# PROGRESS ON S1 INTERSITE TRANSIENTS STUDY

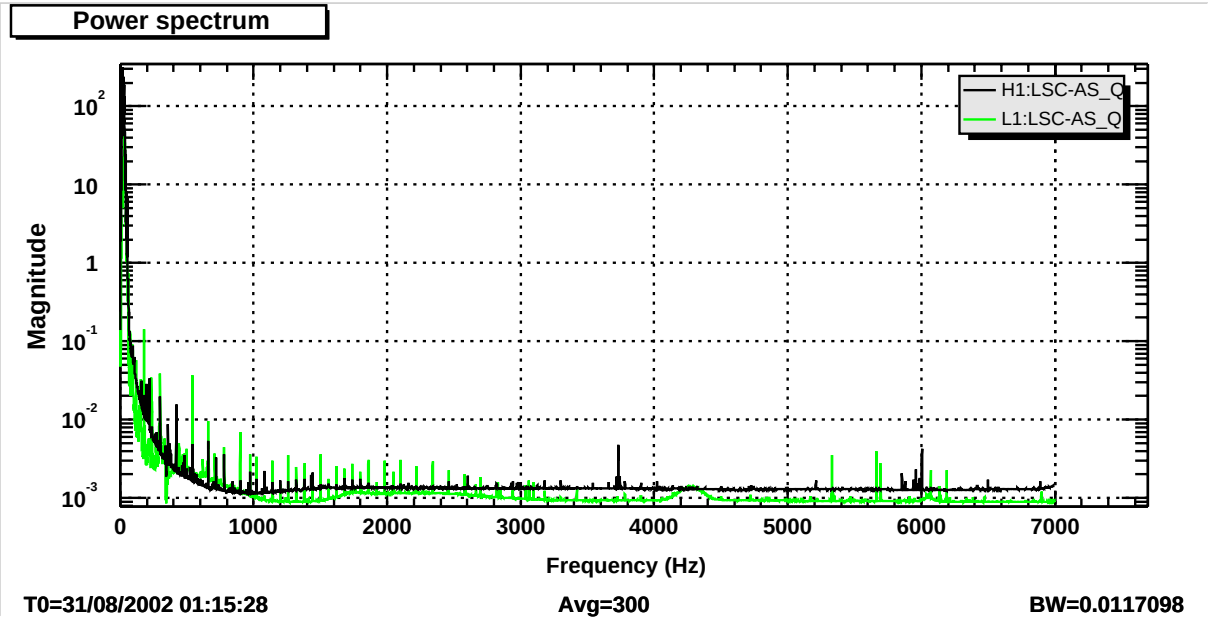
**The intersite RDS (frames containing AS_Q and PEM channels for both sites) has been produced for all but the last 2 days or so of S1**

**The intersite RDS is available from fortress in: /ldasdisks/S1cross/frames**

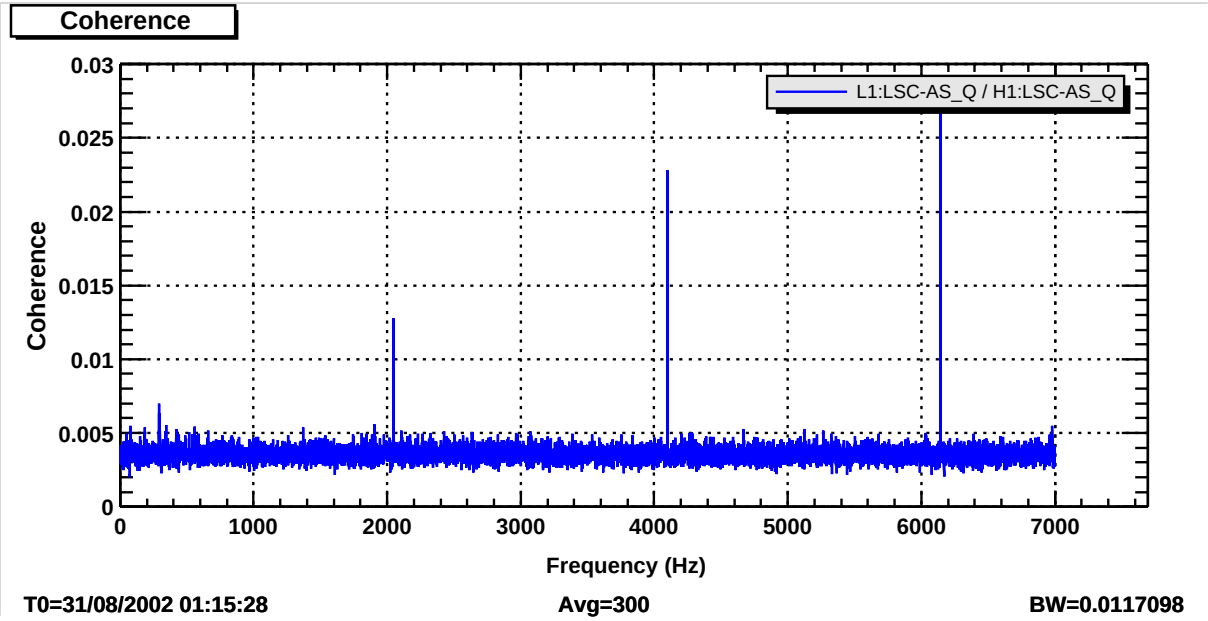
**Preliminary coherence studies of the primary channels revealed mainly self-inflicted coherence between sites (e.g. 2048 Hz and harmonics, 1 Hz and harmonics, 16 Hz and harmonics, 100 Hz and harmonics).**

**Preliminary runs of multi-channel coincidence code have not yet revealed greater than chance coincidence between glitches detected at each site.**

