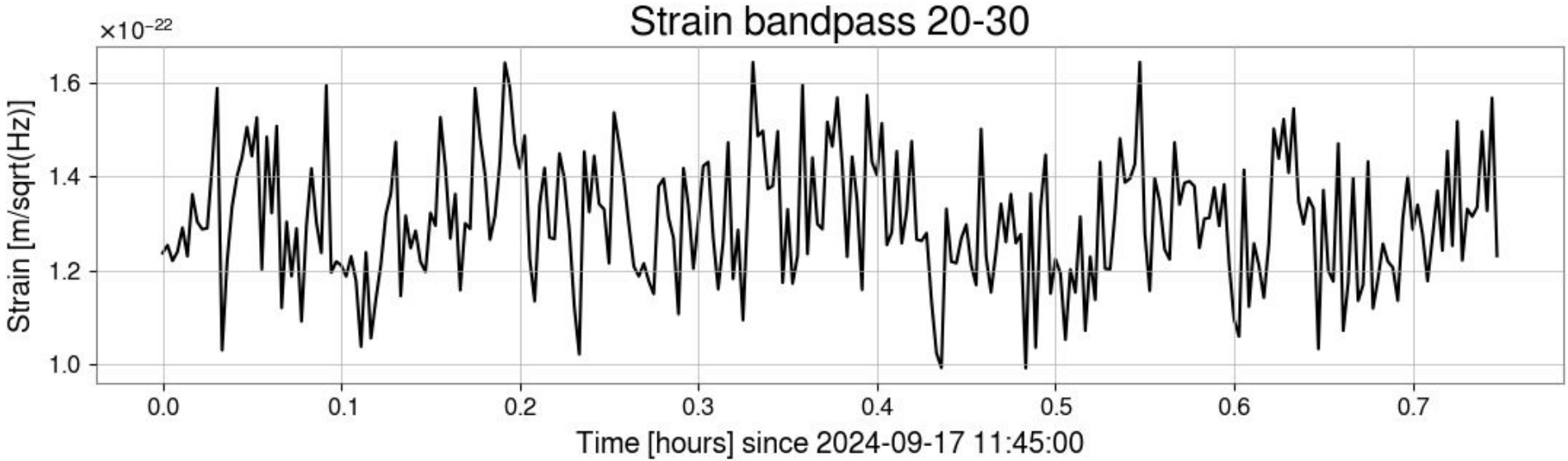
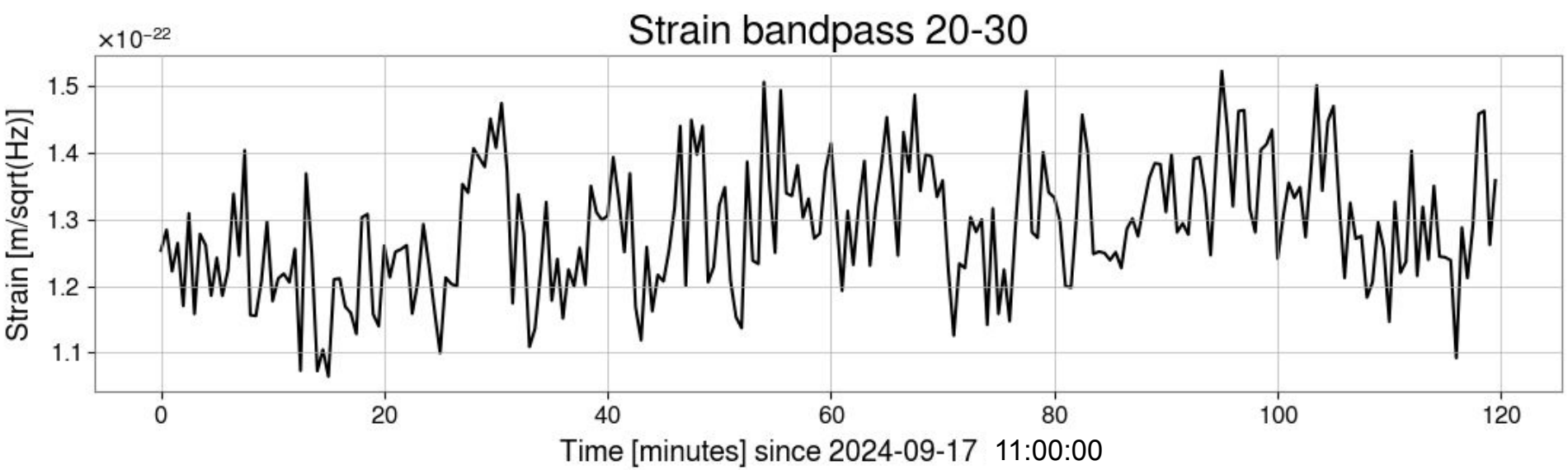
