

Virgo ENV October Commissioning (preliminary)

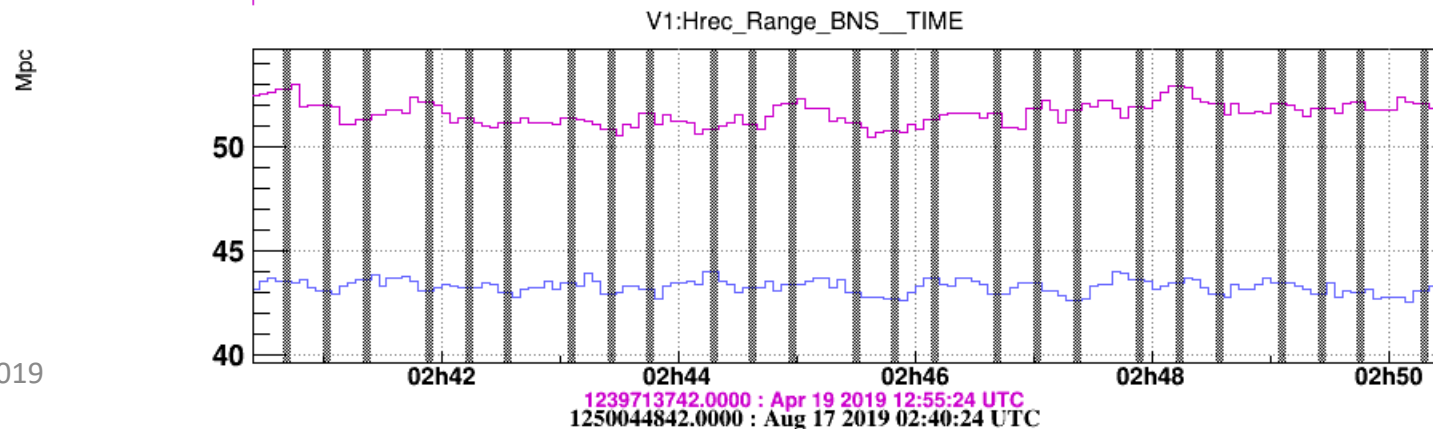
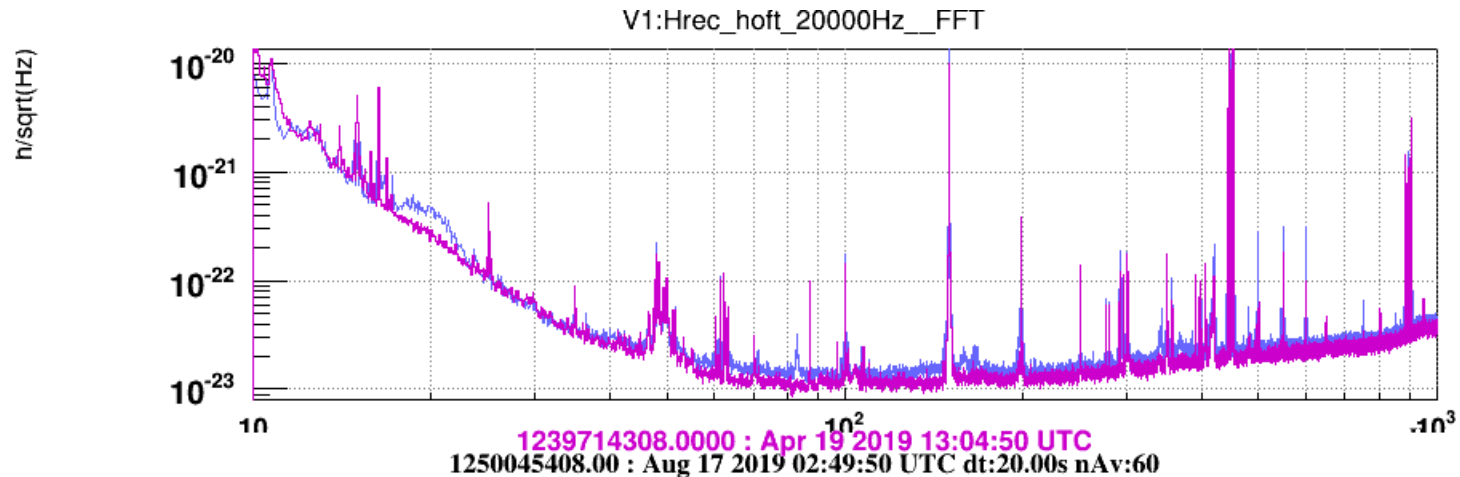
KAGRA PEM meeting