# AS_Q L1 and H1

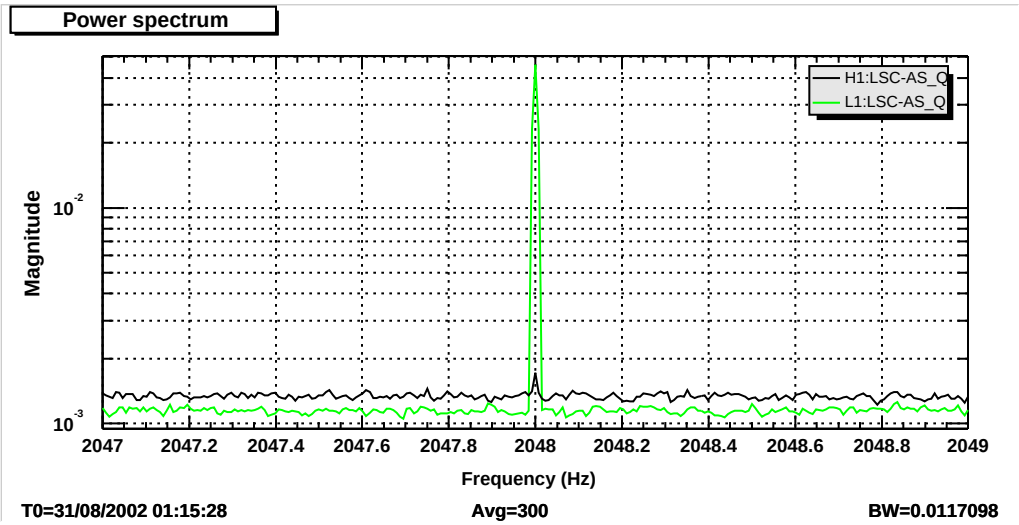


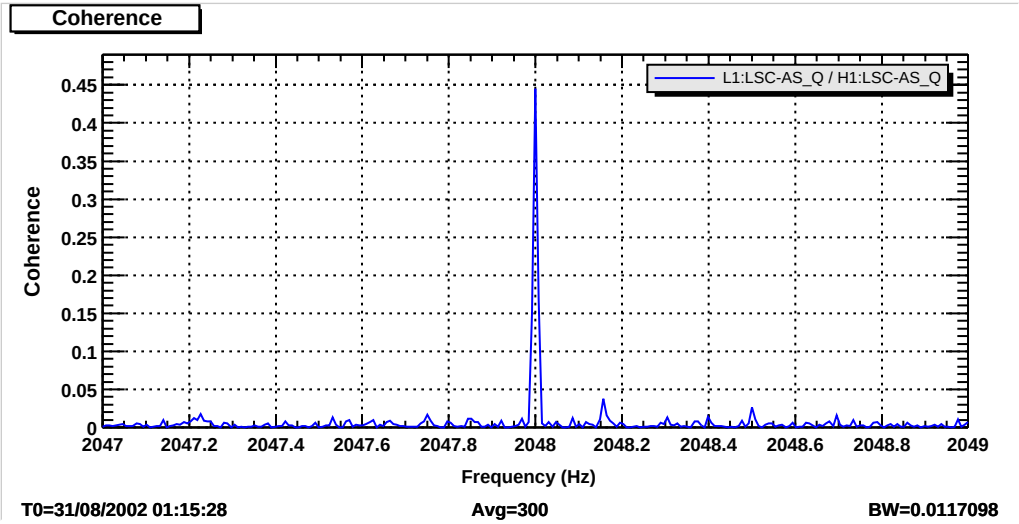

# Coherence over 10.7 hours




# (due to dtt binning, coherence values inaccurate for BW)

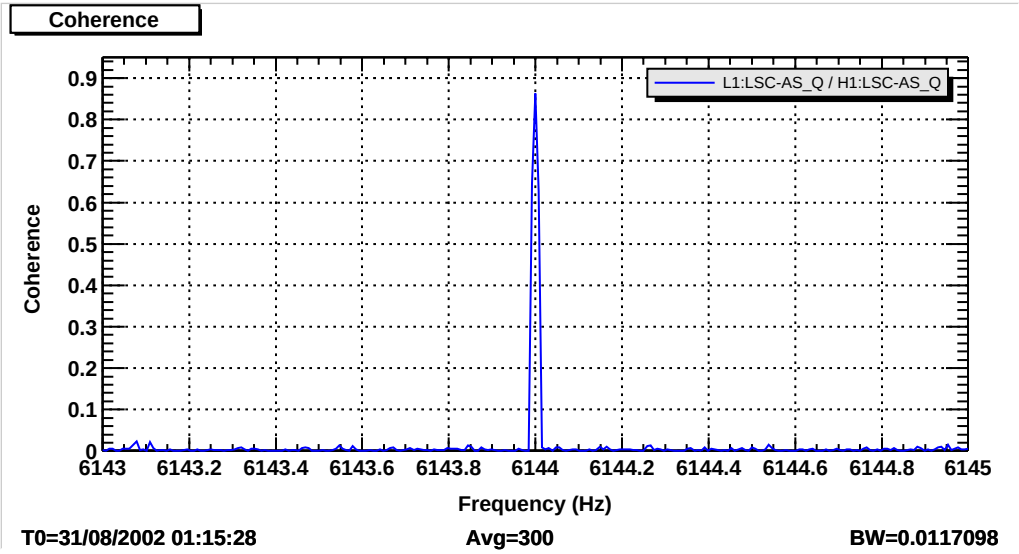
# L1 and H1 AS_Q , peak at 2048



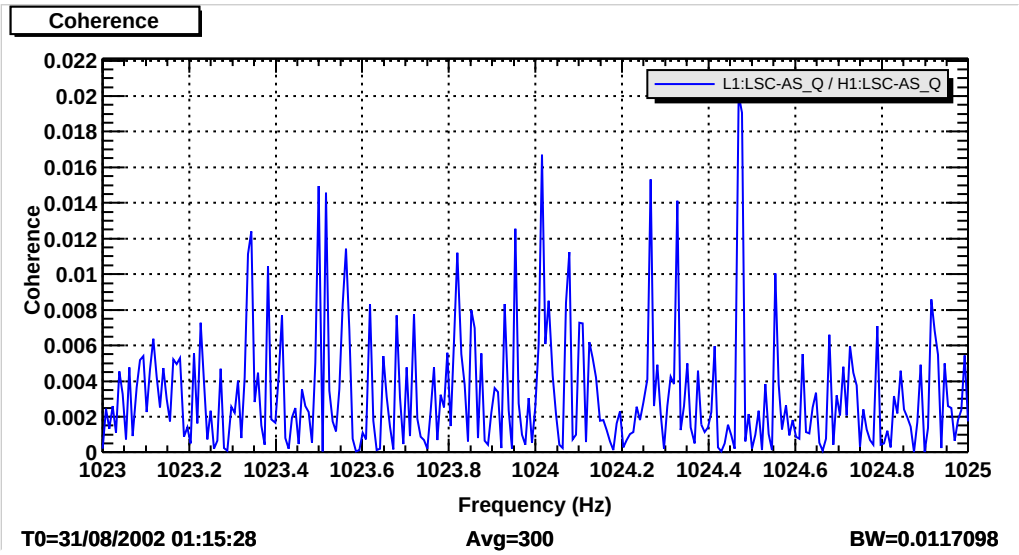




# these coherence values are accurate (no re-binning)

# L1 and H1 AS_Q coherence at 6144

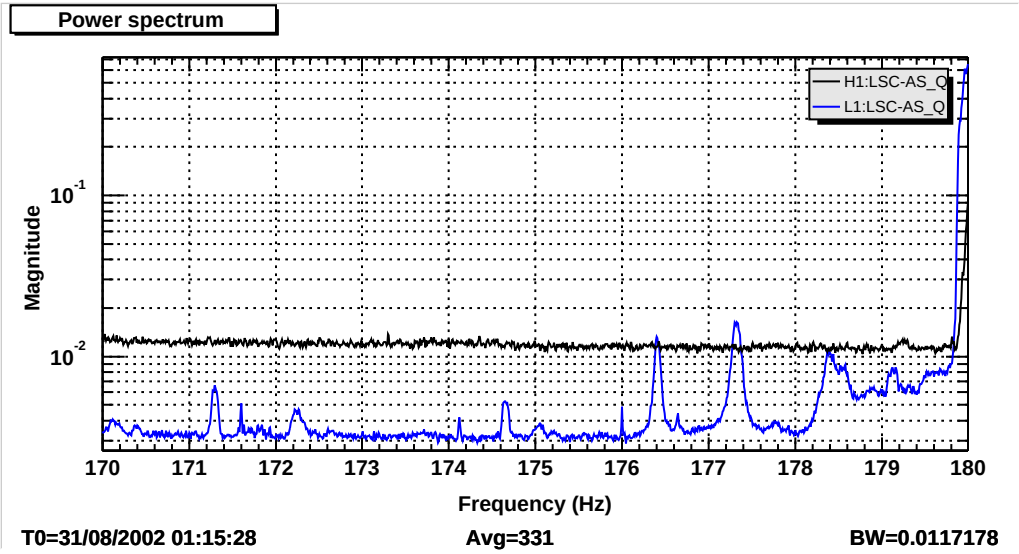


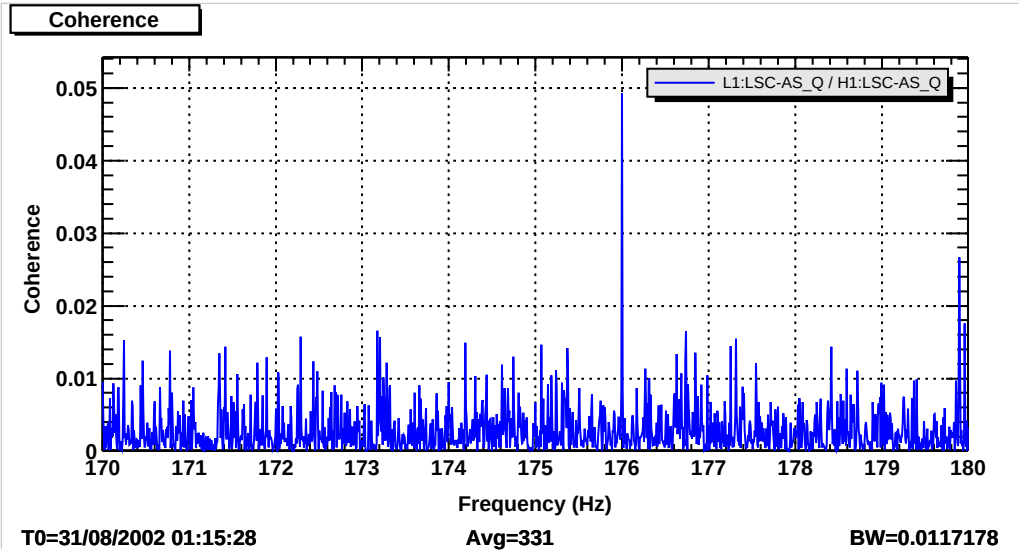

