Detectors and observations in O3

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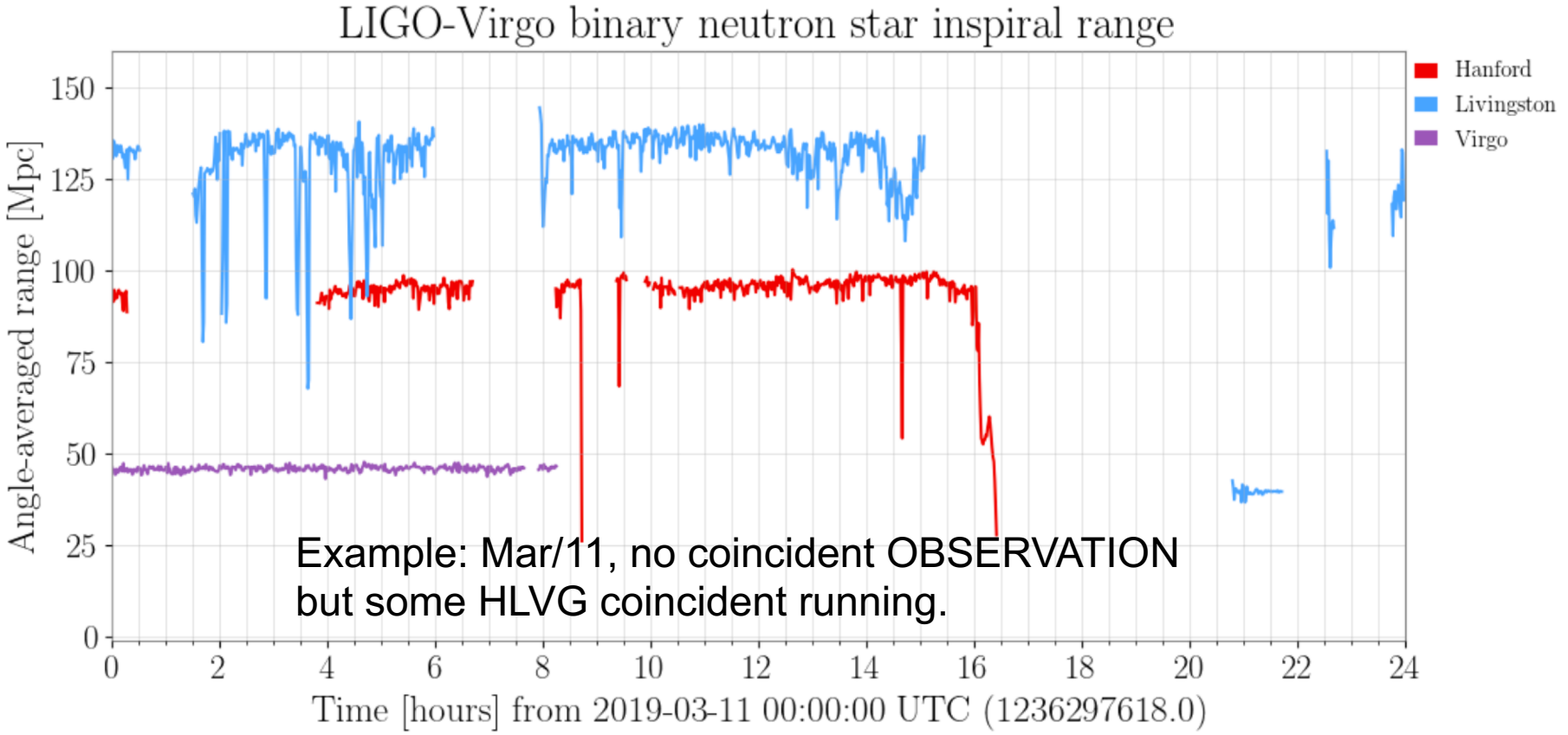
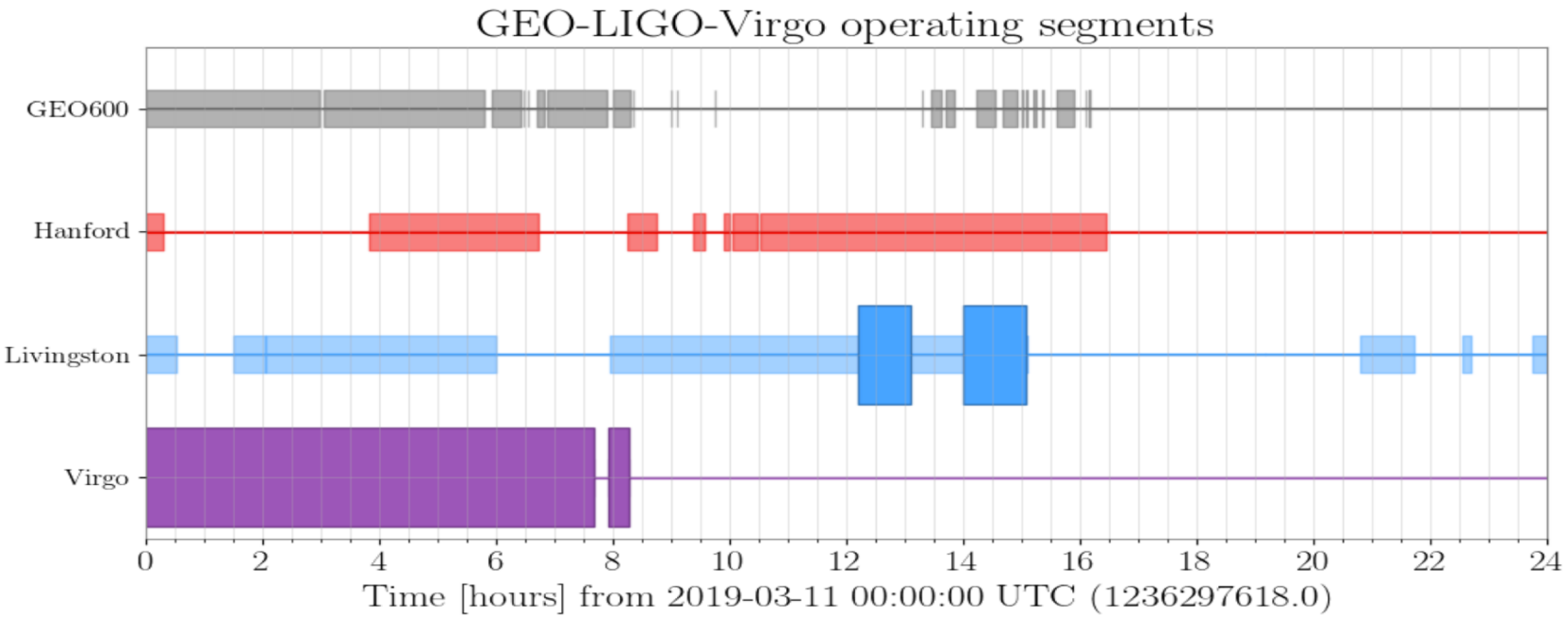
ER14 and Instrument Status

