

aLOG LLO

2015/01/30(-16590)

LLO General (CDS, General)

[Link](#)

keith.thorne@LIGO.ORG - posted 11:58, Monday 12 January 2015 (16340)

Control-room displays after projector mount removal

The last projector mount on the control-room ceiling has finally been removed. This allowed Mike Fyffe to get a shot of all the control-rooms displays currently installed at LLO.

最新のLLO control-room



laura.nuttall@LIGO.ORG - posted 21:02, Monday 12 January 2015 - last comment - 08:21, Tuesday 13 January 2015(16354)

Major carry transitions in MC2 feedback

Laura Nuttall, Josh Smith

Previous alogs report loud DAC glitches in ETMX (14060) and IMC control (12471). Calibrations of the DAC were performed to remove/reduce these glitches (14964).

In Friday night's lock (1104907204-1104916570) we noticed PRCL/SRCL/MICH was glitching quite often as shown in the spectrogram attached (Fig 1). We took, by eye, the times of the glitches in this spectrogram and wrote a script (attached) to plot values of certain channels at these times to look for suspicious value crossings. We found all the MC2 M3 crossing zero at the times of the glitches (Figs 2-5; the red dots denote the time of the glitches). Also attached (Fig 6) is also an image showing the glitches in PRCL CTRL lining up with zero crossings in MC2 feedback.

Images attached to this report**Non-image files attached to this report**
 scriptpy.txt
Comments related to this report

keith.thorne@LIGO.ORG - 08:21, Tuesday 13 January 2015 (16357)CDS

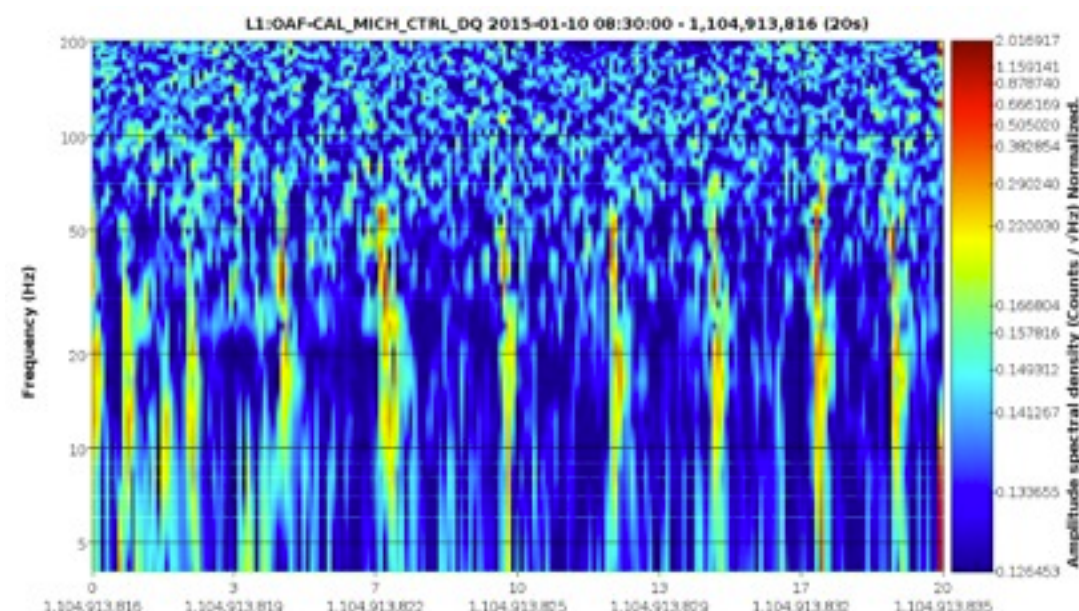
Link

The DAC calibration (AUTOCAL) only happens when the IOP model is restarted. This may not occurs for weeks (due to basic stability of systems). The l1sush34 front-end has been up for 75 days, and the IOP model was last restarted in 2014 sometime.

- I don't think we have good data on how much the calibration drifts. However, we could institute a regular program to restart front-end models to address this.

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16354>

rock直後に大量のglitchが報告
DAC calibrationはIOP(?)modelが
restartしたときに起こる。その後は
このglitchは報告されていない。



nathaniel.strauss@LIGO.ORG - posted 23:51, Monday 12 January 2015 (16356)

Coherence Combs in ER6

I've been examining the coherence tool's run on the ER6 segments at a resolution of 1 mHz, and I've found lots of wide structure, including 4 Hz, 8 Hz, and 16 Hz combs from 0 Hz all the way up into the 1000 Hz range. I've attached a few interesting-looking plots and the links to the results from the interesting channels below.