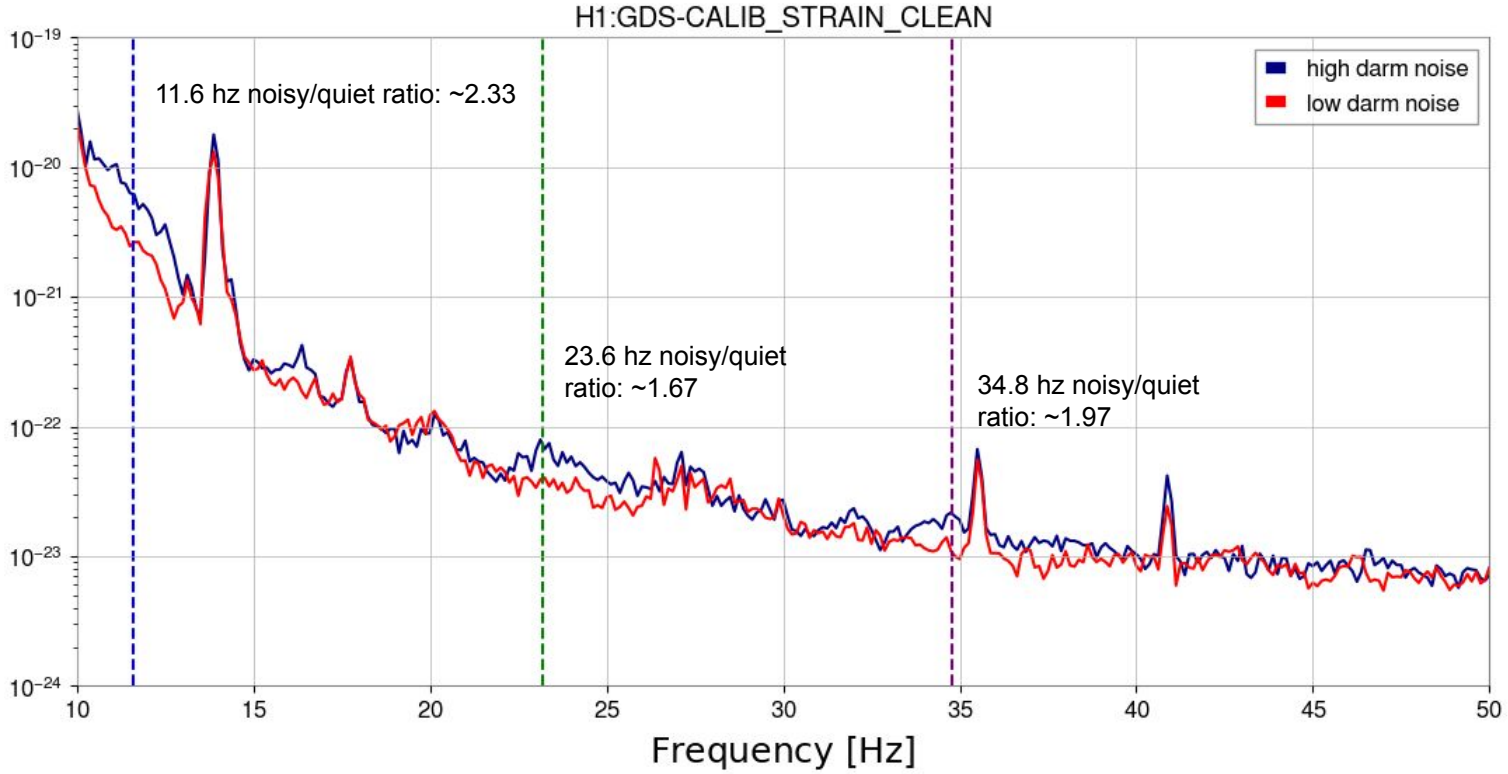
# BLRMS 20-30 Hz: 2024-09-17 11:45:00 - 12:30:00