- First half of ER14 (Started Mon Mar. 4 2019)
  - Better sensitivity than O2 for all 3 instruments.
  - As planned, almost fully commissioning (no OBSERVING) for H1 but there are low noise segments.
  - Large periods of commissioning for Virgo.
  - No triple coincidence OBSERVING so far. But 3-IFO coincident running segments.
  - Minimal L-V coincidence so far.
  - Expect this to go up in the next couple of weeks.
  - Ironing out bugs as we go.


LIGO-Virgo binary neutron star inspiral range
Angle-averaged range [Mpc]
150
125
100
75
50
25
0
Hanford
Livingston
Virgo
Example: Mar/11, no coincident OBSERVATION
but some HLVG coincident running.
0
2
4
6
8
10
12
14
16
18
20
22
24
Time [hours] from 2019-03-11 00:00:00 UTC (1236297618.0)


GEO-LIGO-Virgo operating segments
GEO600
Hanford
Livingston
Virgo
0
2
4
6
8
10
12
14
16
18
20
22
24
Time [hours] from 2019-03-11 00:00:00 UTC (1236297618.0)

ER14 and Instrument Status

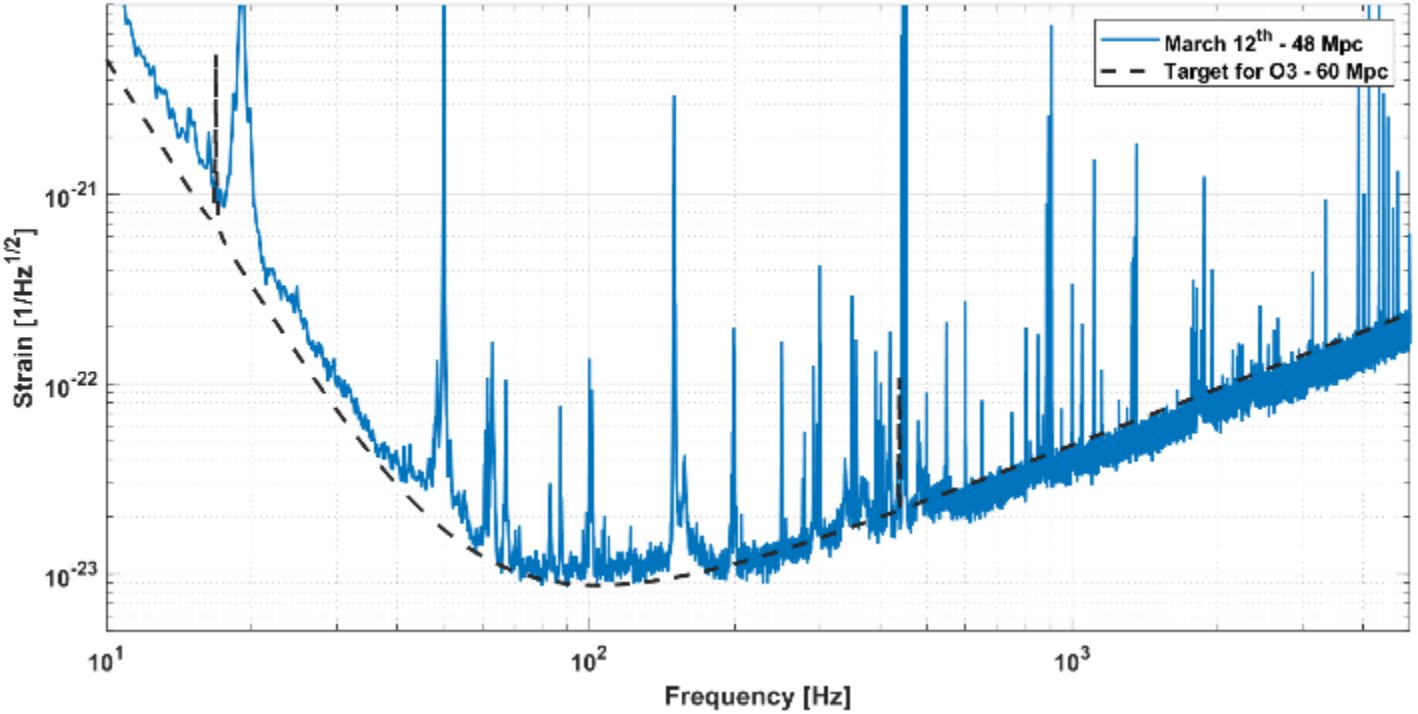
- Second half (Starting Mon Mar. 18 2019)
  - H1 will start going into OBSERVING whenever possible
  - Finalizing calibration for all instruments. Significant calibration time for H1.
  - Some work to be done for all IFOs, but will transition more and more toward 24/7 until O3.

O3

- Apr/01/2019, 15:00 UTC (Tentative, no change in the plan).
- Coordination between the sites for planned downtime to maximize triple coincidence.
- Planned downtime: maintenance and commissioning
  - L1 maintenance Tue. 14:00-18:00 (or 15:00-19:00) UTC.
  - H1 maintenance Tue. 15:00-19:00 (or 16:00-20:00) UTC.
  - V1 maintenance Tue. 07:00 – 11:00 UTC
- We WILL spend time on problems that need immediate attention, or if we think we can make significant improvement in short period.