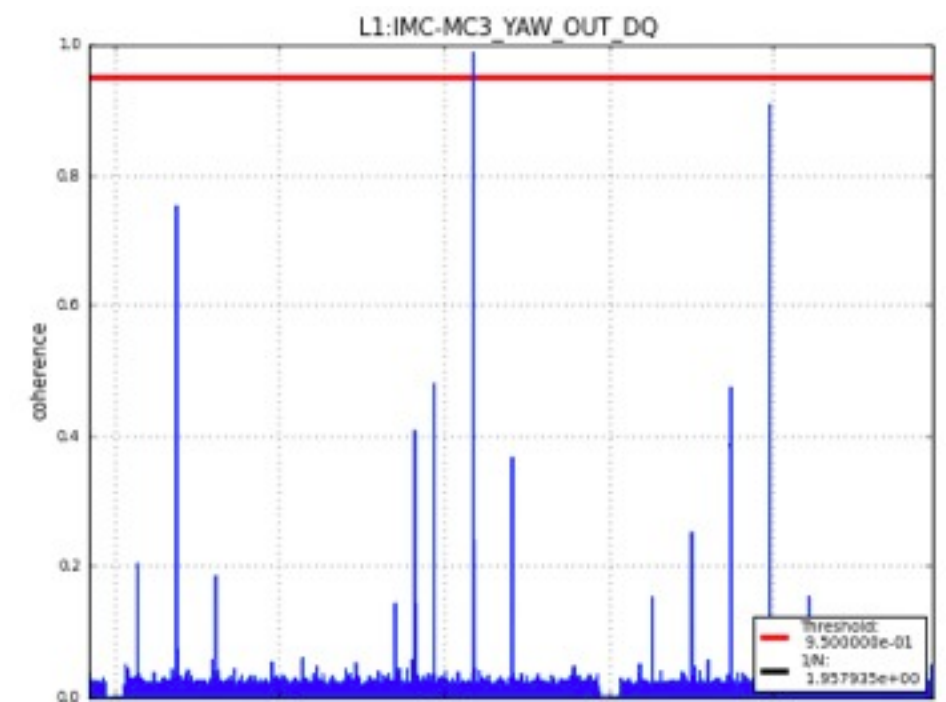
L1:IMC-PWR_IN_OUT_DQ
 L1:IMC-PZT_YAW_OUT_DQ
 L1:IMC-PZT_PIT_OUT_DQ
 L1:TCS-ITMX_CO2_ISS_IN_AC_OUT_DQ
 L1:TCS-ITMX_CO2_ISS_OUT_AC_OUT_DQ
 L1:LSC-POP_A_LF_OUT_DQ
 L1:IMC-MC3_YAW_OUT_DQ
 L1:IMC-MC1_YAW_OUT_DQ
 L1:IMC-MC3_PIT_OUT_DQ
 L1:IMC-MC1_PIT_OUT_DQ
 L1:IMC-MC2_YAW_OUT_DQ
 L1:IMC-MC2_PIT_OUT_DQ
 L1:TCS-ITMY_CO2_ISS_OUT_AC_OUT_DQ
 L1:SUS-ITMX_L3_OPLEV_YAW_OUT_DQ
 L1:SUS-MC1_M1_DAMP_P_IN1_DQ
 L1:SUS-SR2_M3_WIT_P_DQ
 L1:TCS-ITMY_CO2_ISS_IN_AC_OUT_DQ

Images attached to this report



<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16356>

ER6にcoherence toolをexamine
 interes plotをいくつかのせ、
 channelをlistup



L1 CAL (CAL)Link

shivaraj.kandhasamy@LIGO.ORG - posted 15:43, Tuesday 13 January 2015 (16370)

pcal laser at X-end turned on after the fix

Carl, Ladon, Thomas, Marco and shivaraj

Last week we noticed that the pcal laser at X-end was glitching to the extent that it was turning on and off. The LED indicator at the front of the laser power supply (marked as 'laser on') dimmed when we turned on the laser indicating possible load issues. Today we checked the DC power port (+12 V near pcal transmitter module) that was powering the laser power supply and found that it was a little smaller than expected (there were a few PEM instruments added at the X-end last week and it might have increased the load at that port). After increasing the current of the 12 V DC source at the rack, the load issue went away (right now the +12 V DC port near the pcal transmitter reads 12.3 V and Carl suggested to use that value). The pcal laser is now turned on with 533.3 Hz calibration line.