August 20, 2019

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ITF status / sensitivity

- 8 Mpc to recover: now ≈ 44 Mpc, in April we reached 52 Mpc
- Noise coupling very sensitive to ITF working point: global alignment, dark port offset, INJ alignment, SQZ alignment

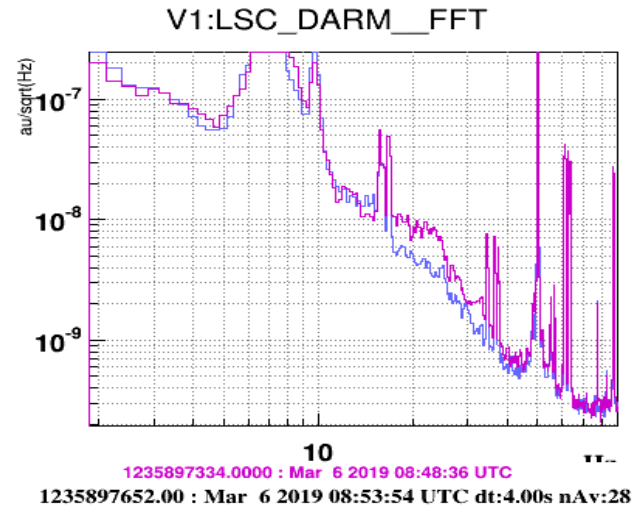


Issues related to ENV

- Scattered light
 - Low frequency noise/peaks
 - Couplings @Injection lab
 - Couplings @Detection lab / SQZ
- Noise at 50Hz and harmonics
 - Switching loads?
 - Coupling path? Ground Vdiff?
- FAST unlocks
 - Related to HVAC or other ENV sources?
- PEM injections
 - Missing NEB acoustic & magnetic, RF injections

Scattered light

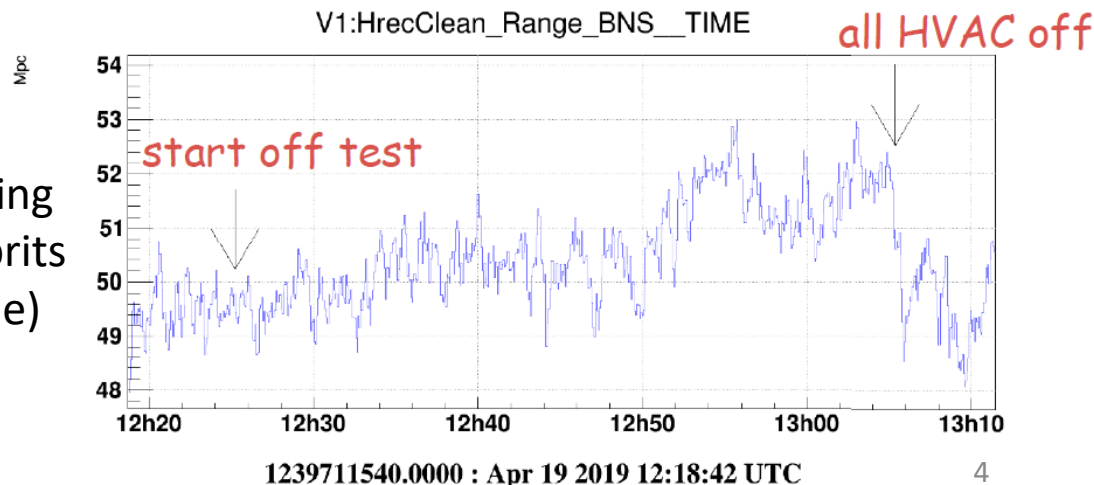
- We have evidence of scattered light on the external injection bench (HVAC laser lab switch off test)
 - ✓ Ongoing this week: bench shaking and acoustic injections