- There is some slight structure, but not enough for lasso to be useful
- Can re-visit this, in the meantime I looked at spectra of aux channels




- Longer duration BLRMS around the noise: 11-13:00 UTC
- Still don’t see much structure




Noisy time: 9/17/24 11:47:06 - 11:49:06 UTC
Quiet reference: 9/17/24 11:43:06 - 11:45:06

# Methods

- Created spectra of the HPI, ISI, SUS, and PEM channels. Taken from the standard O4 H1 channel list here.
  - Did this for all stations
- Didn’t apply any sort of calibration to the spectra, just looking for channels in which the noise around 11.6 Hz was at least ~2 times higher. Also looking for excess noise in that 20-30 hz region.

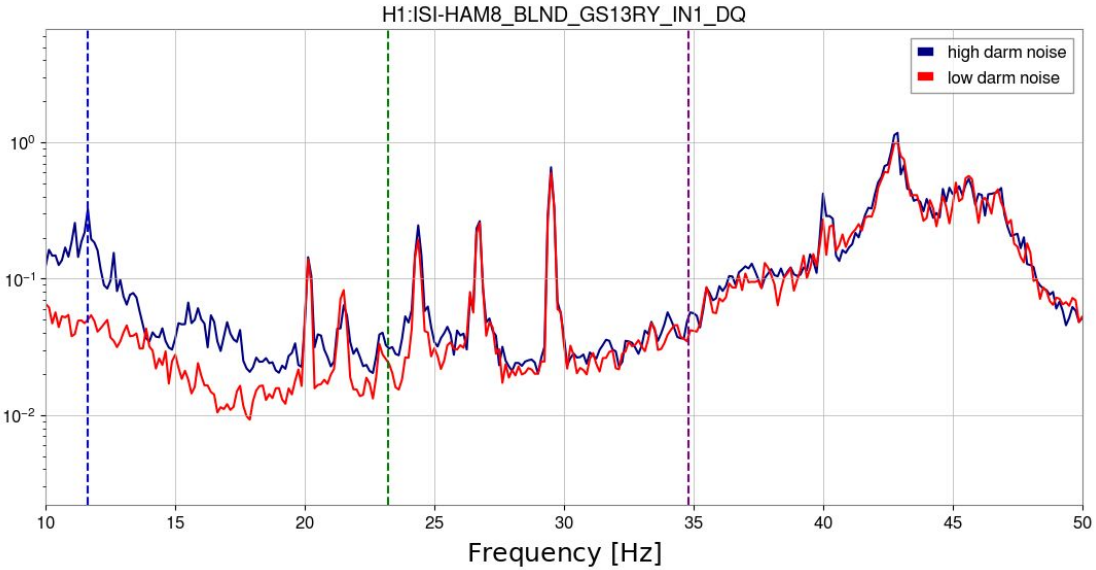
# Results

- I did not see really any excess noise at ~11.6 hz or in the 20-30 hz region in the end station channels I checked.
  - Leads me to think the scatter is localized to somewhere in the cornerstation
- Just based on visual inspection, I also didn’t really see much excess noise in the 20-30 hz region in the CS channels. However, many had excess noise around 11.6 Hz
  - Will show some example in the following slides