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16370>

X-endのpcal laserをon offすると
glitchが起こった。
これはCD powerが期待値+12Vより
も少し下がっていたことにより起こ
っており、+12Vに戻したら大丈夫に
なった。

denis.martynov@LIGO.ORG - posted 19:24, Monday 19 January 2015 - last comment - 10:58, Tuesday 20 January 2015(16444)

noise budget for 55-60Mpc lock

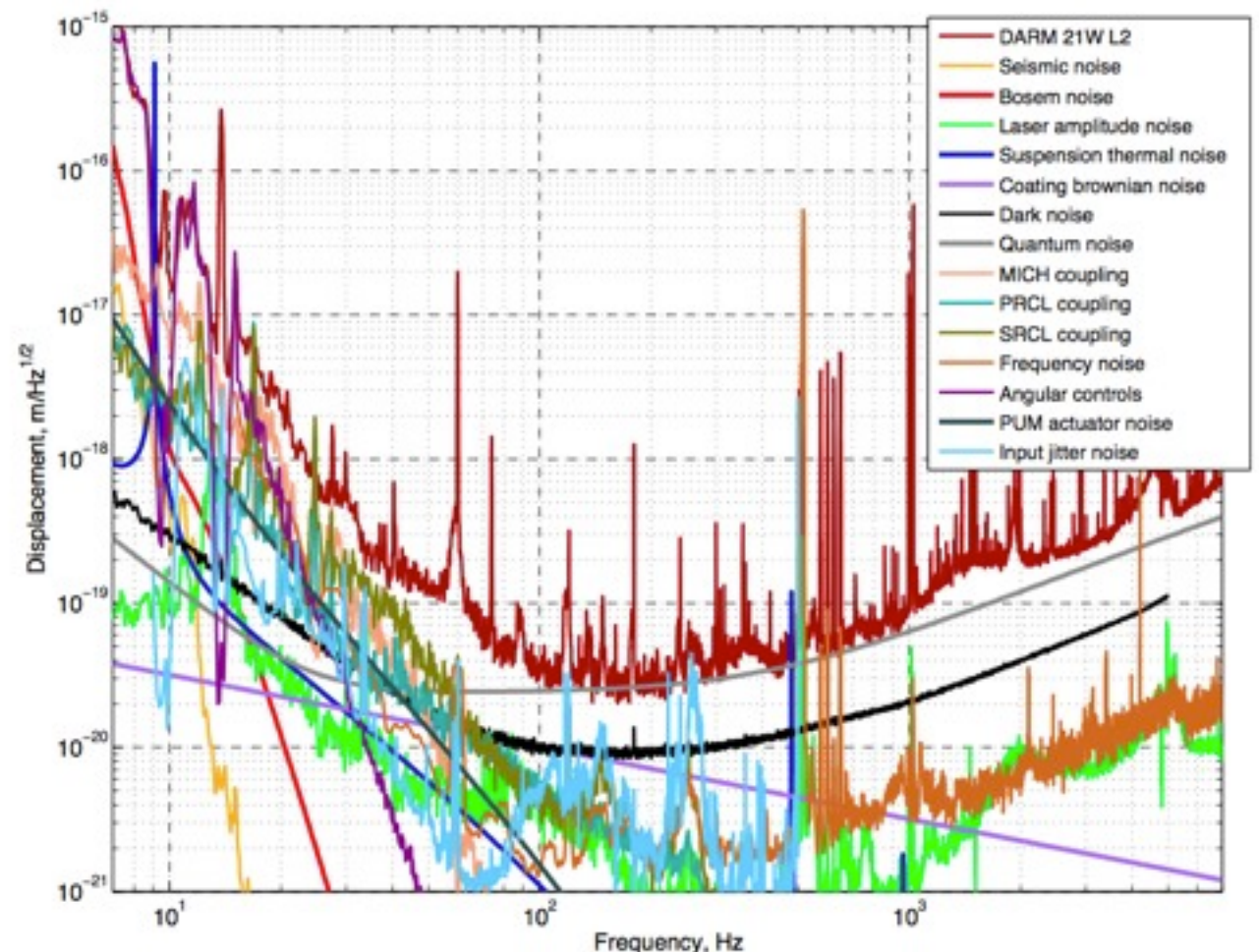
This alog shows noise budget for the lock stretch from Dec 13. Since then noise improved above 800Hz due to PMC swap (alog 16186, alog 16210), at 256Hz due to perioscope steering mirror mount replacement (alog 16227, alog 16331) and at 10-40Hz (alog 16260). However, we could not get better BNS range yet since PSL output power reduced from 23.5W down to 18W and later to 13.5W after PMC swap.

Attached plots shows noise budgets for DARM, MICH, PRCL and SRCL. During the week we had a several discussions on how can we improve the noise. This is a list of our conclusions:

- DRMI [10 - 40 Hz]. Increase power of POP PD but before try to control DRMI using POP air PD that has factor of ~ 8 more light compared to invac PD. More power will improve DRMI noise since SRCL is shot noise limited from ~ 20 Hz. MICH noise in the frequency range 10-60Hz probably comes from SRCL due to non-optimal phase rotation of POP 45. Then we plan to switch M3 actuator of small triples to state 3, we used to run in state 1 (lp off, acq off). We also plan to measured RF generator noise coupling.
- Angular controls [5 - 20 Hz]. Estimation in the DARM noise budget is done by taking quad angular control signal, propagating it to angle and multiplying by beam centering of 4mm (measured using oplevs during power up from 2W to 20W). We plan to tune quad L2 pitch and yaw output matrices to reduce angle to length coupling relative to our beam position.
- Calibration [40 - 70 Hz]. We think that DARM is slightly overestimated (~ 10 -20%) around the loop UGF since we did not account for delay and phase drope due to high frequency violin notches in the OAF calibration block. Our calibration overestimated phase difference between control and error signals by 15° at 60Hz. We have added AI, AA and delay blocks to OAF (alog 16421).
- ESD charge. Noise in the frequency range 40-100Hz is still not clear. ESD discharging might help (alog 16440)
- OMC tuning. We are currently running with 1 whitening stage for OMC trans PDs. Since violin and bounce/roll modes have been low enough lately we can engage second whitening stage and reduce dark noise by ~ 10 in the frequency range 10-60Hz and factor of ~ 2 at 100Hz. We might also run at ~ 20 pm DARM offset to increase OMC current. At 15pm we have 28mAmps when input power is 20W. Today I have also noticed that we can increase OMC power by 1% by moving SR2 in pitch by ~ 30 urad in single bounce configuration. OMC alignment was held using OMs. We also plan to estimate output jitter coupling to DARM.
- Scattering [100Hz]. We can see scattering noise coupling to DARM from HAM6 (alog 16255). We try to investigate how can we damp scattered light inside the chamber.

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16444>

Noise budgetを行った。
DARMにおいては右図のようなノイズスペクトルの同定ができた。
ただ、全てのスペクトルの測定はフォローできておりません。。



Pcal channels and summary

In the a-log [entry](#), it was noted that a few glitches (~per week) were seen in the Pcal laser. Rick and Valera suggested that reducing the requested laser power might reduce these glitches. After reducing the requested power, the system has been running without any glitches for the past couple of weeks (Today there were some problems with Pcal laser which we are still investigating). We looked at the stability of Pcal line (only one line was running at 533.3 Hz) during these two weeks by looking at the read back channel used for pcal line calibration. A plot showing the variation of the amplitude of the line is attached here with. In the plot, we see trends (inversely) following temperature of the transmitter module (where the readback PD is housed) with variation of ~1.5%. In the worst case scenario, this would correspond to systematic error of readback PD and need to be added to existing error of the calibration line coming from other factors such as error in end test mass, angle of incidence, absolute power calibration etc. Those other factors contribute ~1% error. We have also attached another plot comparing the spectrum of read back channel with and without 533.3 Hz line (dark noise). We see the noise levels are very similar and higher harmonics of cal lines are suppressed by ~3 orders of magnitude (there will be an additional suppression of $1/f^2$ when this translates into DARM). Two cal lines were running during part of ER6 and during that period pcal line calibration and OAF calibration agreed within ~15% (@33.7 Hz ~3%, @533.3 ~15%; plot attached).

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16313>

前回の報告でも話題になったPcal glitchがpowerを
suggestされた通り減らしてみたら、glitchが抑えられる
ようになった。

gabriele.vajente@LIGO.ORG - posted 11:29, Wednesday 21 January 2015 (16472)

High frequency noise in 60 Mpc lock

As a comment to [Den's entry on DARM noise budget](#), I'd like to add something on the high frequency noise, which deviates significantly from the expected shot noise.

Looking at the [brute force coherence](#) that I ran some time ago, I can see that there is some coherence with PMC and ISS signals at frequencies above a couple of kHz, especially in correspondance of the first bump in the sensitivity at about 2 kHz.

It is then likely that the origin of the noise can be traced to the PMC. This is hopefully also solved by the PMC swap.