# but not at 1024




## 2048 and harmonics

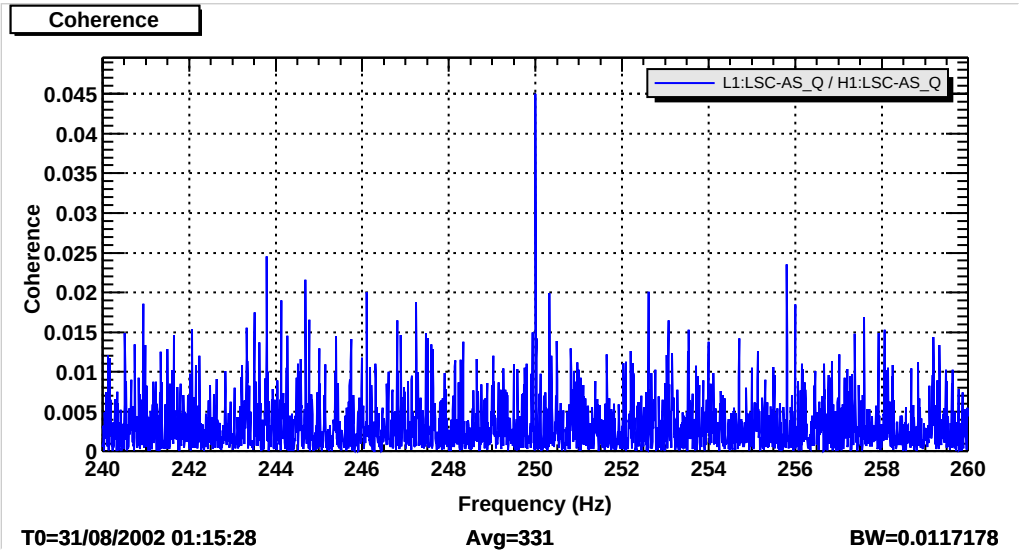
# L1 and H1 AS_Q coherence at 176



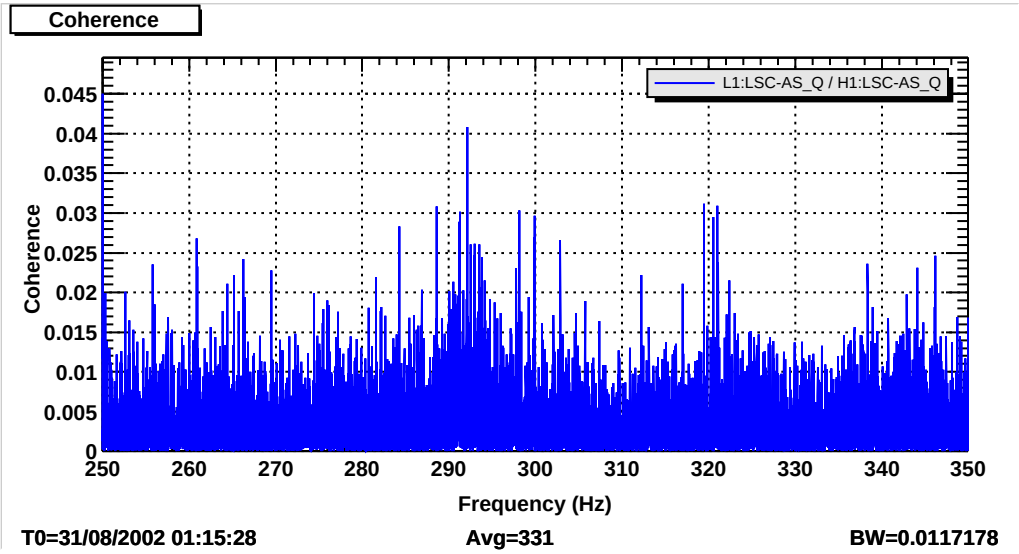




# only about 10.7 hours of data - could be a good clock chip

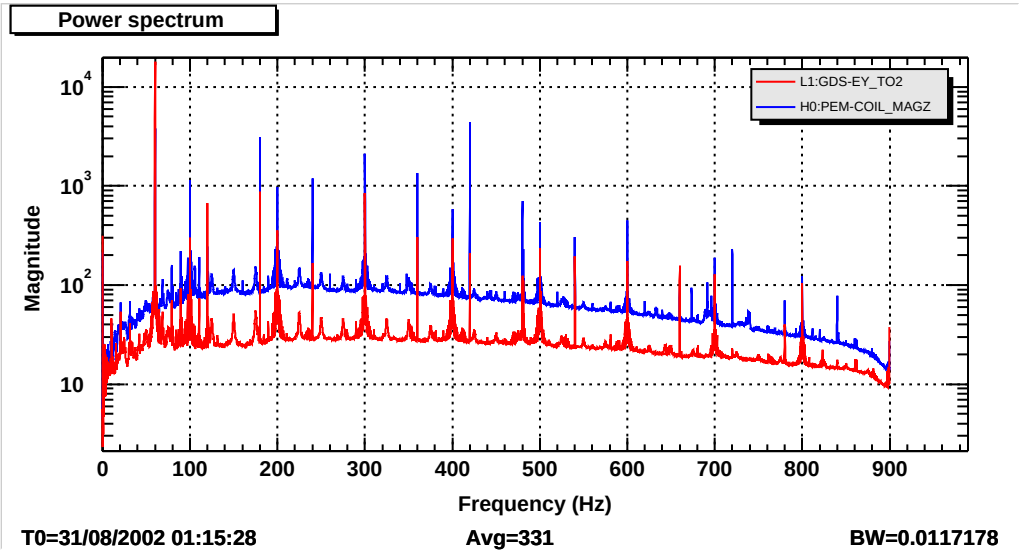
# L1 and H1 AS_Q coherence at 250

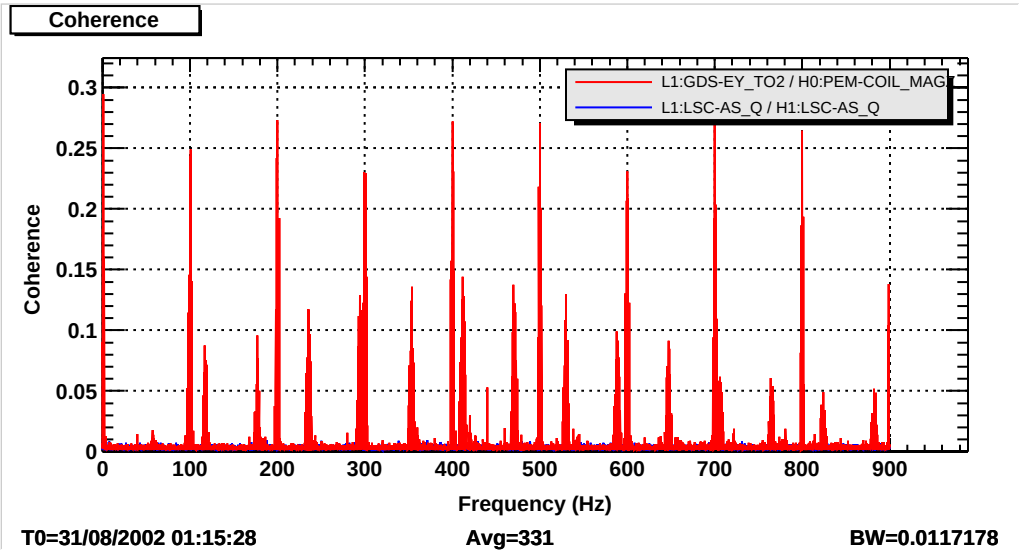



# another good clock?
# and 290?



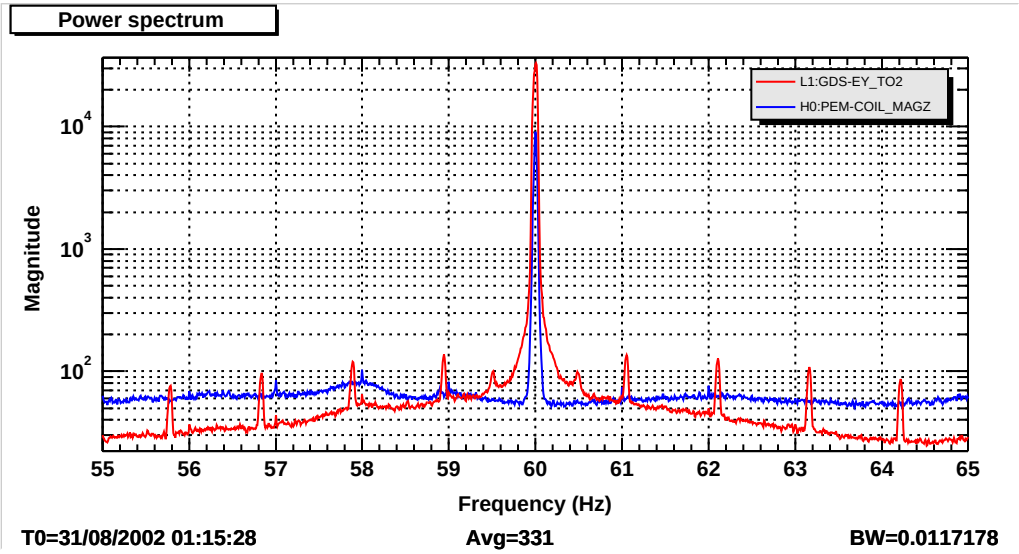
# LLO and LHO coil magnetometers coherent at 100 and harmonics