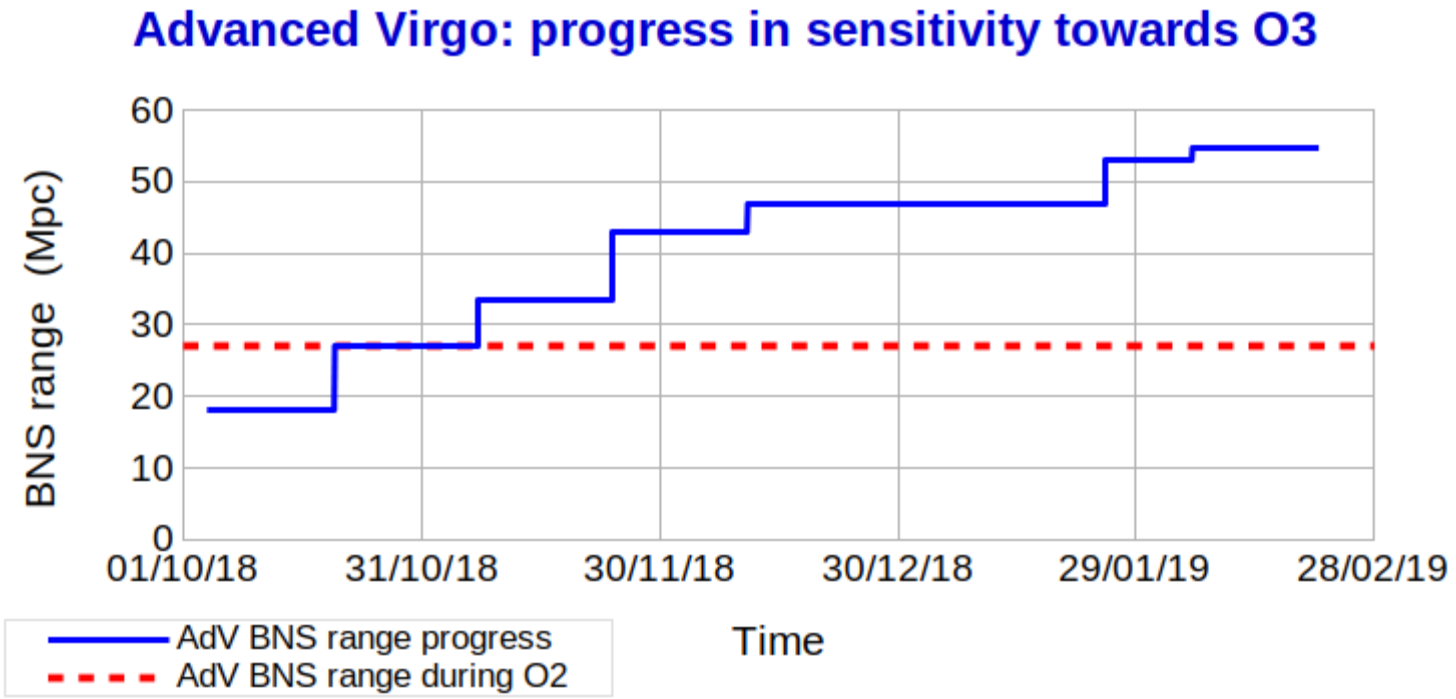
Current detector performance: V1

- Currently alternating commissioning and calibrations during daytime and observing mode in the nights;
- Good (>85%) duty cycle in science mode (“night time”)
- Same scheme will be kept in place in the next weeks, with commissioning activities fading away as O3 approaches;