# Channels with most excess noise around 11.6 hz

| | Channel | Ratio_11Hz | Ratio_23Hz | Ratio_34Hz |
|---|---|---|---|---|
| 665 | H1:ISI-HAM8_BLND_GS13RY_IN1_DQ | 6.474112 | 1.292296 | 1.394393 |
| 1103 | H1:PEM-FCES_ACC_BEAMTUBE_FCTUBE_X_DQ | 6.242196 | 1.656254 | 1.207117 |
| 669 | H1:ISI-HAM8_BLND_GS13Z_IN1_DQ | 5.893836 | 1.531117 | 1.093385 |
| 1106 | H1:PEM-FCES_ACC_HAM8_FC2_Z_DQ | 5.712057 | 1.319284 | 1.199765 |
| 1157 | H1:PEM-CS_SEIS_LVEA_VERTEX_X_DQ | 5.378272 | 1.373703 | 1.058603 |
| 688 | H1:ISI-GND_STS_ITMY_X_DQ | 5.369525 | 1.286927 | 1.209872 |
| 279 | H1:HPI-HAM5_BLND_L4C_Y_IN1_DQ | 5.070258 | 1.400335 | 0.975230 |
| 1096 | H1:PEM-CS_ACC_HAM5_SRM_Y_DQ | 5.069910 | 1.192962 | 1.418585 |
| 254 | H1:HPI-HAM2_BLND_L4C_X_IN1_DQ | 4.996357 | 1.061076 | 0.790664 |
| 1120 | H1:PEM-CS_ACC_LVEAFLOOR_XCRY0_Z_DQ | 4.861310 | 1.156938 | 1.150538 |
| 662 | H1:ISI-HAM7_BLND_GS13Y_IN1_DQ | 4.810313 | 1.136248 | 1.161432 |
| 1104 | H1:PEM-FCES_ACC_HAM8_FC2_X_DQ | 4.777007 | 1.370807 | 1.017636 |
| 252 | H1:HPI-HAM2_BLND_L4C_RZ_IN1_DQ | 4.549880 | 1.337706 | 1.097451 |
| 667 | H1:ISI-HAM8_BLND_GS13X_IN1_DQ | 4.433407 | 2.138120 | 1.259528 |
| 247 | H1:HPI-HAM6_BLND_L4C_Y_IN1_DQ | 4.405449 | 1.401344 | 1.357913 |
| 245 | H1:HPI-HAM6_BLND_L4C_RZ_IN1_DQ | 4.378142 | 1.318982 | 1.538506 |
| 643 | H1:ISI-HAM3_BLND_GS13X_IN1_DQ | 4.333298 | 1.552208 | 0.850092 |
| 632 | H1:ISI-HAM6_BLND_GS13Y_IN1_DQ | 4.205495 | 1.603294 | 1.571991 |
| 303 | H1:HPI-ITMY_BLND_L4C_Y_IN1_DQ | 4.204516 | 1.223495 | 0.999047 |
| 6 | H1:SUS-ITMX_L3_OPLEV_YAW_OUT_DQ | 4.204078 | 1.241784 | 1.431668 |
| 1127 | H1:PEM-CS_ACC_PSL_TABLE1_Z_DQ | 4.202101 | 1.328286 | 1.074909 |
| 1117 | H1:PEM-CS_ACC_LVEAFLOOR_HAM1_X_DQ | 4.189512 | 0.947782 | 1.154235 |
| 689 | H1:ISI-GND_STS_ITMY_Y_DQ | 4.143875 | 1.824266 | 0.995726 |
| 1098 | H1:PEM-CS_ACC_HAM6_OMC_Y_DQ | 4.100703 | 1.249576 | 1.094870 |
| 241 | H1:HPI-HAM1_BLND_L4C_Z_IN1_DQ | 4.070488 | 0.913088 | 1.330833 |
| 1122 | H1:PEM-CS_ACC_OPLEV_ITMX_Y_DQ | 4.048522 | 1.725840 | 1.599001 |
| 1105 | H1:PEM-FCES_ACC_HAM8_FC2_Y_DQ | 4.040034 | 0.965278 | 1.219068 |

- I added a threshold of channels with excess noise at least 4 times greater than the quiet reference at 11.6 hz
  - There were a lot…
  - ISI HAM8 GS13RY was the noisiest around 11.6 hz