Non-image files attached to this report

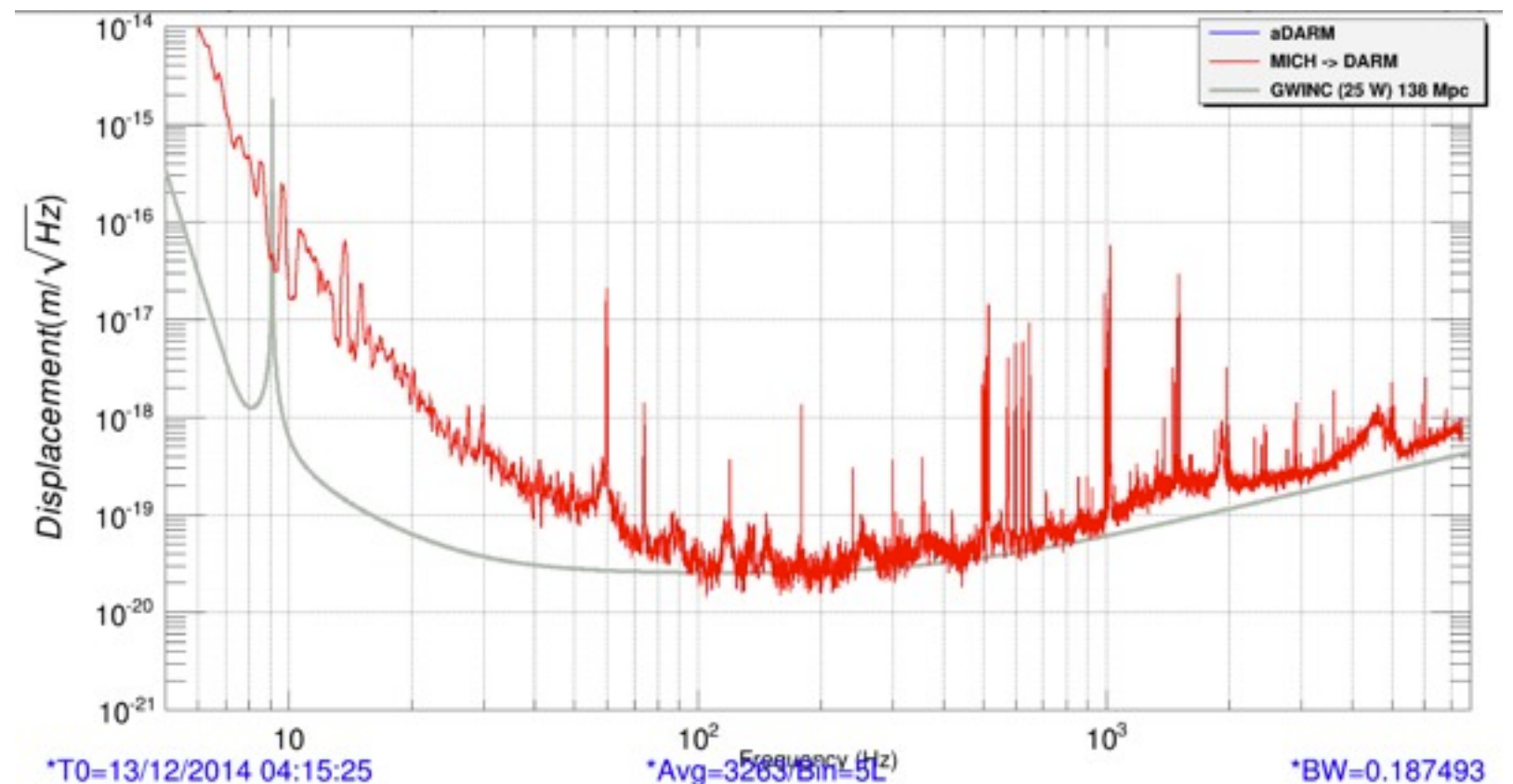
[PSL-ISS_PDA_REL_OUT_DQ.pdf](#)

[PSL-PMC_MIXER_OUT_DQ.pdf](#)

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16472>

60Mpc lockのさいのhigh frequency noiseについて調べてみたら
PMC(Pre Mode Cleaner)と
ISS(Intensity Stabilization Servo)にcoherencyが見られた。これは特に2kHzの
bumpに見られる。