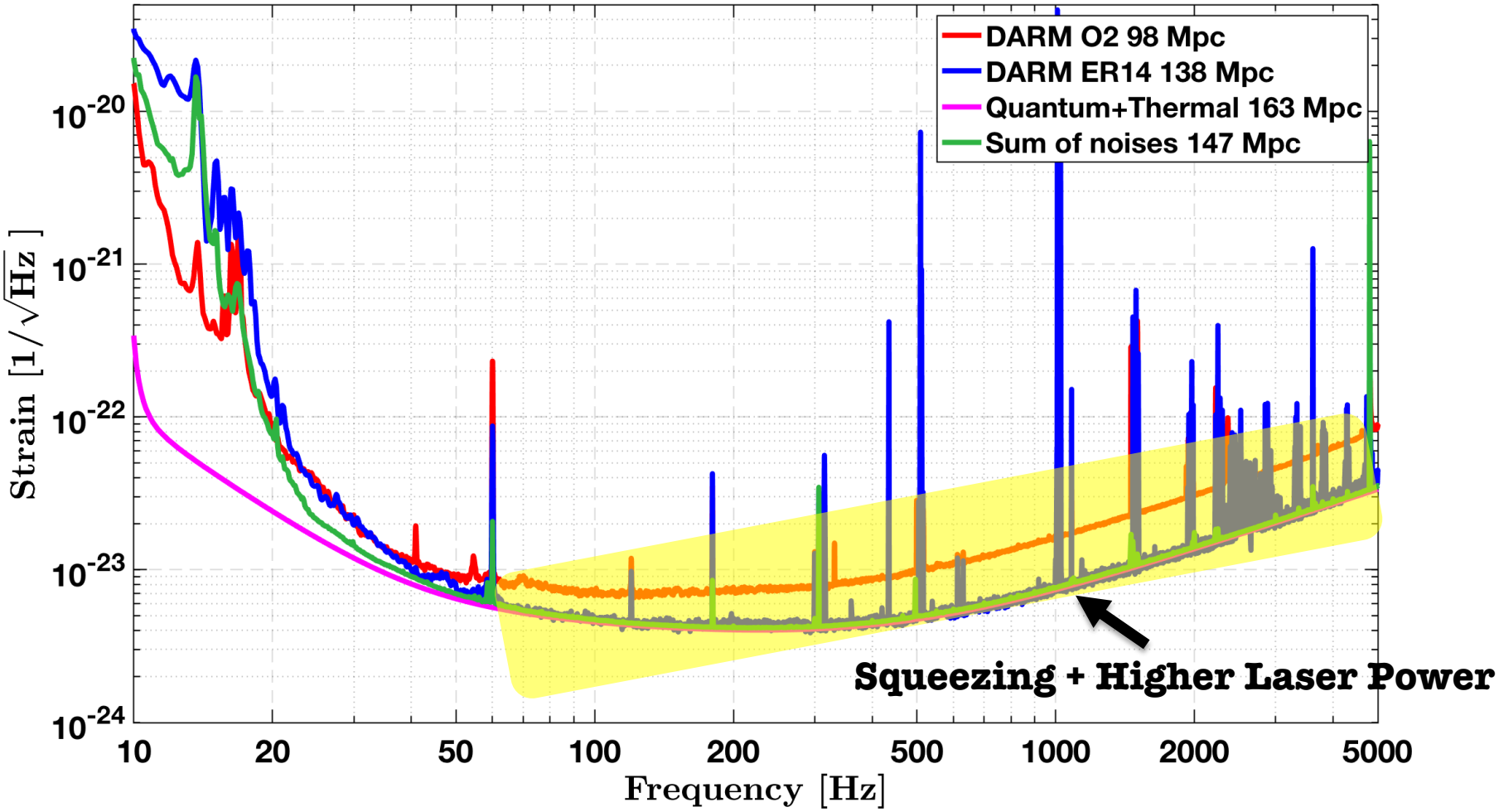


Current detector performance: V1

- Best range observed so far close to 55 Mpc for BNS, usually fluctuating between 45 Mpc and 50 Mpc → work in progress to stabilize the sensitivity;