- Evidence of scattered light noise in other places in Central area and particularly in Detection lab (all HVAC sequential switch off except laser lab):

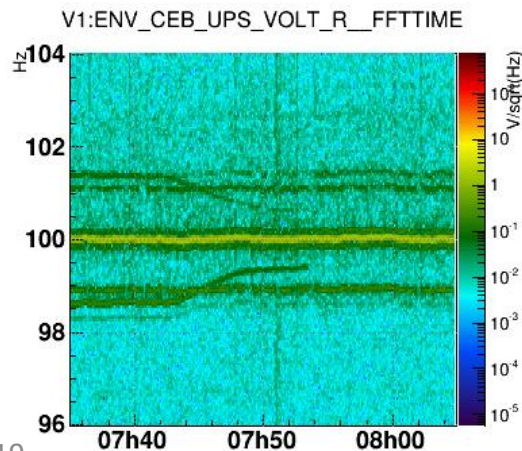
TO DO:

- ✓ Repeat switch off
- ✓ Acoustic injections to quantify coupling
- ✓ Shaking or tapping of suspected culprits (SQZ bench, CryoTrap, EDB, for example) to identify

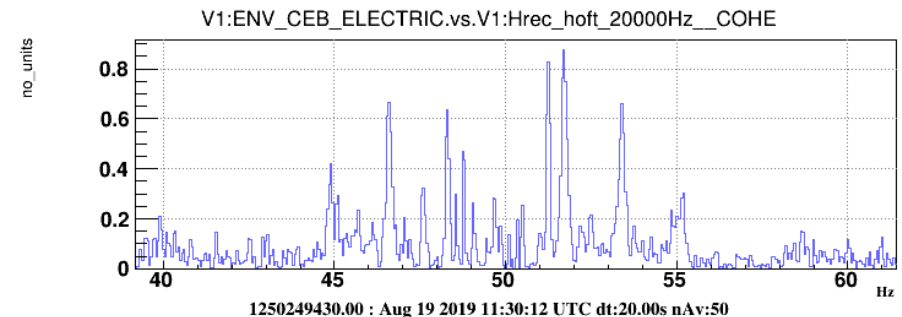
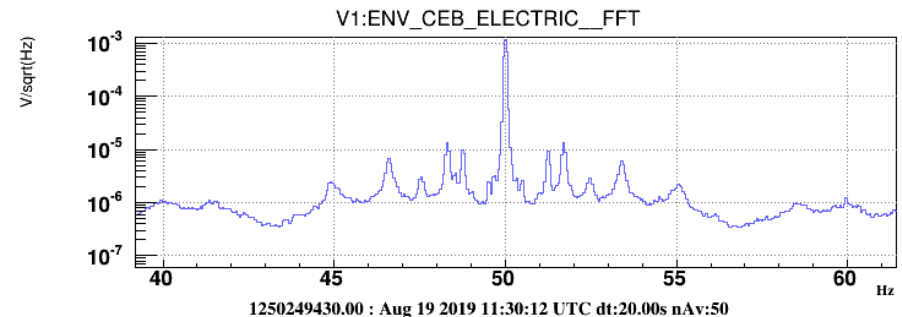
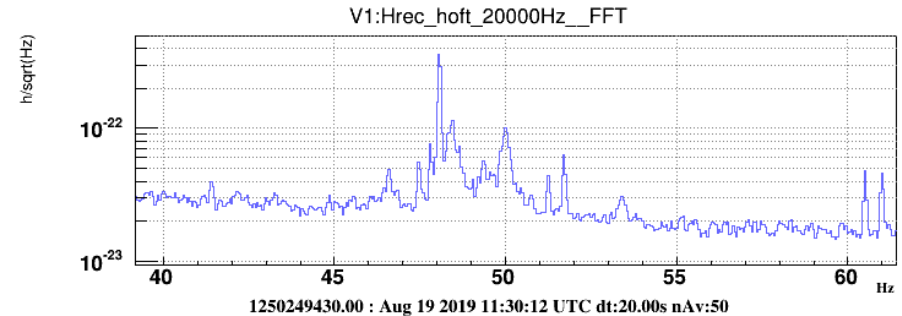


Noise at 50Hz and harmonics

- To DO:
 - ✓ Investigate coupling path. Largest coherence with probe measuring Vdiff noise between ground of SAT electronics and vacuum chambers
 - ✓ Investigate sources. Switching loads (like chillers) produce sidebands of mains. Switch off or move on different power line.