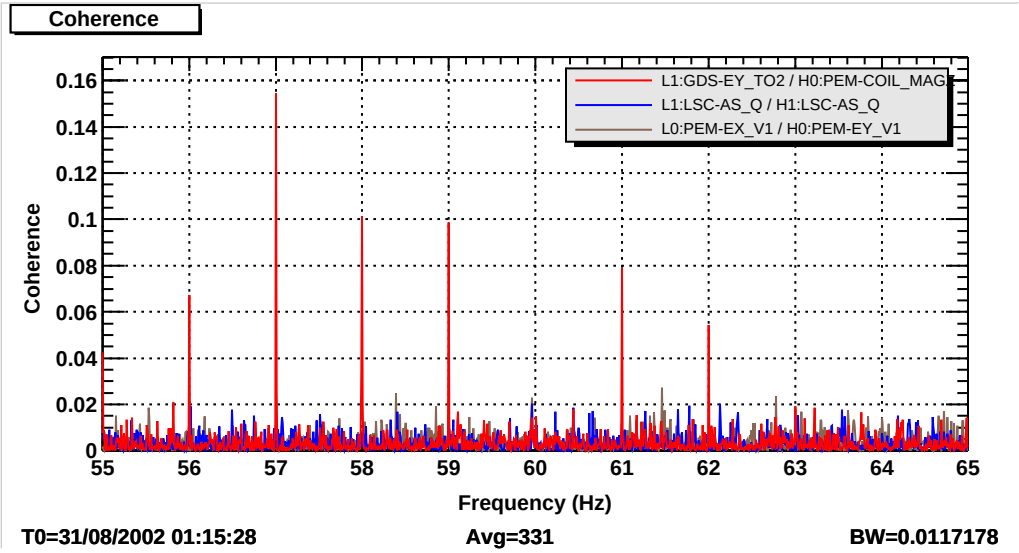


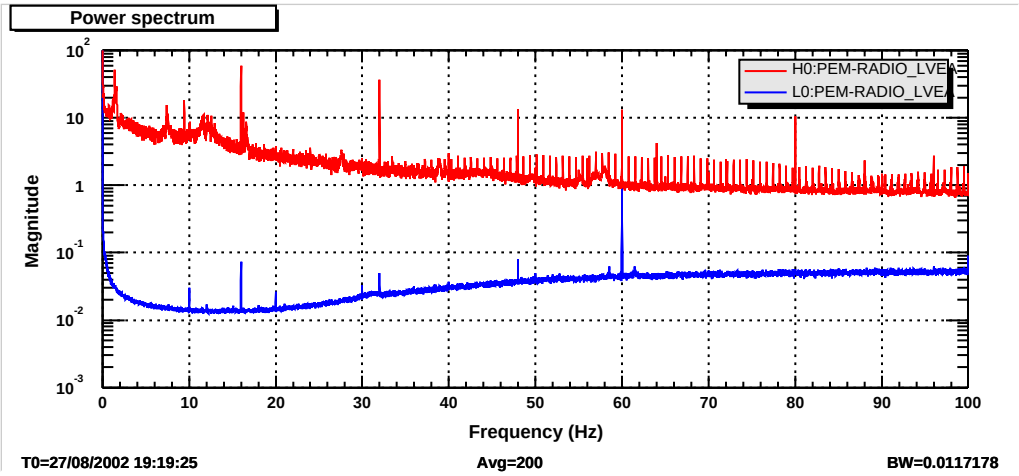

# Coherence inaccurate for BW due to binning

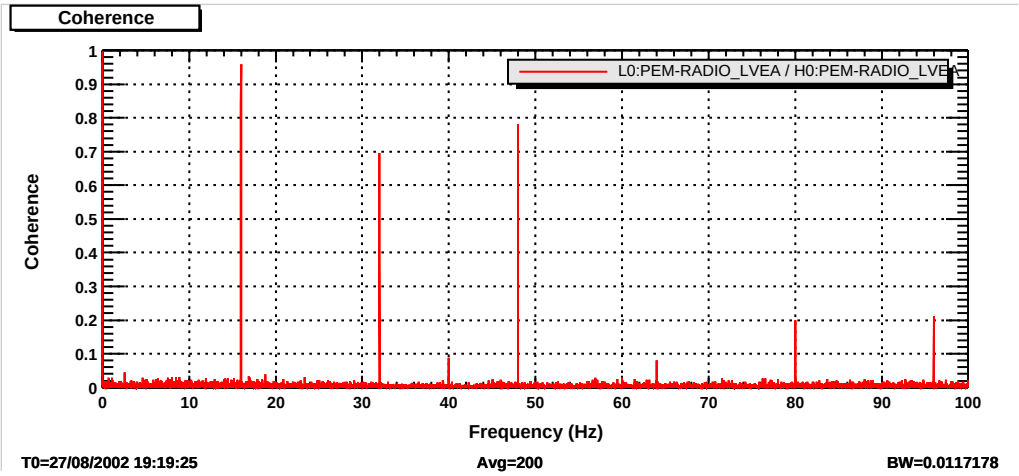
# LHO and LLO coil magnetometers



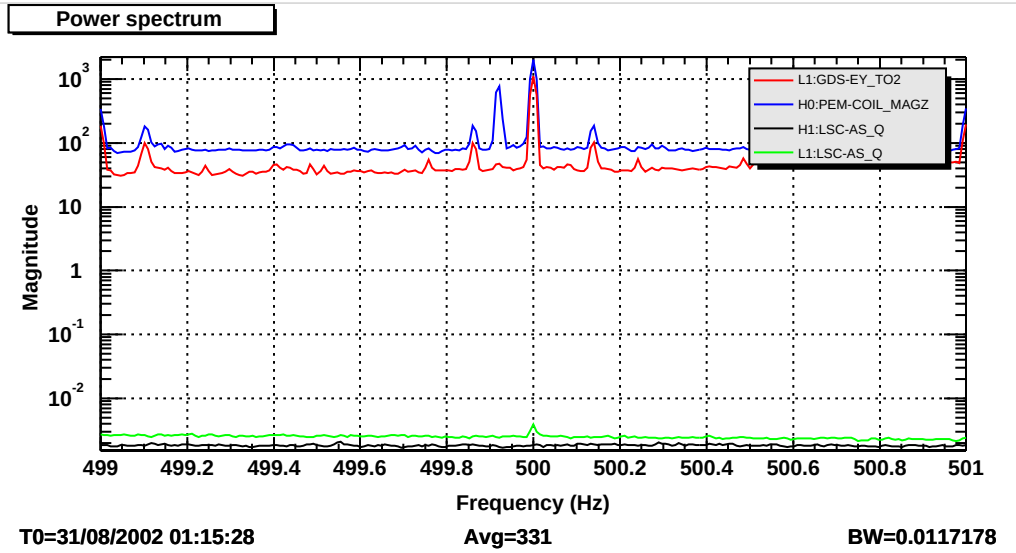
# LLO and LHO radio channels: coherence at 16 Hz and harmonics (LLO radio not working)

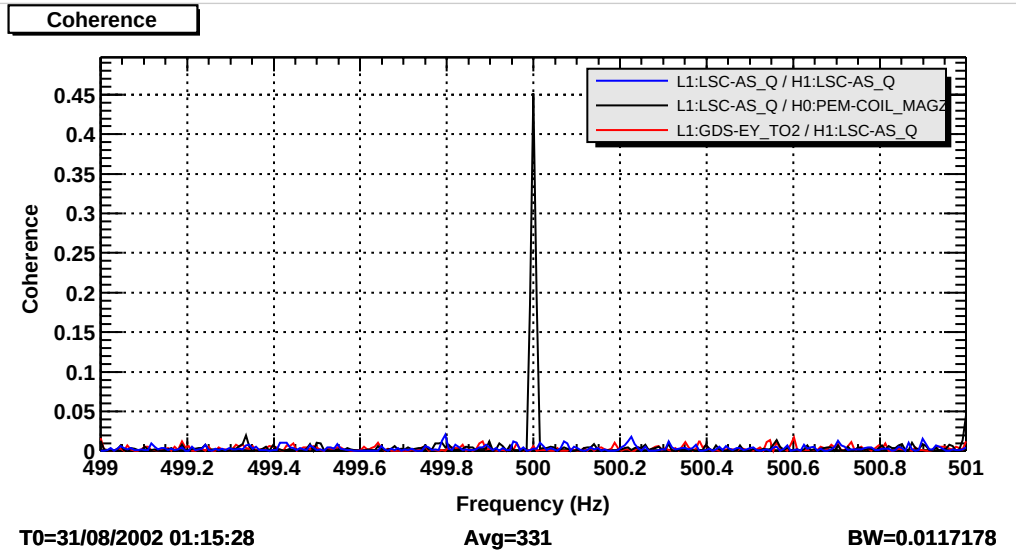



# Intersite coherence at 16 Hz and harmonics also found on several pairs of Bartington magnetometer channels

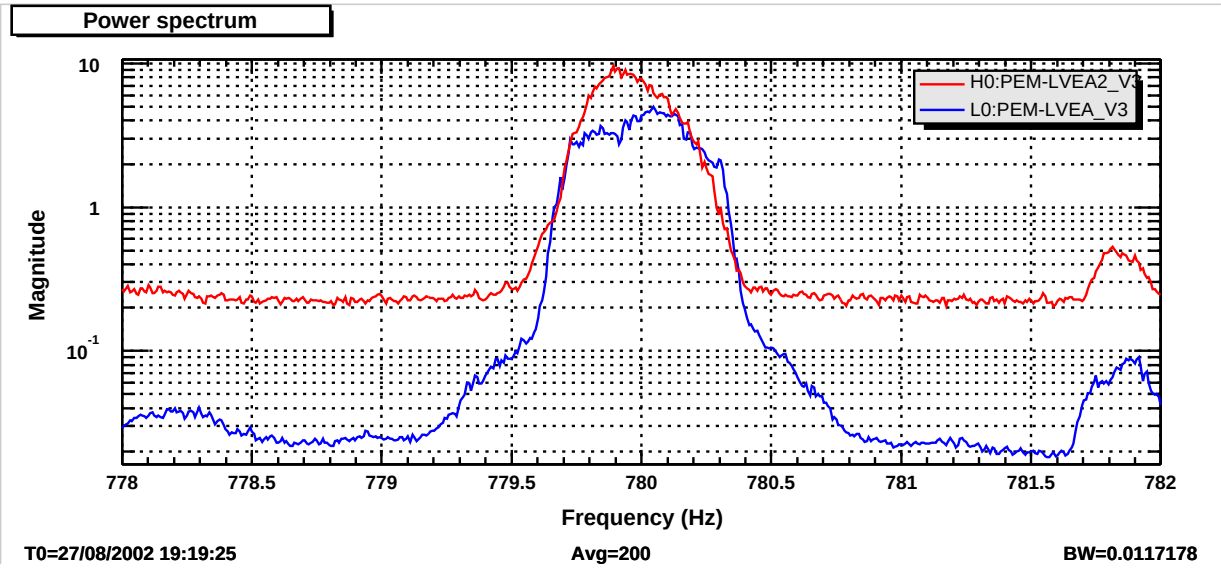
# Coherence at 500 Hz between LHO coil magnetometer and LLO AS_Q