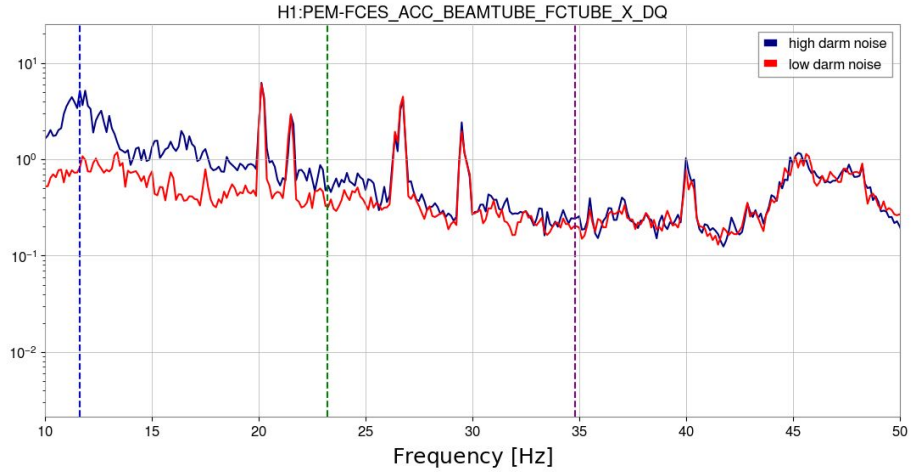


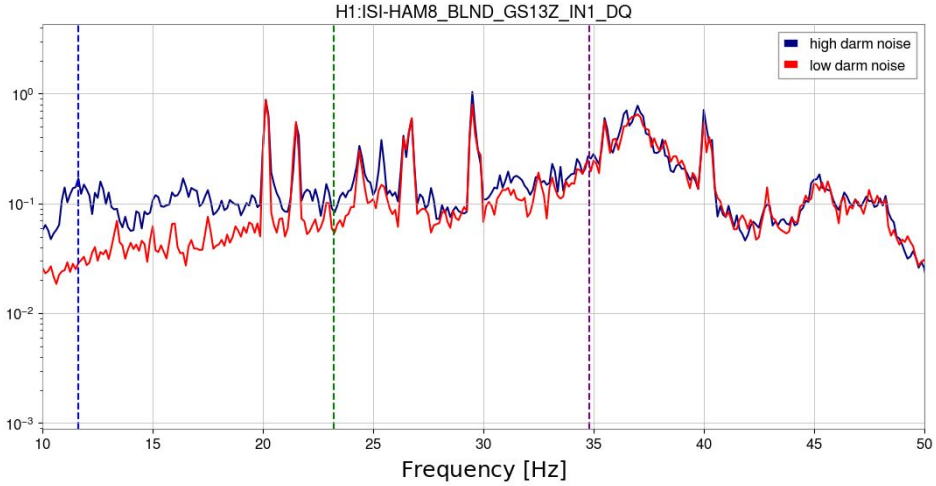
# Channels with excess noise around 11.6 hz & 23.2 hz

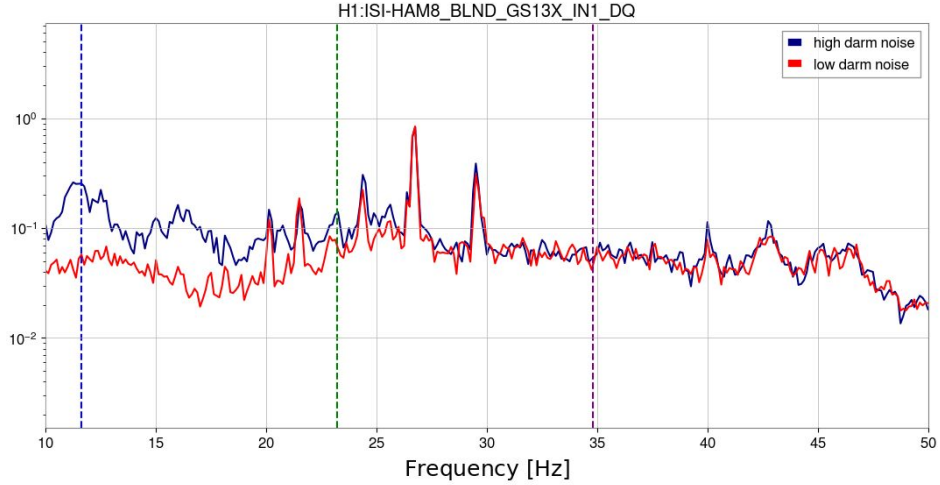
- Added two thresholds: channels w/ excess noise at least 4 times higher at 11.6 hz and 1.5 times higher at 23.2 hz

