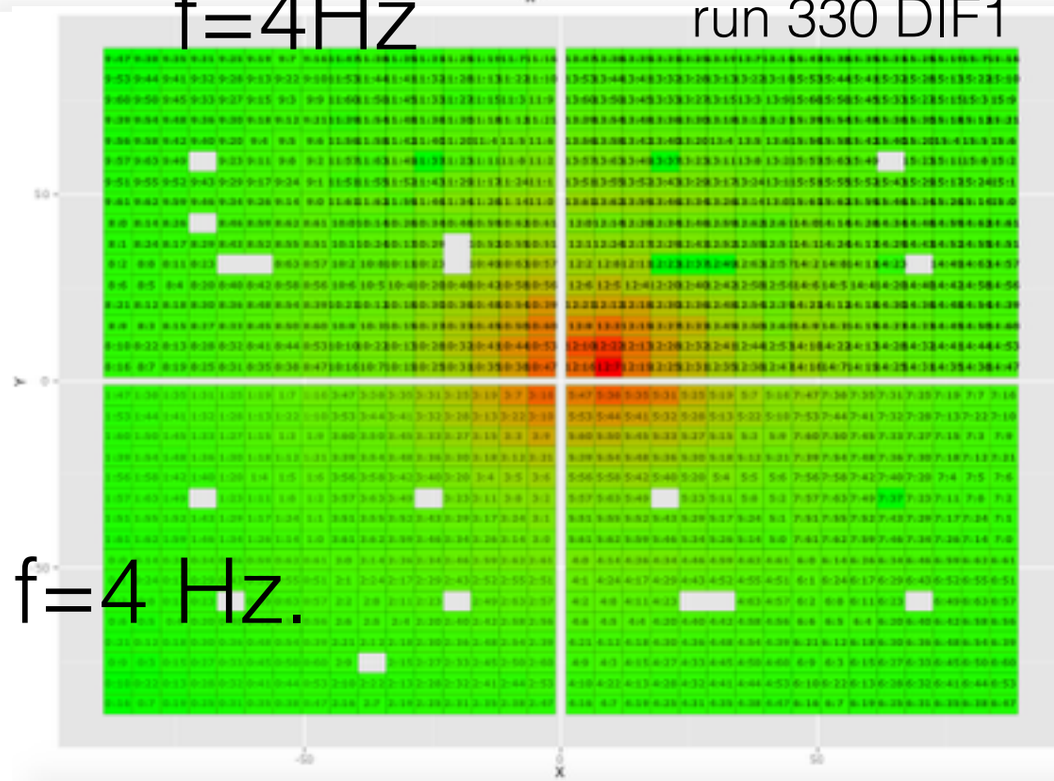


With t=274.5msec and f=4 Hz, effect disappears.

TB elog entry 658
run326 #problemsDIF0,1,2=(0, 0, 0) #ACQ=21003

f=4Hz

run 330 DIF1



Dependent on f, disappeared with f=4 Hz.

Missing MSB&MSB+LSB

MSB or MSB+LSB of spill number can be absent in spill trailer

ex: run 211 DIF2 ACQ 23333 missing MSB&LSB
run 211 DIF2 ACQ 23377 missing MSB

run 211 DIF0 #problems 8 #ACQ 19258
run 211 DIF1 #problems 12 #ACQ 19258
run 211 DIF2 #problems 142 #ACQ 19258