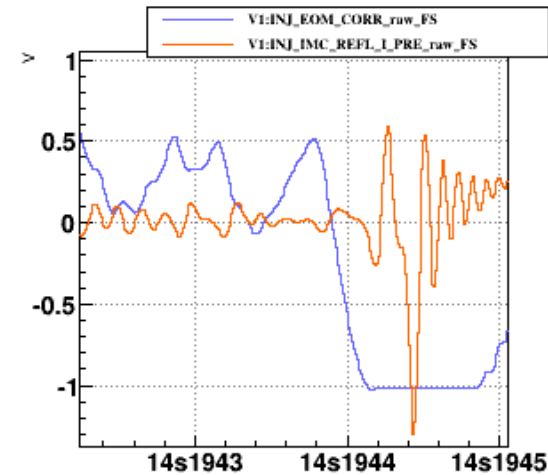
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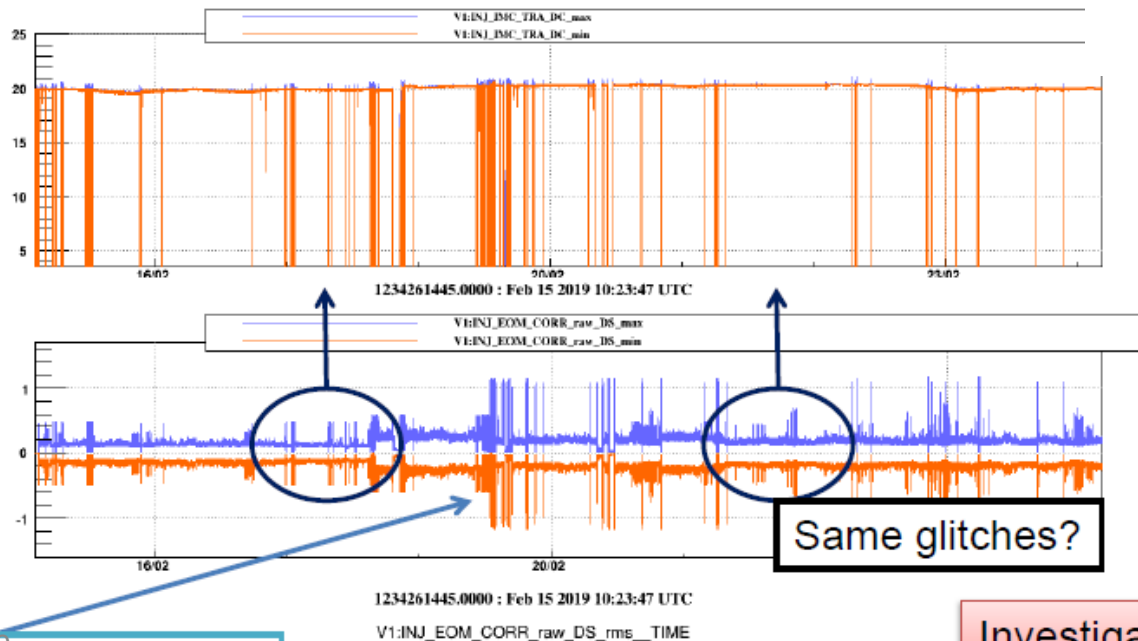
Fast unlocks

- Sudden IMC lock loss (timescale of 10^{-5} s).
- Something understood: glitches of UNKNOWN origin cause saturation of EOM loop. We mitigated (not removed) in March by increasing driver dynamic range.

[Link document VIR-0914A-19](#)



1239682832.1942 : Apr 19 2019 04:20:14 UTC



Still looking for the cause.