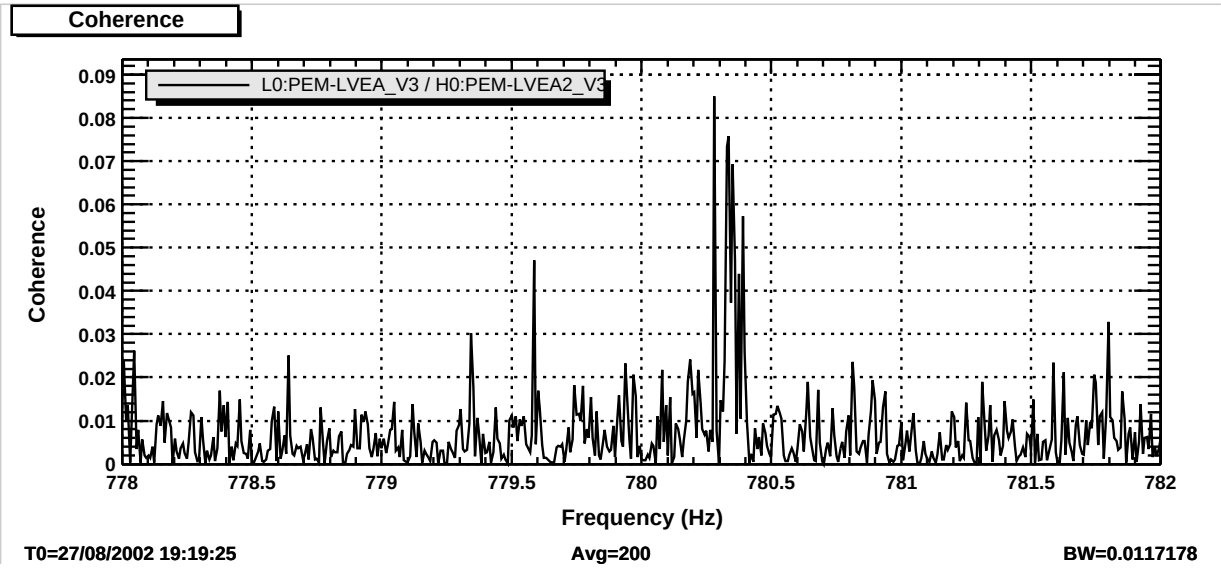



**a mystery but probably self-inflicted.**

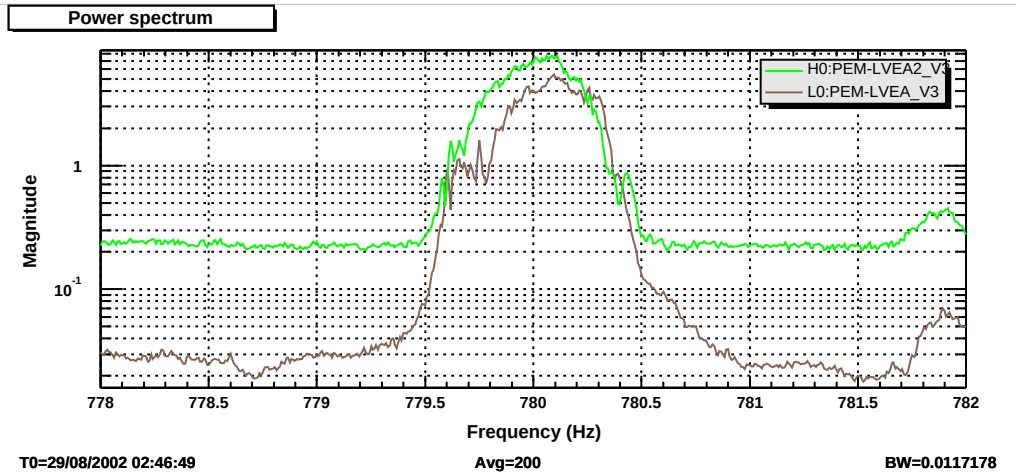
# LLO and LHO voltage monitors: persistent coherence near edge of peak

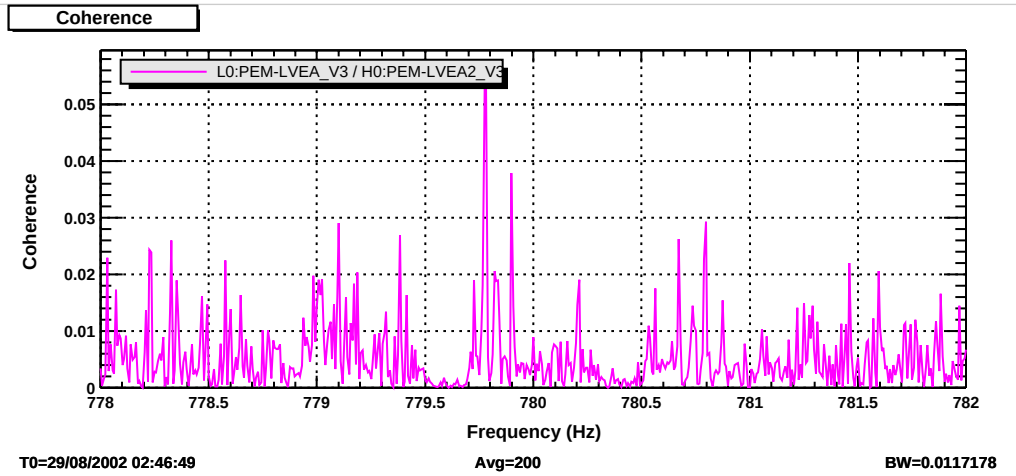



# About 7 hours of data

# LLO and LHO voltage monitors



# Stand alone algorithm compares multi-channel coincidence for aligned and misaligned time series

**3.5 Highest threshold**
**560 filter band**
**580 filter band**
**4 filter order**
**1 not used**
**8 number of channels**
**3 number of LLO channels that must exceed threshold to produce event**
**3 number of LHO channels that must exceed threshold to produce event**

**L0:PEM-EX_V1**
**L0:PEM-EX_V2**
**L0:PEM-LVEA_V3**
**L0:PEM-LVEA_V1**
**H0:PEM-MY_V1**
**H0:PEM-MY_V2**
**H0:PEM-LVEA2_V2**
**H0:PEM-LVEA2_V1**

**Total number of seconds: 42840**

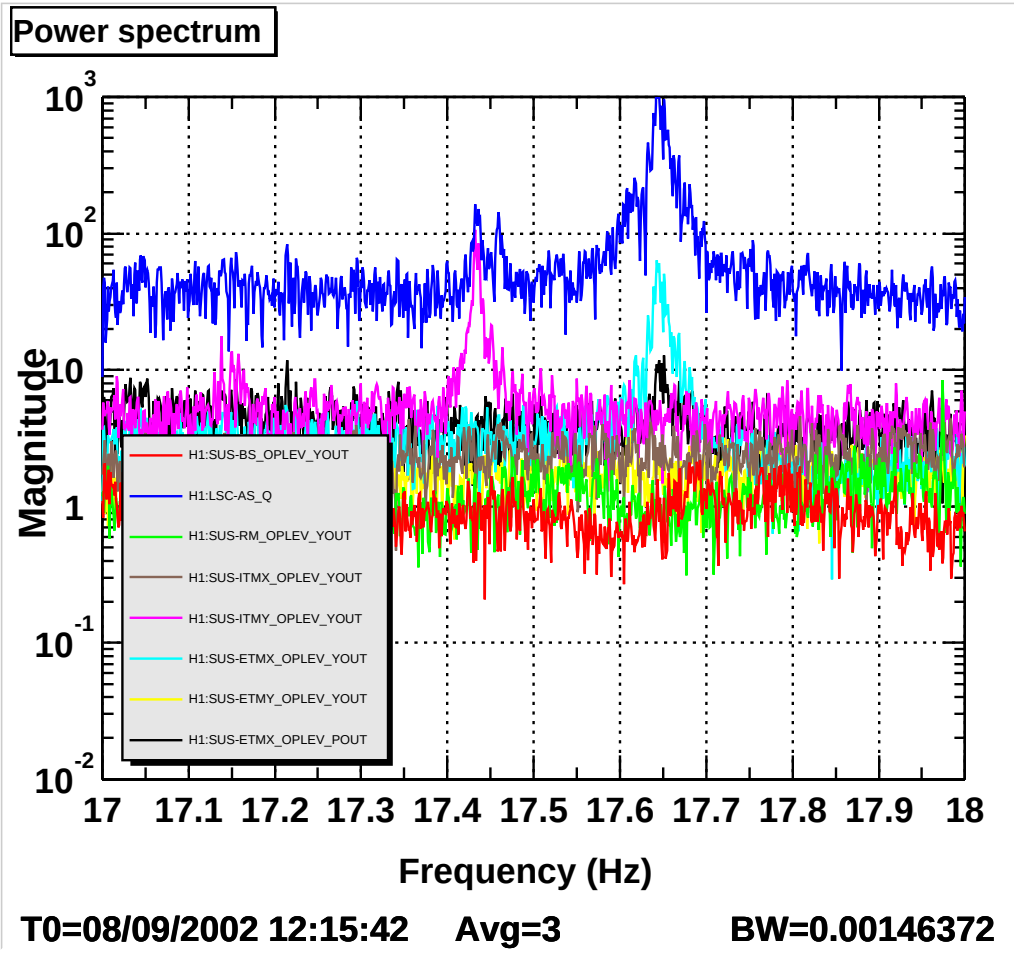
| Threshold | Events | Off Second Events | (on - off) | sqrt(on+off) |
|---|---|---|---|---|
| 3.5 | 0 | 0 | 0 | 0 |
| 3.3 | 0 | 0 | 0 | 0 |
| 3.1 | 2 | 1 | 1 | 1.73205 |
| 2.9 | 4 | 5 | -1 | 3 |
| 2.7 | 23 | 20 | 3 | 6.55744 |
| 2.5 | 118 | 109 | 9 | 15.0665 |
| 2.3 | 632 | 675 | -43 | 36.1525 |
| 2.1 | 3344 | 3406 | -62 | 82.1584 |
| 1.9 | 13593 | 13649 | -56 | 165.052 |