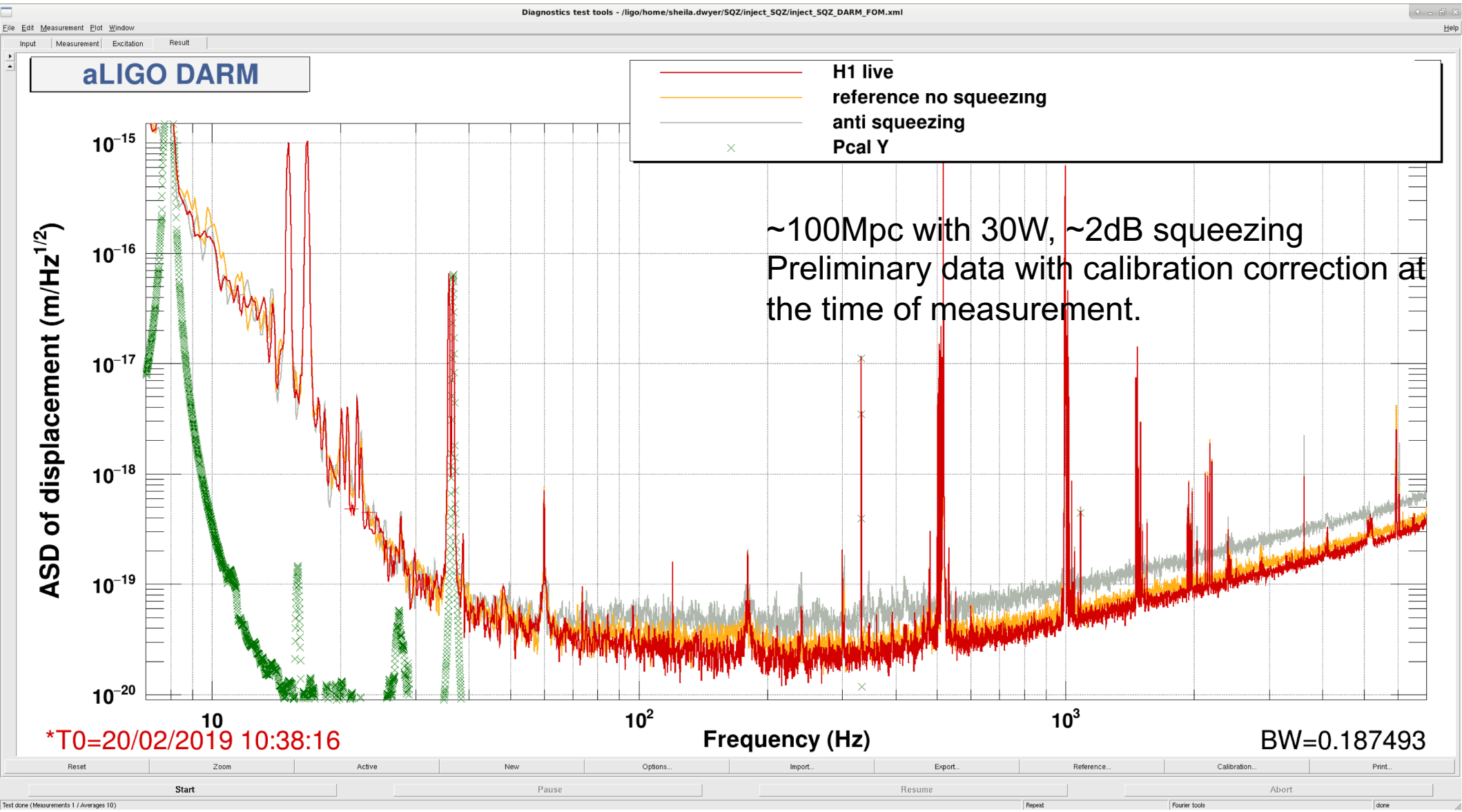
Current detector performance: L1



Current detector performance: L1

- Recent improvement in sensitivity from finding alignment on test mass that avoids point absorbers.
- Squeezing as high as 3.0 dB observed. Input power as high as 50W but plan to run with 40W during O3 for stability/robustness.
- ER14 –
  - Commissioning work continues
  - Tracking down noise sources.
  - Improving lock sequence and stability.
  - Calibration, Hardware injection tests etc.

Current detector performance: H1



Current detector performance: H1

- Benefit from avoiding high absorption spot on one of the mirrors.
- Benefit from squeezing.
- Operation reliable once it acquires lock (but acquisition is still slow).
- Later half of ER14
  - Calibration.
  - Environmental noise Injection.
- (Site closure days during ER14 due to snow.)

LIGO-VIRGO Joint Run Planning Committee

LIGO-G1801056

Working schedule for O3

(Public document G1801056-v4, based on G1800889-v7)