| | Channel | Ratio_11Hz | Ratio_23Hz | Ratio_34Hz |
|---|---|---|---|---|
| 1103 | H1:PEM-FCES_ACC_BEAMTUBE_FCTUBE_X_DQ | 6.242196 | 1.656254 | 1.207117 |
| 669 | H1:ISI-HAM8_BLND_GS13Z_IN1_DQ | 5.893836 | 1.531117 | 1.093385 |
| 667 | H1:ISI-HAM8_BLND_GS13X_IN1_DQ | 4.433407 | 2.138120 | 1.259528 |
| 643 | H1:ISI-HAM3_BLND_GS13X_IN1_DQ | 4.333298 | 1.552208 | 0.850092 |
| 632 | H1:ISI-HAM6_BLND_GS13Y_IN1_DQ | 4.205495 | 1.603294 | 1.571991 |
| 689 | H1:ISI-GND_STS_ITMY_Y_DQ | 4.143875 | 1.824266 | 0.995726 |
| 1122 | H1:PEM-CS_ACC_OPLEV_ITMX_Y_DQ | 4.048522 | 1.725840 | 1.599001 |

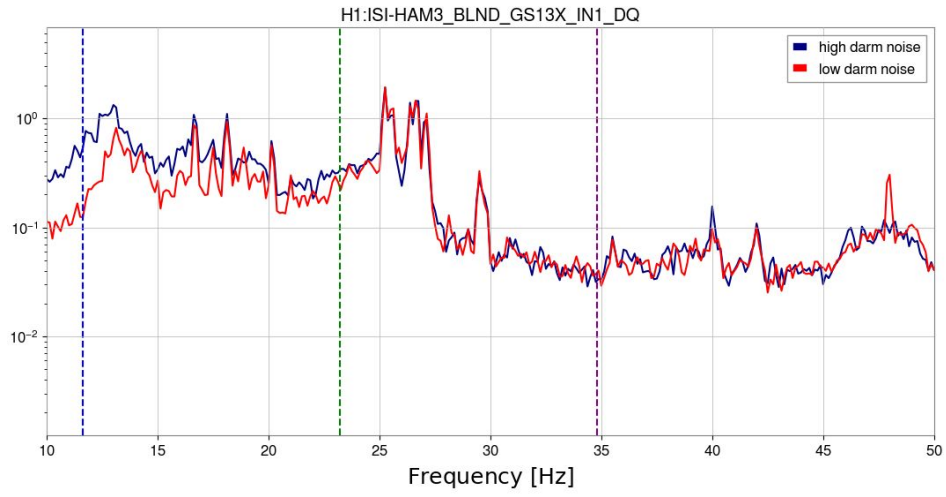
- Top 3 channels are near HAM 8
- Following slides show spectra of these channels