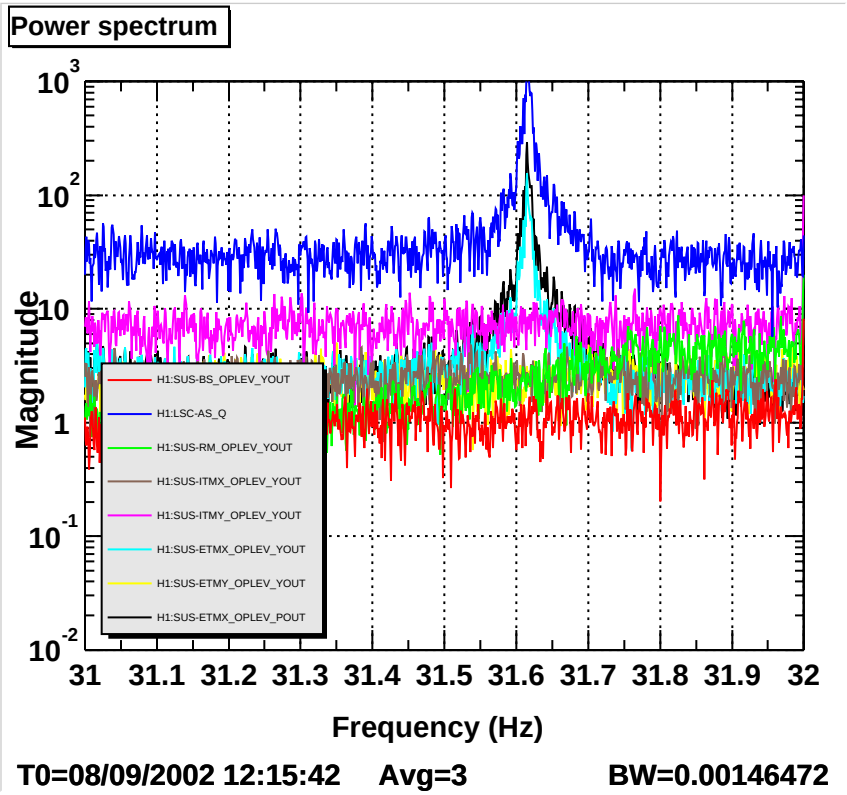
## Nothing seen yet..... 13

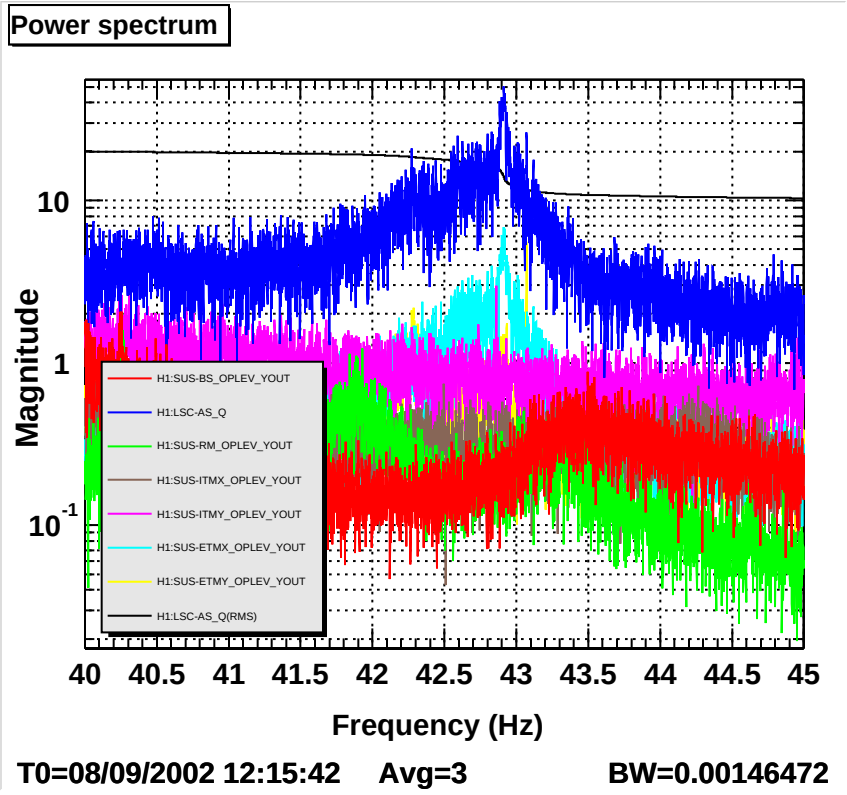
# PROGRESS ON S1 ENVIRONMENTAL DISTURBANCES
# (with a focus on loose bolts)

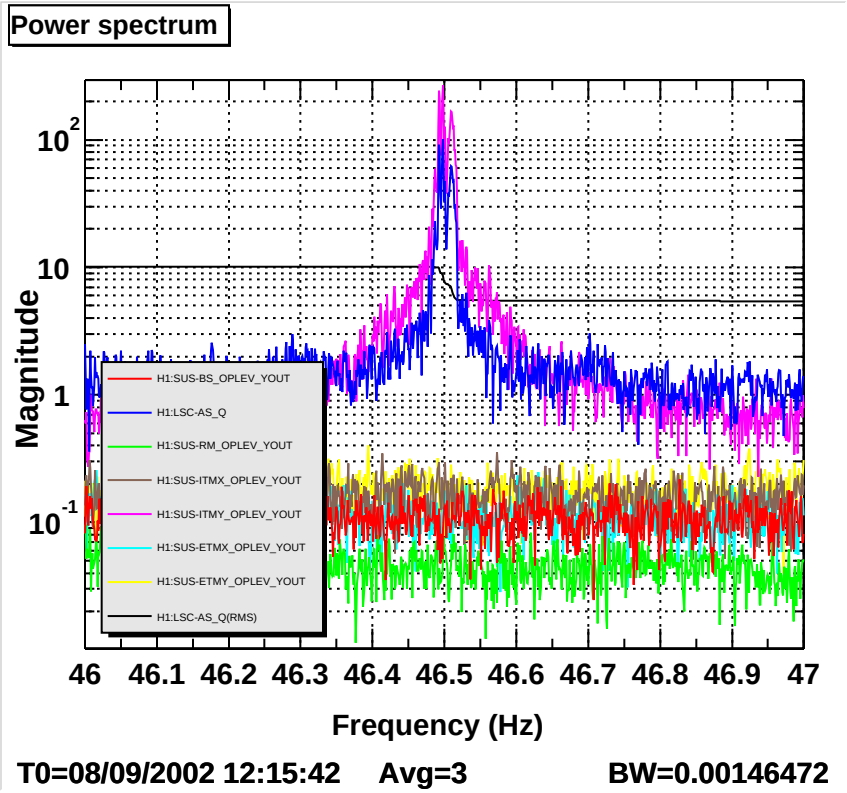
## Optical Levers

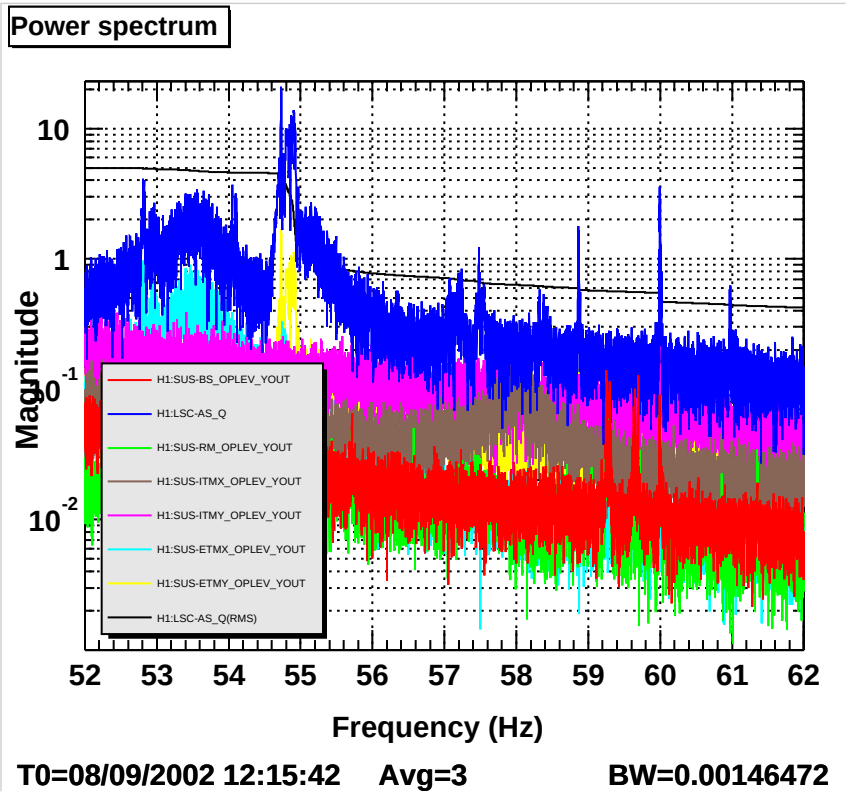
## During S1 many peaks in H1 AS_Q matched peaks in optical lever servo signals