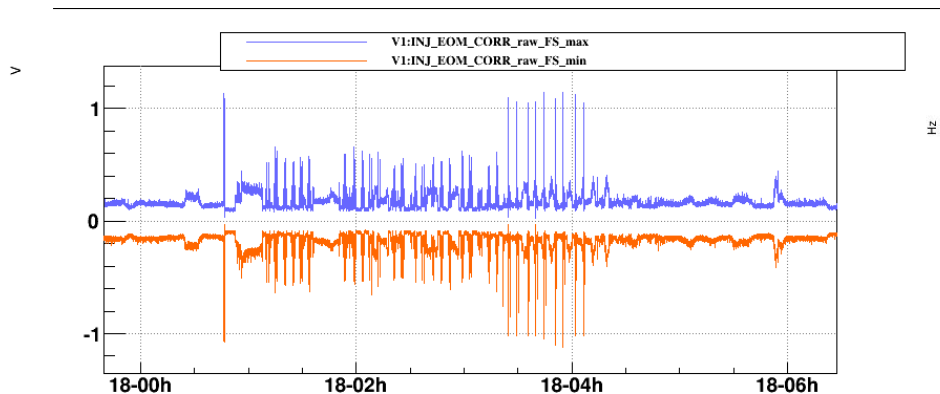
Same glitches?

Investigation ongoing

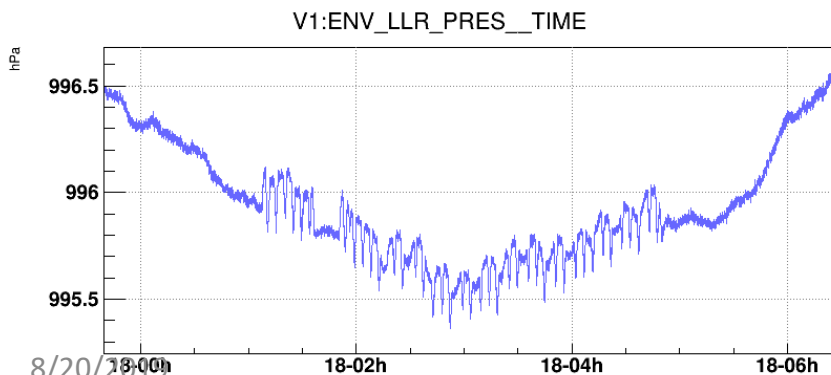
8/20/2019
Increased dynamic range

Fast unlocks

- Glitches in EOM seems to correlate with “crazy” behavior of HVAC system.
- Investigate: physical noise that triggers EOM glitch, origin of HVAC behavior

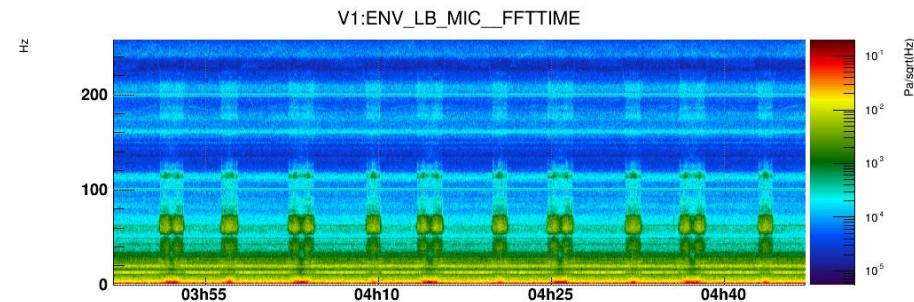


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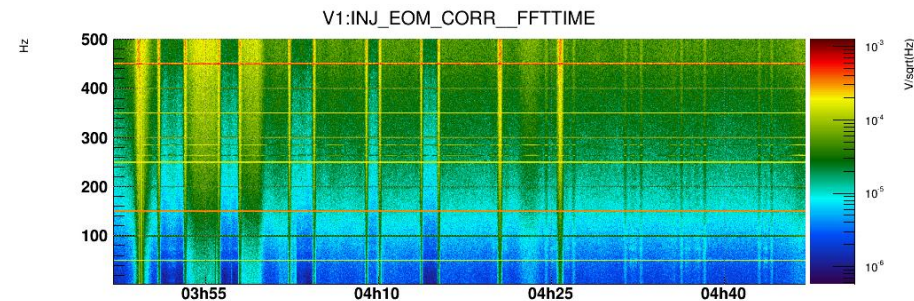