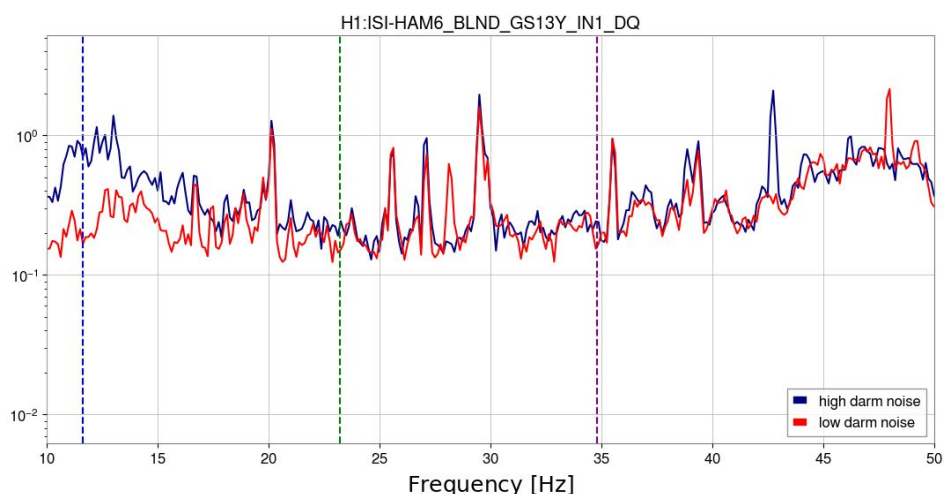


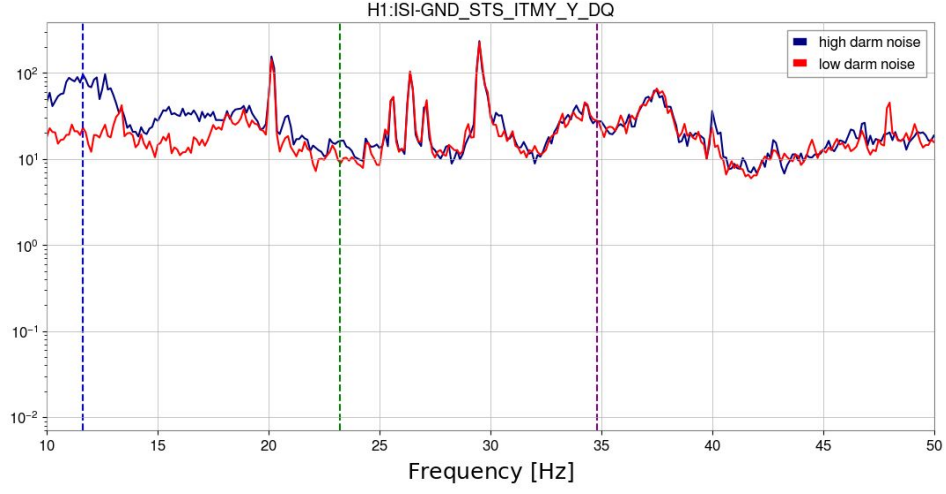



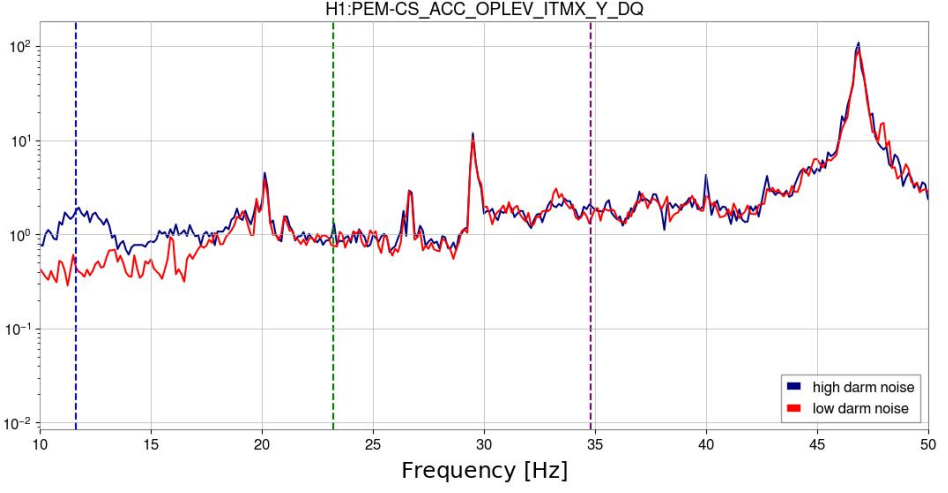




- Can see excess noise from 10 hz up to ~25 hz


H1:ISI-HAM3_BLND_GS13X_IN1_DQ
high darm noise
low darm noise
Frequency [Hz]