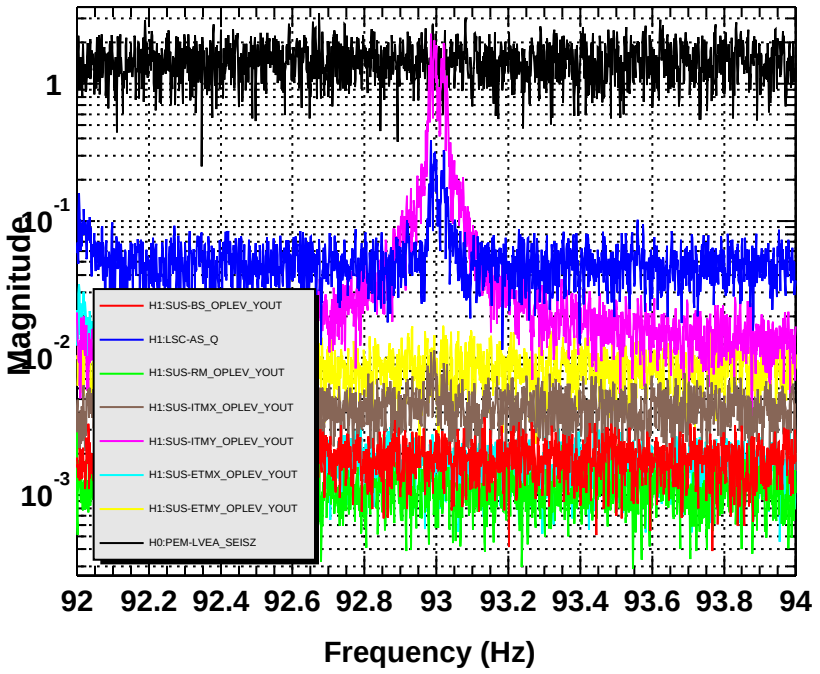

Power spectrum
Magnitude
Frequency (Hz)
H1:SUS-BS_OPLEV_YOUT
H1:LSC-AS_Q
H1:SUS-RM_OPLEV_YOUT
H1:SUS-ITMX_OPLEV_YOUT
H1:SUS-ITMY_OPLEV_YOUT
H1:SUS-ETMX_OPLEV_YOUT
H1:SUS-ETMY_OPLEV_YOUT
H1:SUS-ETMX_OPLEV_POUT
T0=08/09/2002 12:15:42 Avg=3 BW=0.00146472


Power spectrum
Magnitude
Frequency (Hz)
H1:SUS-BS_OPLEV_YOUT
H1:LSC-AS_Q
H1:SUS-RM_OPLEV_YOUT
H1:SUS-ITMX_OPLEV_YOUT
H1:SUS-ITMY_OPLEV_YOUT
H1:SUS-ETMX_OPLEV_YOUT
H1:SUS-ETMY_OPLEV_YOUT
H1:LSC-AS_Q(RMS)
T0=08/09/2002 12:15:42 Avg=3 BW=0.00146472


Power spectrum
Magnitude
Frequency (Hz)
H1:SUS-BS_OPLEV_YOUT
H1:LSC-AS_Q
H1:SUS-RM_OPLEV_YOUT
H1:SUS-ITMX_OPLEV_YOUT
H1:SUS-ITMY_OPLEV_YOUT
H1:SUS-ETMX_OPLEV_YOUT
H1:SUS-ETMY_OPLEV_YOUT
H1:LSC-AS_Q(RMS)
T0=08/09/2002 12:15:42 Avg=3 BW=0.00146472

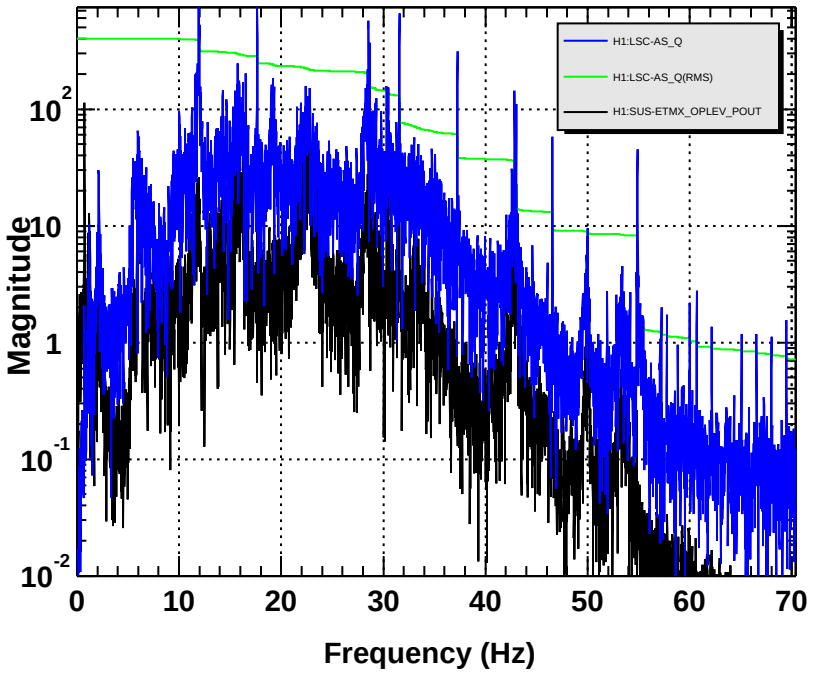

Power spectrum
Magnitude
Frequency (Hz)
H1:SUS-BS_OPLEV_YOUT
H1:LSC-AS_Q
H1:SUS-RM_OPLEV_YOUT
H1:SUS-ITMX_OPLEV_YOUT
H1:SUS-ITMY_OPLEV_YOUT
H1:SUS-ETMX_OPLEV_YOUT
H1:SUS-ETMY_OPLEV_YOUT
H1:LSC-AS_Q(RMS)
T0=08/09/2002 12:15:42 Avg=3 BW=0.00146472