60MHzを達成したときの
スペクトル
aLOG16087



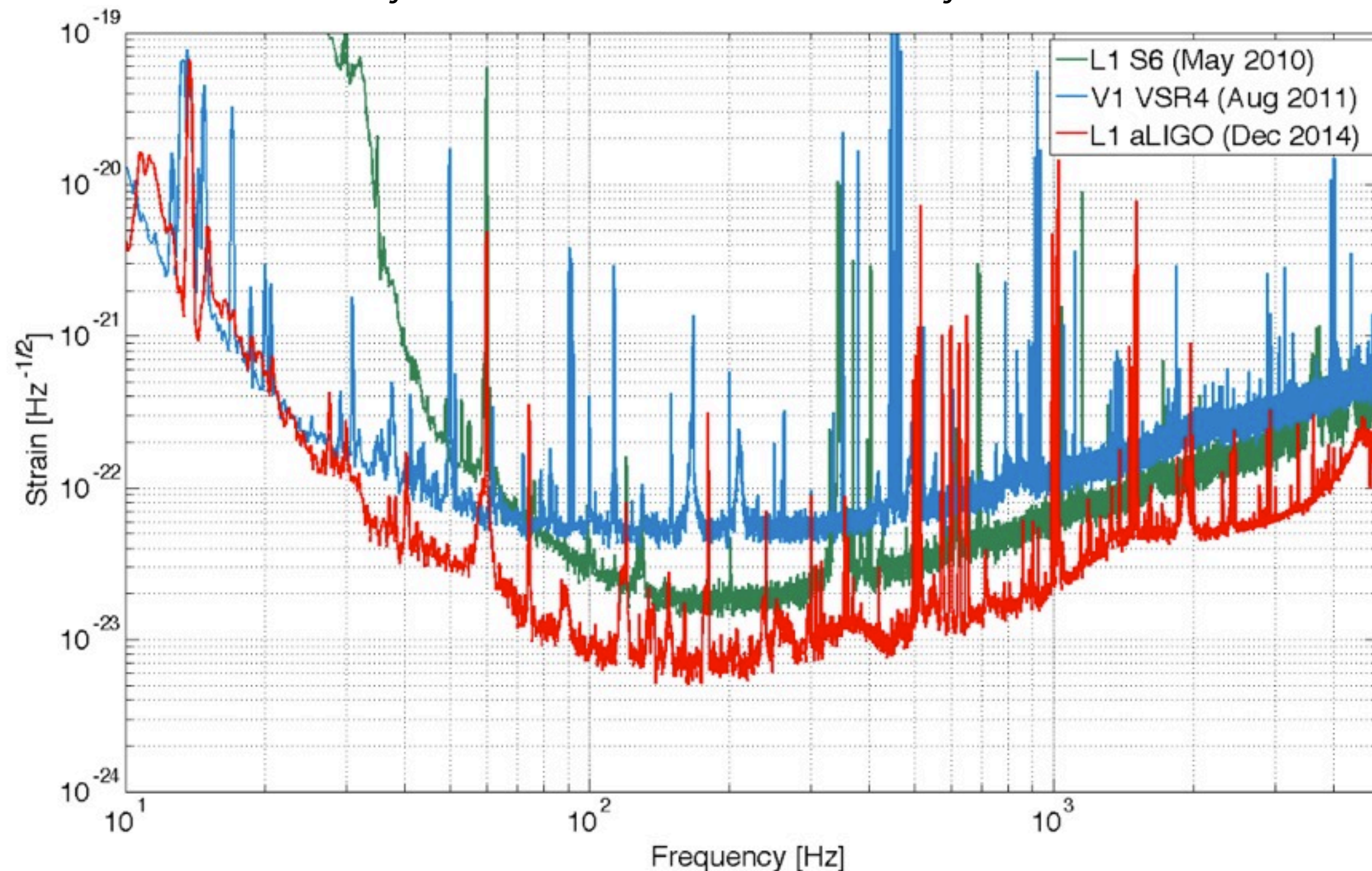
Sensitivities

Here is a comparison of the L1 sensitivity from December 13th, with the best sensitivities of detectors from the first generation era.

L1 has achieved the best sensitivity so far of any interferometer at (almost) all frequencies from 10 Hz and up.

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16473>

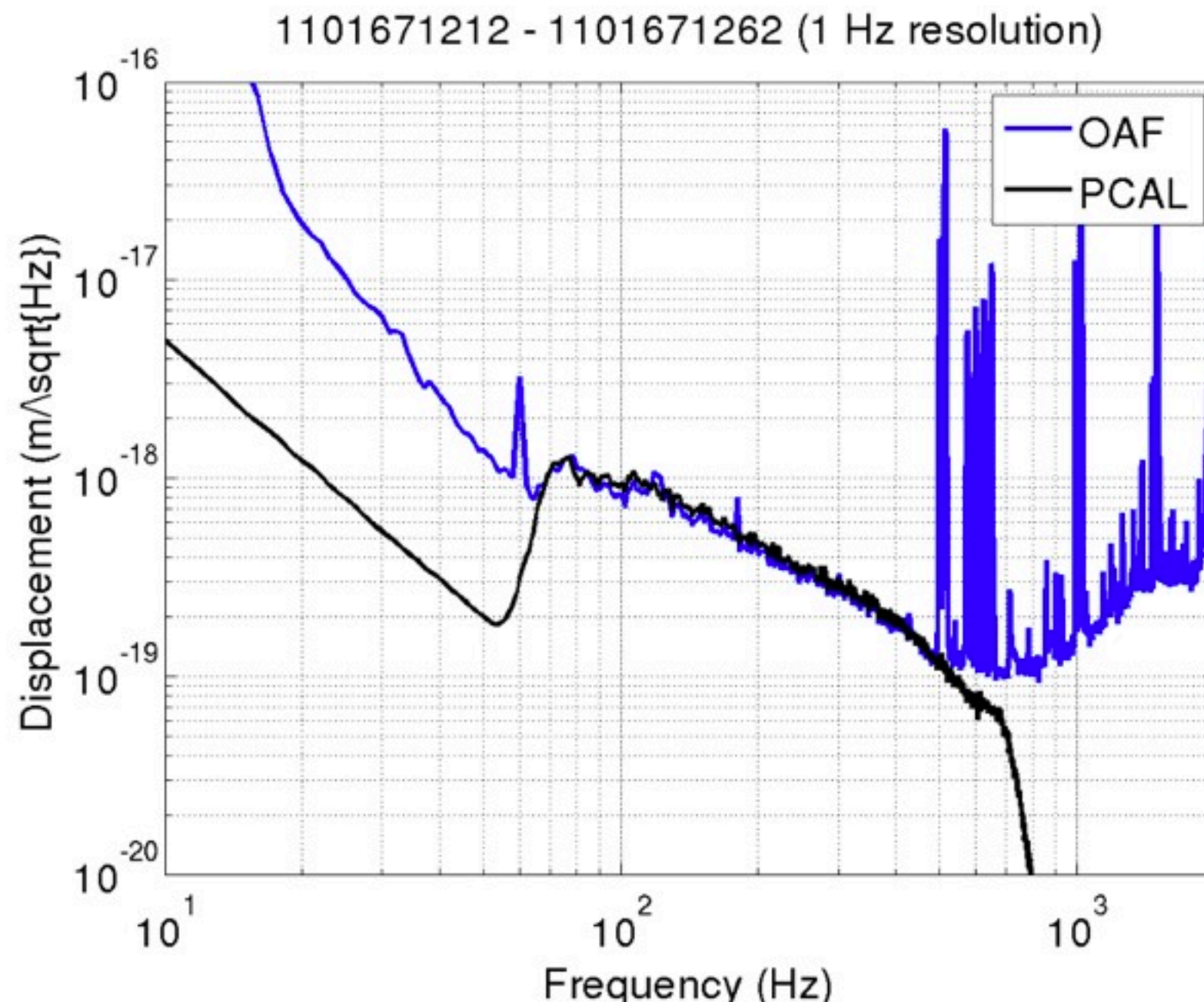
Dec 13thのsensitivity curveを比較。best sensitivityを達成している。