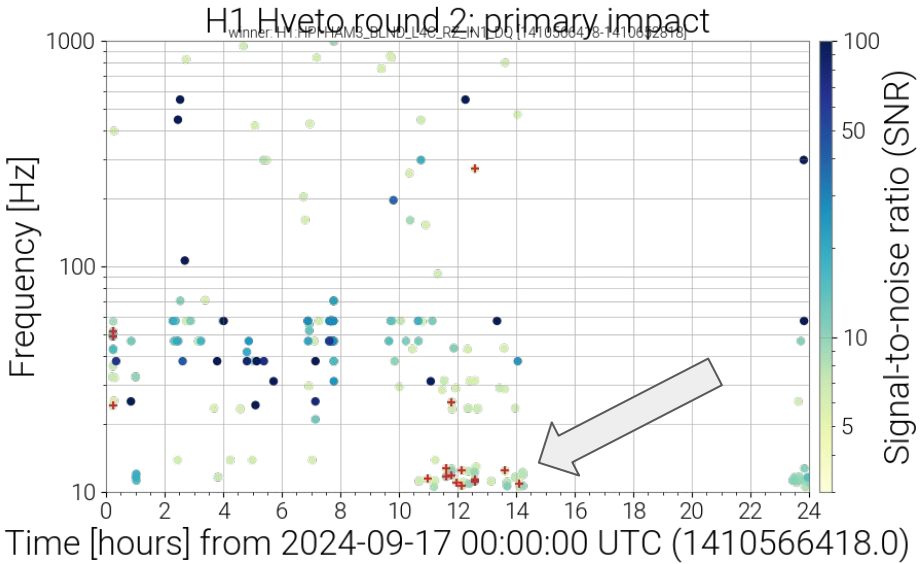

H1:ISI-HAM6_BLND_GS13Y_IN1_DQ
high darm noise
low darm noise
Frequency [Hz]

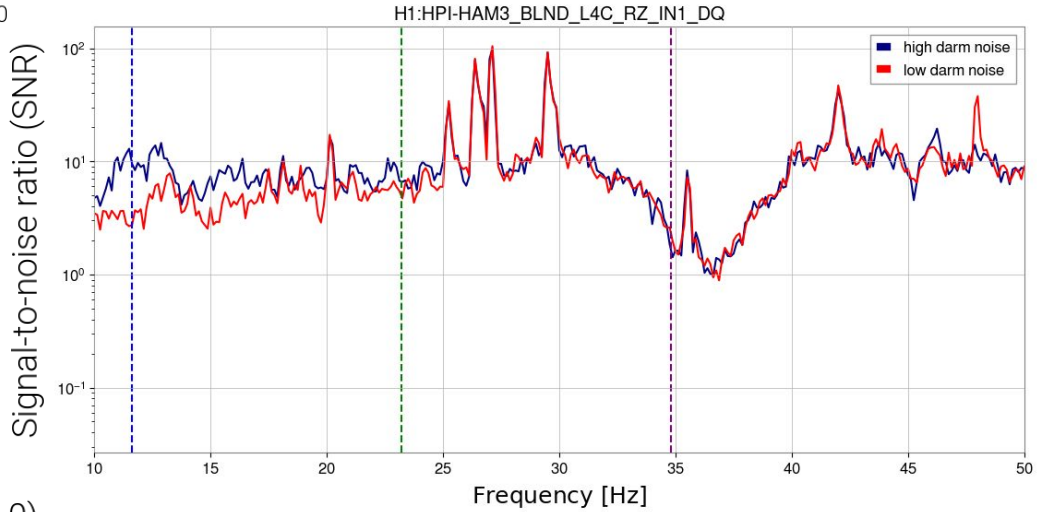

H1:ISI-GND_STS_ITMY_Y_DQ
high darm noise
low darm noise
Frequency [Hz]


H1:PEM-CS_ACC_OPLEV_ITMX_Y_DQ
high darm noise
low darm noise
Frequency [Hz]

# HVeto results: HAM 3

- One of the channels with excess noise at 11.6 Hz and 23.2 Hz was H1:ISI-HAM3_BLND_GS13X_IN1_DQ (spectra on previous slide).
- The Hveto results for this day picked out a HAM3 HPI channel H1:HPI-HAM3_BLND_L4C_RZ_IN1_DQ



# Conclusions

- No excess noise in the HPI, SUS, ISI or PEM channels found at EX or EY
- Most noise was around 11.6 hz, and the CS channels witnessed this the most
- Of the channels that had excess noise around 11.6 hz and the first harmonic, HAM8 area popped up the most
    - H1:PEM-FCES_ACC_BEAMTUBE_FCTUBE_X_DQ
    - H1:ISI-HAM8_BLND_GS13Z_IN1_DQ
    - H1:ISI-HAM8_BLND_GS13X_IN1_DQ
- HAM3 also popped up, and Hveto also picked out some glitches witnessed by H1:HPI-HAM3_BLND_L4C_RZ_IN1_DQ
- Potential scatter areas: HAM8 and HAM3 ?