## Installed new logic for hardware injection ODC https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18464

#### • New ODC

6 control bits that tell the user that the injection system is configured correctly

1- HARDWARE filter state OK

- 2- HARDWARE filter GAIN OK
- 3- CW filter state OK
- 4- CW filter GAIN OK
- 5- TRANSIENT filter state OK
- 6- TRANSIENT filter GAIN OK

and 7 bits that indicate when each of the following is true:

7- no HARDWARE injection signal of any kind
8- no CW injection signal
9- no TRANSIENT injection signal of any type
10- no CBC injection (TINJ\_TYPE == 1)
11- no BURST injection (TINJ\_TYPE == 2)
12- no DetChar injection (TINJ\_TYPE == 3)
13- no Stochastic injection (TINJ\_TYPE == 4)

the first 6 bits will constitute the summary bitmask, and the other 7 will be used to construct data-quality flags for offline analysis use

This change will invert the meaning of bits 24/25/26 of ODC-MASTER, where these bits will now have the following definitions:

- 24: No CBC injection present
- 25: No Burst injection present
- 26: No DetChar injection present

# aLIGO hardware injection flowchart





# **LIGO DetChar**



Advanced LIGO Data Quality Infrastructure

Blue=off site Red=doesn't exist yet

## IFO State Information in Guardian & ODC



#### ground shaking test https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18478

Tonight we have removed shaker from HAM6 wall and put it on the ground near the chamber. We sent broadband excitation signal to the shaker in the frequency range 200-900Hz using channel L1:PEM-CS\_DAC\_1\_EXC. Surprisingly, we did not see much of excess noise in PEM sensors, like accelerometers or HAM6 GS13, but DARM noise has increased by factor of 3-5 in the frequency range 30-200Hz as shown in the attached plot.We have also noticed that DARM noise above 1kHz has also degraded, in particular around OMC length dither frequency. We saw new sidebands in the spectrum, separated by ~1kHz from the dither line.



Channel to excite : L1:PEM-CS\_DAC\_1\_EXC

### Brute force coherence https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18501

Brute force coherence report for one of the last locks

- some coherence in the low frequency range (~10 Hz) with angular signals (plot 1)
- coherence with SRCL below 50 Hz (plot 2)
- coherence with POP\_LF at high frequency (plot 3)

Corresponding channels

Coherence OAF-CAL\_DARM\_DQ vs L1:ASC-REFL\_A\_RF9\_I\_PIT\_OUT\_DQ

Coherence OAF-CAL\_DARM\_DQ vs L1:LSC-SRCL\_OUT\_DQ

## Coherence OAF-CAL\_DARM\_DQ vs L1:LSC-POP\_A\_LF\_OUT\_DQ ·







Time variance in relationship between IMC-F and PSL VCO frequencies https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18151

In investigations of IMC-F whistles at LLO it has been noticed that the values of IMC-F that correspond to whistles changes not only between locks but also, to a lesser extent, within lock stretches ( https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=17751). This may be because the frequencies that the PSL VCO is interfering with are wandering, but it may also be the that the IMC-F\_OUT\_DQ channel is not a good enough proxy for the PSL VCO values.

The PSL VCO comparator channels

L1:SYS-TIMING\_C\_FO\_A\_PORT\_11\_SLAVE\_CFC\_FREQUENCY\_5



### Seismic noise https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18562



## L1:HPI-STSB\_BLRMS L1:HPI-STSB\_BLRMS\_Z\_3\_10



#### DQ Shift: LLO 1117378816 - 1117584015 (3rd to 5th June) https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=18590

## Shift Summary

## https://alog.ligo-la.caltech.edu/aLOG/uploads/18590\_20 150608201920\_ER7LLODQshift1Summary.pdf

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For this DQ shift, we saw:

- 1. whistle glitches between 300 and 3000 Hz (June 3rd:~12 to 13 hours, June 4th: ~6 to 10 hours, June 5th: ~17 to 19 and 22 to 24 hours)
- 2. violin mode and harmonics @510 Hz (June4th: 16 to 24 hours, June5th: all day during the lock streches)
- 3. quad suspension bounce and roll modes (June 3rd: ~14 Hz and between12 to 16 hours, June4th: 16 to 24 hours, June 5th: 0 to 1 hours)
- 4. parametric instability (@844 Hz on June 3rd, ~7 to 9 hours)
- 5. The 35 Hz calibration line temporarily increased in ampltiude on June5th 22 to 24 hours, but that didn't lead to any obvious glitch.