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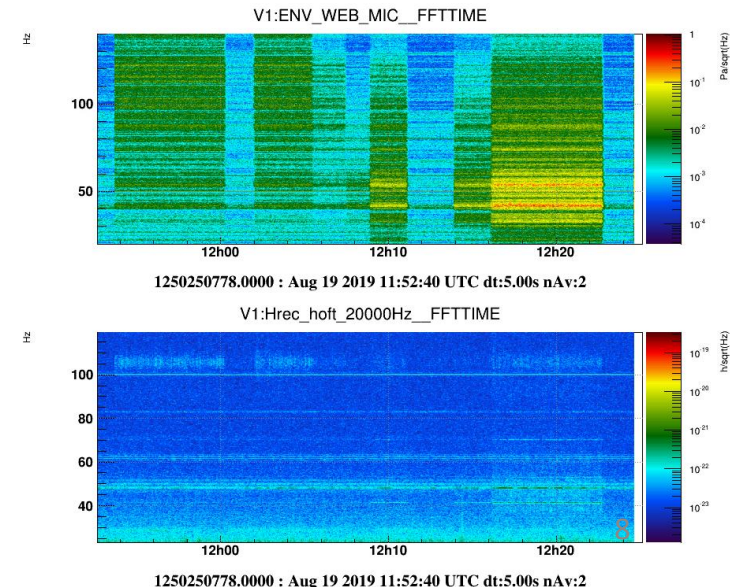
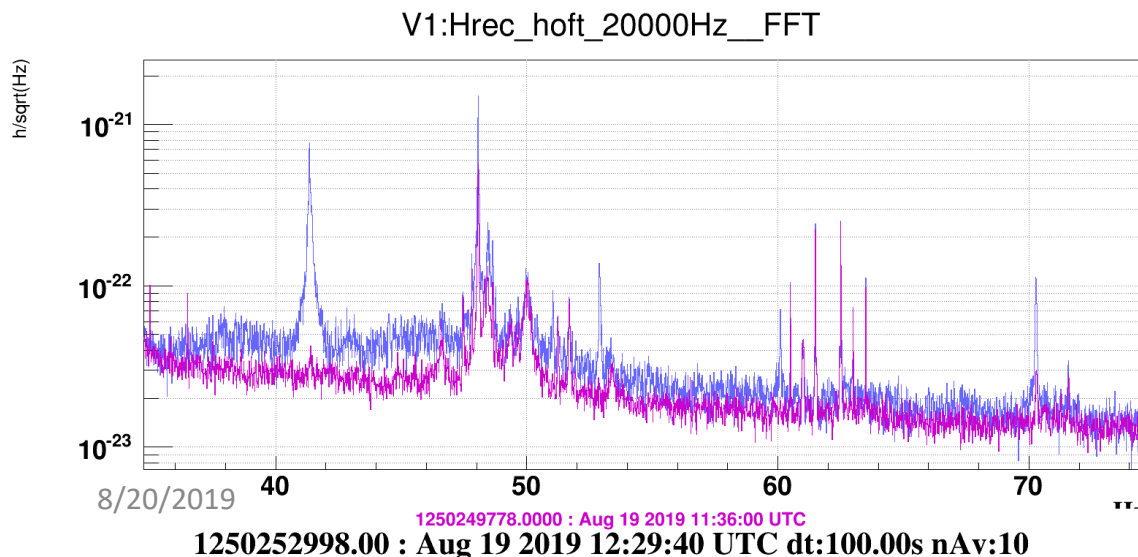
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PEM injections

- Some PEM injections still missing:
RF injections site-wide, acoustic
NEB
- Yesterday WEB acoustic injections
excited interesting structures.
Follow-up investigation to be
done.



Planning

- Commissioning 1 to 31 October
- Task list (requests from all subsystems) in Comm wiki: <https://wiki.virgo-gw.eu/Commissioning/CommissioningDuringO3>
- Planning details to be prepared with Commissioning Coordinator, in September.