Power spectrum

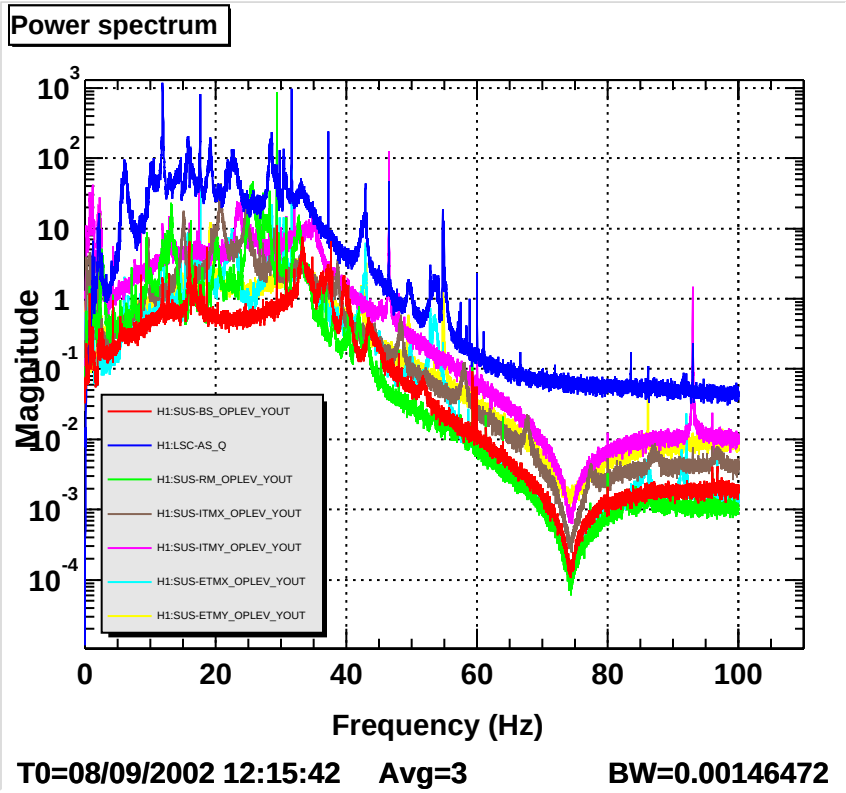



T0=08/09/2002 12:15:42 Avg=3 BW=0.00146472

Power spectrum




T0=06/09/2002 10:30:00 Avg=3 BW=0.0234367



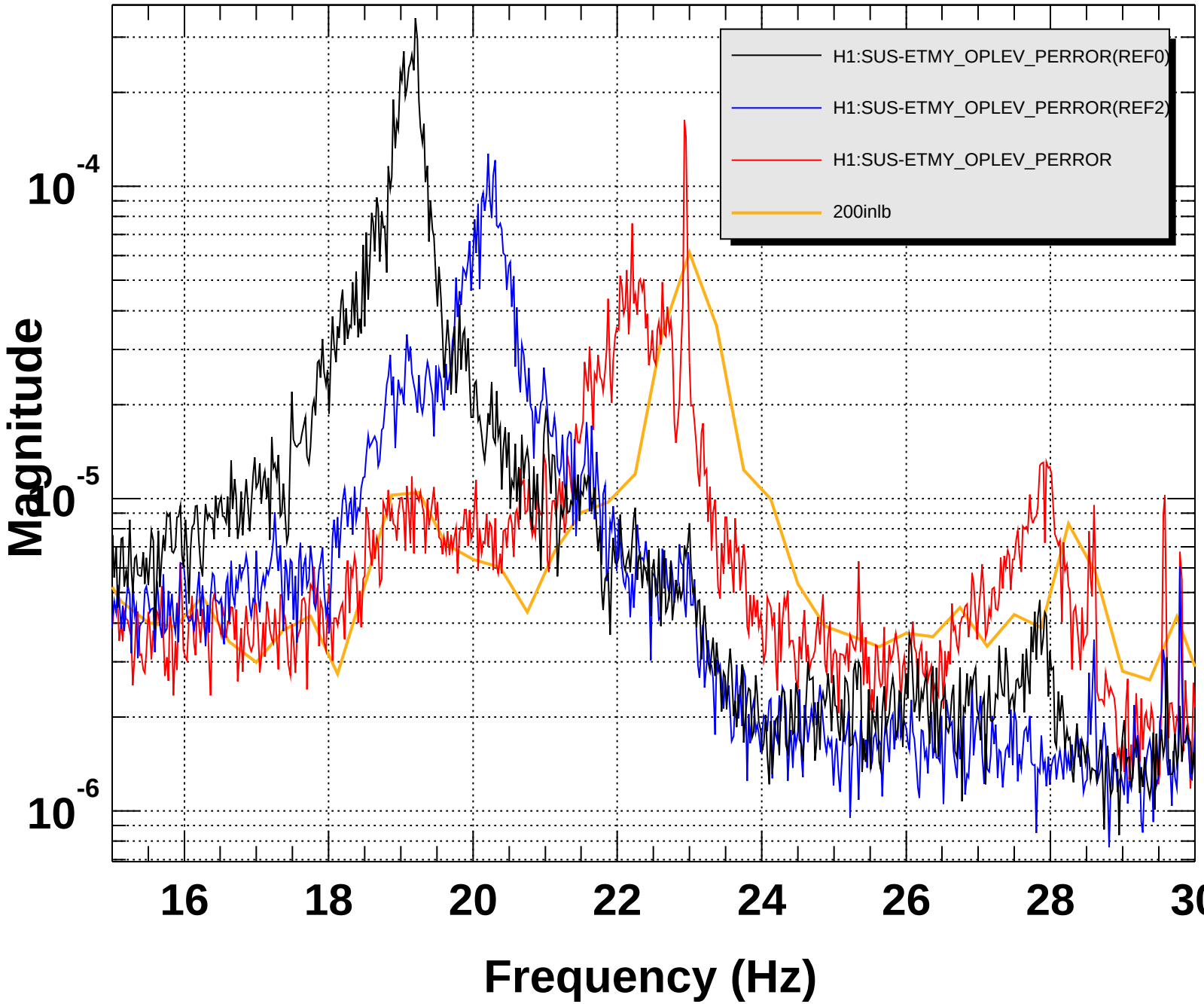

**Summary:**

**ETMX op. lev.: 17.65, 31.6, 43.**
**ETMY op. lev.: 43 and about 53**
**ITMY op. lev.: 29.35, 46.5, 93**
**ITMX op. lev.: 29.35**

**John Z. and I showed that ETMY op. lev. was responsible for some major non-stationarity that he had detected.**

**Tightening bolts moved and reduced peaks:**

# Power spectrum




*T0=12/11/2002 04:23:33 *Avg=4 *BW=0.0117178

**A number of people have been working on the optical lever problem, new servo filters have been installed and we are working out schemes to reduce the amplitudes of the resonances**

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## LN2 DEWARS AND LOCK LOSS

**Large 1-2 per day MX seismic transient knocked us out of lock nearly every time during S1**

**Set up an accelerometer about 30m +X of MX station and one -X of the building. Three total including the one in the building**

**Struck various candidates with a padded 4x8 piece of lumber to get propagation delay times to each accelerometer.**

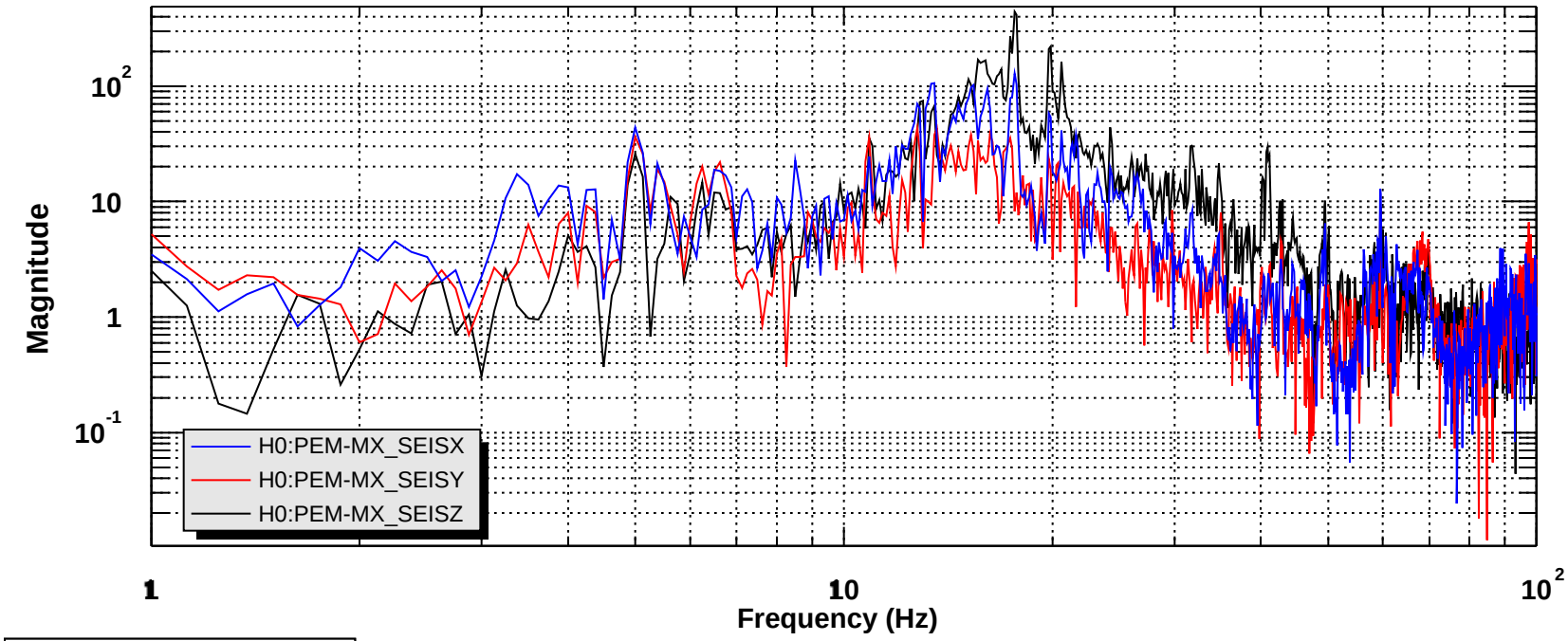
**Propagation delays from the transient matched those for the struck +X LN2 dewar. Accelerometer on dewar confirmed.**

**Transient went away after John W. and Kyle tightened bolts.**

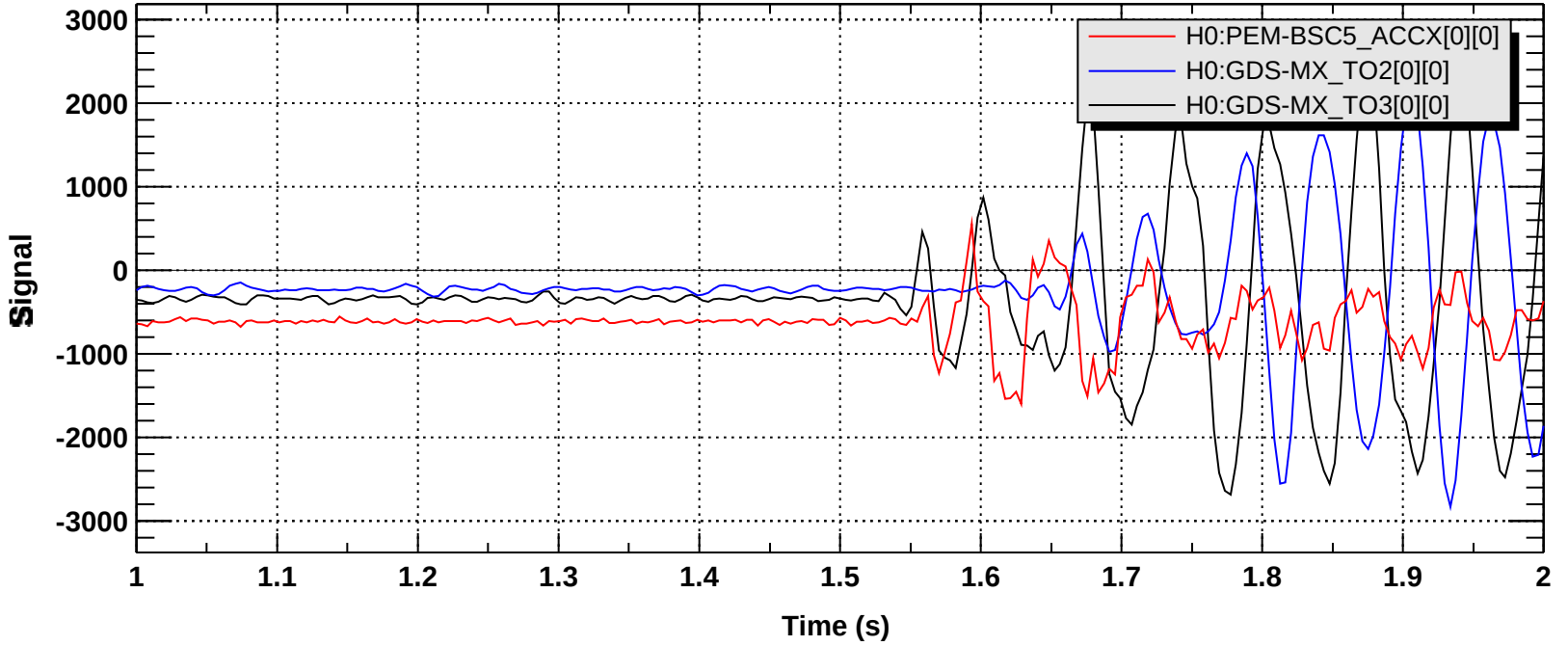
**But smaller transients appeared to be coming from -X dewar.**

**Welding may be solution if leg stick and slip is the cause. John W. is instrumenting legs.**

## Power spectrum




## Time series




**T0=11/10/2002 12:25:01** **Avg=1**