Here is a plot showing OAF-CAL and PCAL-CAL comparison during December 3rd (a little late to the a-log) with a broadband injection (70 - 500 Hz) using Pcal. The DARM actuation was on L3 (ESD). We see the two calibrations agree within 15% in most of the band. We (Den and I) were trying to do transfer function measurement between Pcal and DARM and this is a byproduct of that measurement.

<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16500>

Dec3rdのbroadband pcal(70Hz-500Hz)injectionしたときの
PCal-CALとOAF-CAL(online adaptive filtering)を比較し15%の精度で一致。
PcalとDARMのtransfer function測定をtry



andrew.lundgren@LIGO.ORG - posted 12:06, Tuesday 27 January 2015 (16549)

Glitches coincident with front end IPC errors

During ER6, it was noticed that a disproportionate number of short glitches happened very near the integer GPS second `alog`. I think we have a possible culprit. Almost all of these glitches have an inter-process communication (IPC) error reported by the front end, far more than can be expected from random chance.

Keith Thorne pointed me to two channels, `FEC-88_IPC_LSC_ETMX_DARM_ERR_ET` and `FEC-98_IPC_LSC_ETMY_DARM_ERR_ET`. They report the GPS time of the last IPC error. From the names, I think they are the communication from LSC DARM_ERR to the ETMs. I made a list of these errors for long locks on Dec 11 and 12, and a list of some of the short glitches over the same segments.

There are errors about every 15 seconds in the communication with ETMX, and every 5 seconds with ETMY. Attached are plots of the glitches by SNR and the decimal part of their end time. The ones marked in red have an IPC error reported in ETMX. It is evident that there is a large excess just after the GPS second, and that IPC errors are the likely cause. There also seems to be evidence from Dec 11 that IPC errors may also cause glitches not on the second boundary.

Note: The IPC error is always reported as one second after the GPS time of the glitch. The glitch at 1102354117.01 has an IPC error reported at 1102354118. I don't know why.

There's reliably an error reported in ETMX. There's less evidence that ETMY plays a role, but that can be investigated further. These glitches seem to not be present in the most recent lock on January 10th, but I might have used too stringent a criterion to find them. I'll look into it further.