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			5053	SP
			4C49	IL
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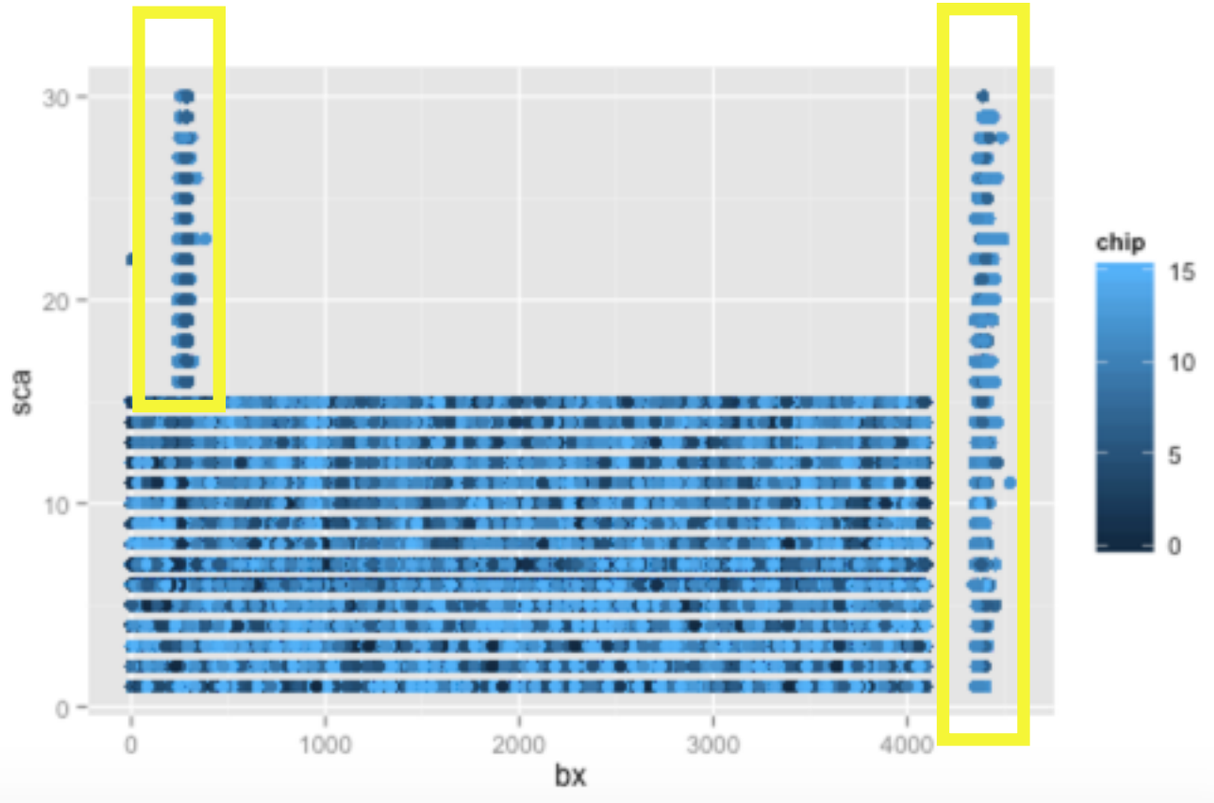
		marker	FFFD	
		FF <id>	FF..	
	CHIP header		4843	CH
			5049	IP
		blank space	2020	' '
	DATA			
	CHIP trailer	marker	FFFE	
		FF <id>	FF..	
		blank space	2020	
		blank space	2020	
SPILL trailer		marker	FFFF	
		<ACQid> MSB		
		<ACQid> LSB		
		00 <nbchip>	00..	
		<SIZE> MSB		
		<SIZE> LSB		
		blank space	2020	' '

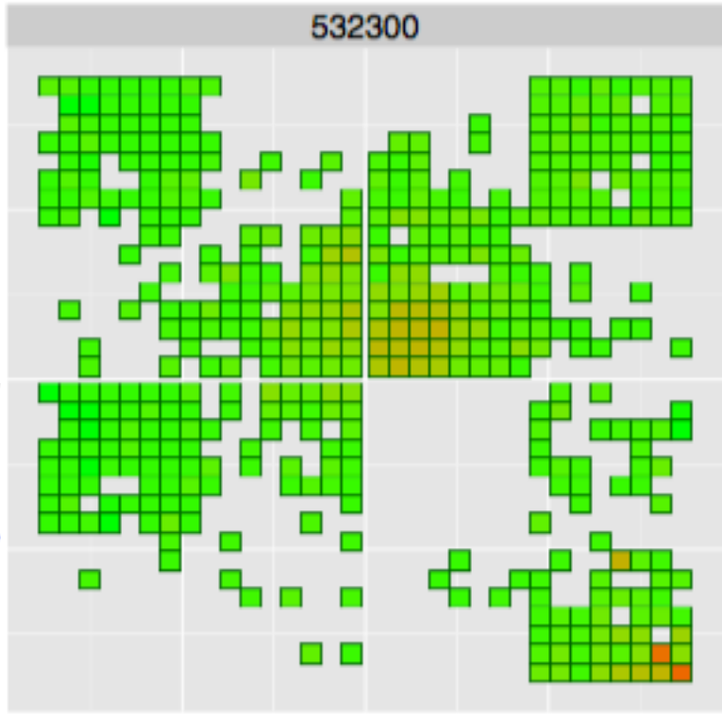
Missing FFid

FFid in chip bloc can be absent in chip header or trailer.

In this case, the next chip block is corrupted (might have sca>15 or unphysical BX)

ex.: run 211 DIF2 ACQ 24300 chip 15
run 211 DIF2 ACQ 25023 chip 5





** Read out data format

section	subsection			
SPILL header				
		blank space	4C49 2020	IL ' '
	CHIP header	marker FF <id> blank space	FFFD FF.. 5049 2020	 IP ' '
	DATA			
	CHIP trailer	marker FF <id> blank space blank space	FFFE FF.. 2020 2020	
SPILL trailer		marker <ACQid> MSB <ACQid> LSB 00 <nbchip> <SIZE> MSB <SIZE> LSB blank space	FFFF 00.. 2020	 ' '