Images attached to this report

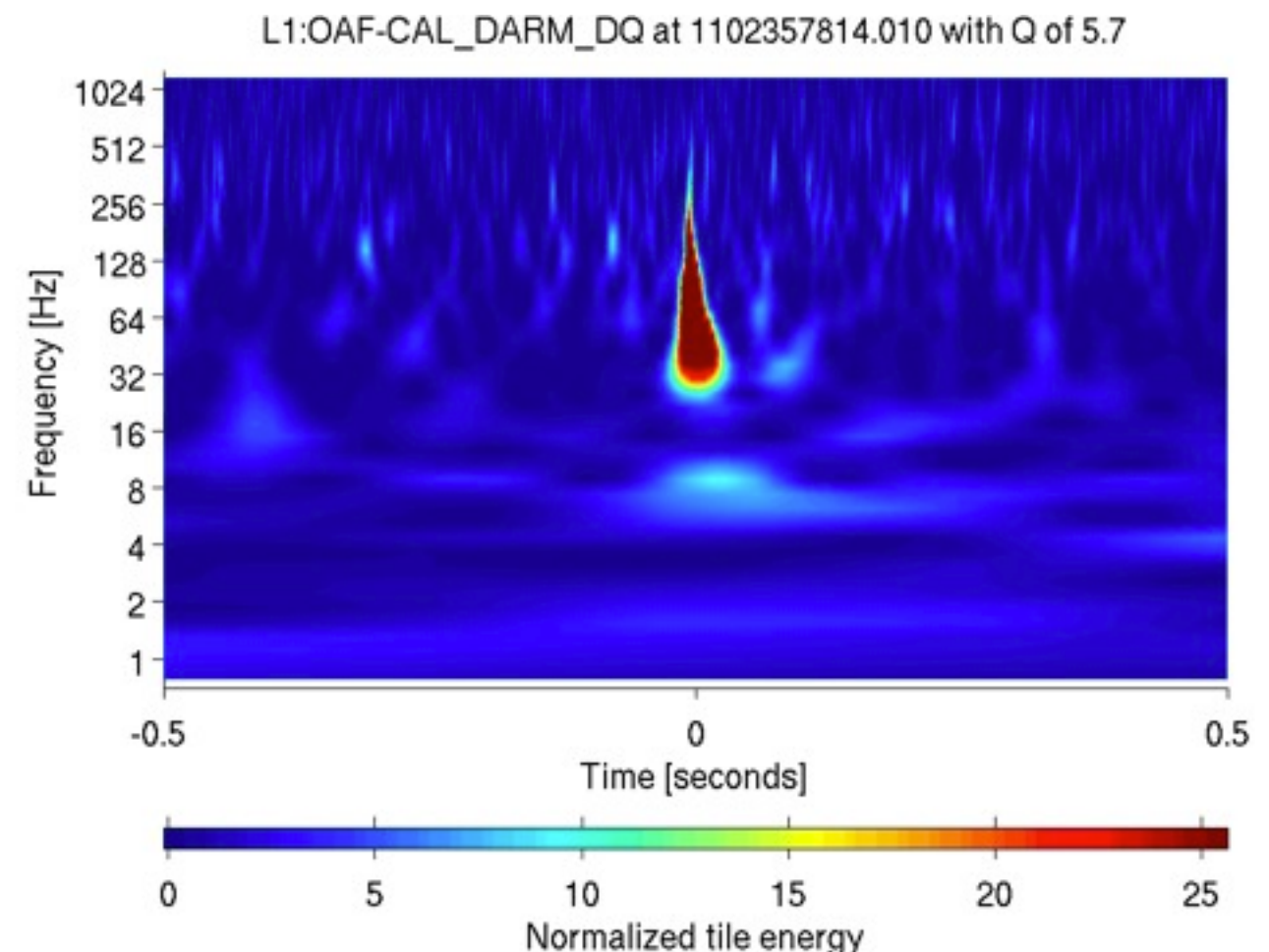


<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16549>

Dec11(16052)にて報告した
disproportionate number of short
glitches

2つのchannelがlistupされた。

`FEC-88_IPC_LSC_ETMX_DARM_ERR_ET` and
`FEC-98_IPC_LSC_ETMY_DARM_ERR_ET`



denis.martynov@LIGO.ORG - posted 15:47, Thursday 29 January 2015 (16589)

24.4W lock, 60Hz sidebands

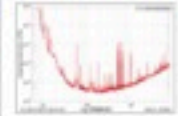
Valera, Anamaria, Nic, Ryan, Den

Last night after day time PSL work (alog 16571) we have tuned EOM alignment and reduced 9MHz and 45MHz RF AM down to the level of 10^{-4} by looking at the REFL RF PD. Being on the PSL we could also hear noise from PSL electronics rack stations outside. We have put acoustic isolation blocks near the hole with wires going from the rack to PSL.

We have locked interferometer at the input PSL power of 24.4W, ifo input power was 22.5W, PRC power was 830W. We were in this state for ~2 hours and bns range we could get was 59-63Mpc. We think that 60Hz sidebands got smaller compared to last night.

Our power up scripts adjusts common gain of the CM servo and at 24.4W lock gain was reduced down to -24dB. We think that we start to see CM input electronics noise. We have offloaded the gain to fast and slow paths. Common gain became -10dB and fast gain -14dB. Gain offload has slightly improved noise in the frequency range 10-50Hz. When we increased common gain up to 0dB, DARM noise increased probably due to saturations. We plan to repeat frequency noise projection again and see how can we redistribute the gains or we might reduce 9MHz modulation index.

Images attached to this report



<https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16589>

先週は、power upしたLaserとSUSに関するテクニカルなレポートがあったが、全てフォローはできず。そしてlockしたところ以下のスペクトルと最初の2時間で59-63MPcを達成。

60Hz sidebandが昨夜に比べて小さくなっているのを確認。

