

# SixtyHertzMon Update

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# SixtyHertzMon – Reminder of Method

## Idea:

Upconversion artifacts due to 60 Hz should track the slight frequency variations of power mains

## Scheme:

- 1) Heterodyne DARM\_ERR w.r.t. fixed 60 Hz signal (control)
- 2) Heterodyne DARM\_ERR w.r.t, varying 60 Hz signal (frequency measured each minute from voltage monitor)

Compare spectra near 60 Hz (or higher harmonic) from 1) and 2):

If artifact is sharper in 2) than in 1), then 60 Hz is likely source

If artifact is sharper in 1) than in 2), 60 Hz source unlikely

Developed offline in summer/fall 2006 and used to examine a pulsar search outlier (78.6 Hz → NOT a roll-mode sideband)

Initial online trial in January/February covering  $\pm 30$  Hz band around 60 Hz for H1, H2, and L1

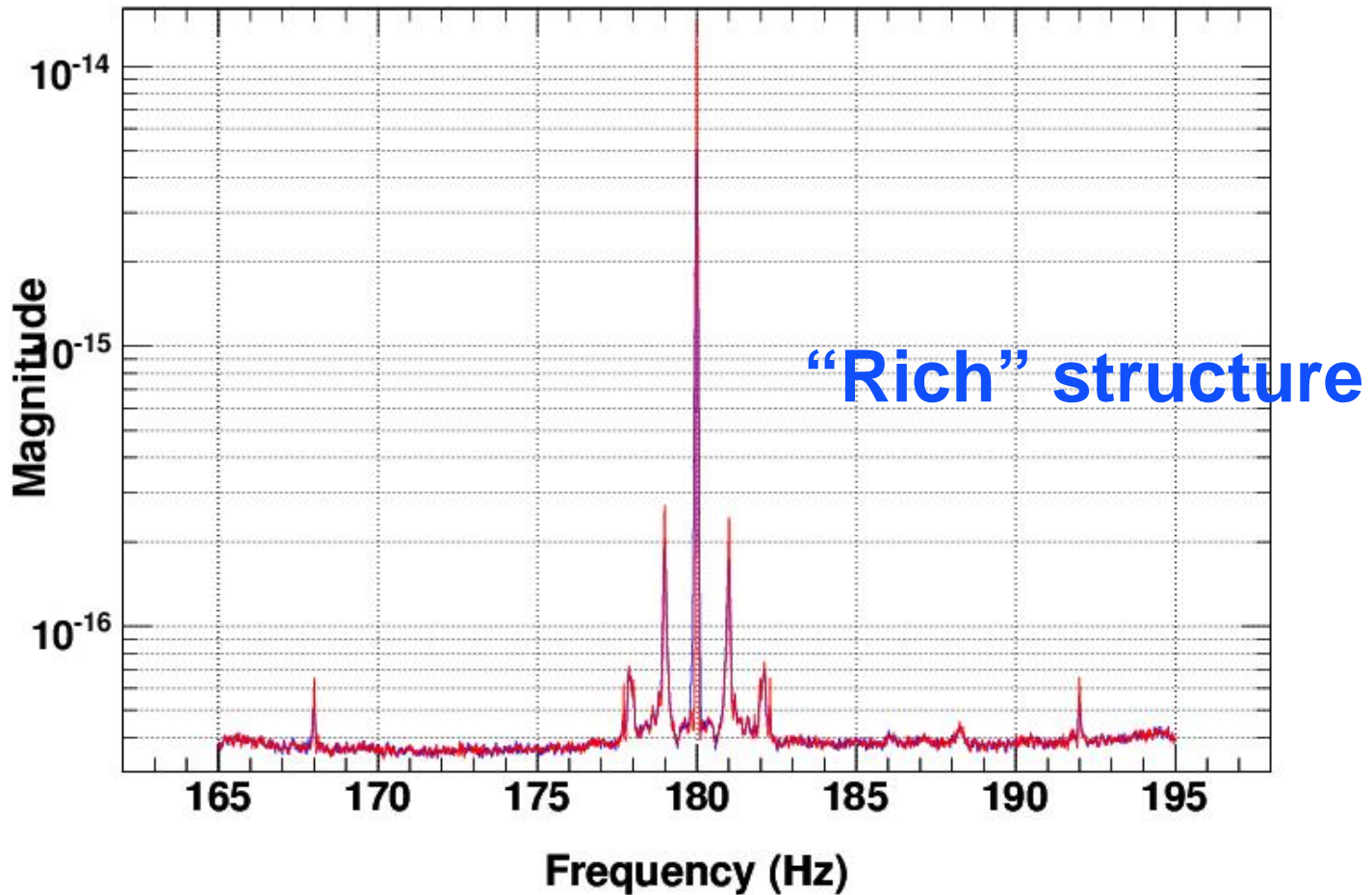
Found some operational problems:

- Turning on/off of calibration lines not handled well
- Temporary dropout of voltage monitor channel caused crashes
- Inefficient to devote one monitor per 60 Hz harmonic

Fixed these problems and launched new programs in February to cover 30-210 Hz for 60 Hz, 120 Hz, and 180 Hz (documentation online)

# Example – H1 180 Hz Region

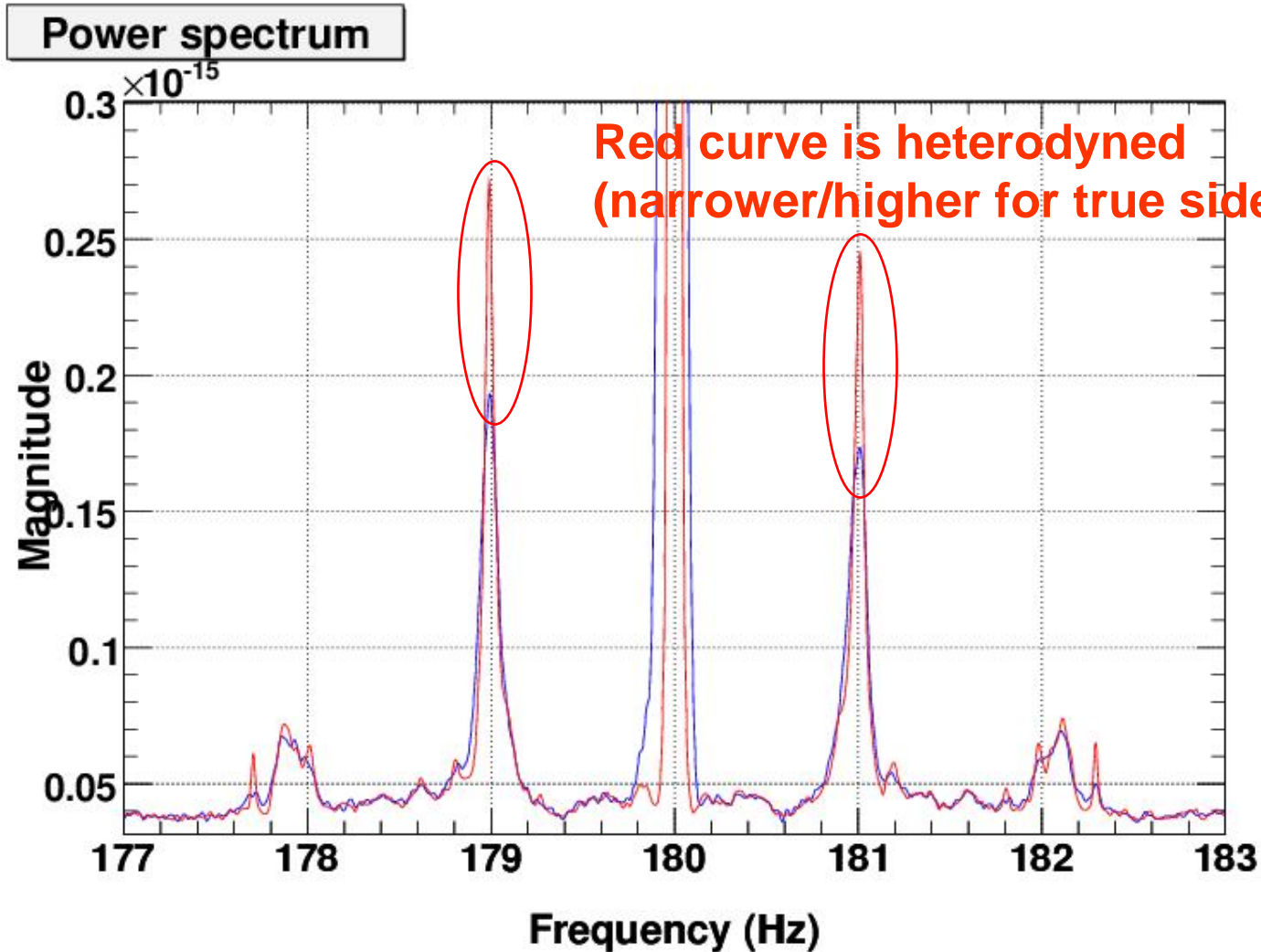
Power spectrum



T0=854436687

Avg=1

# Zooming in frequency

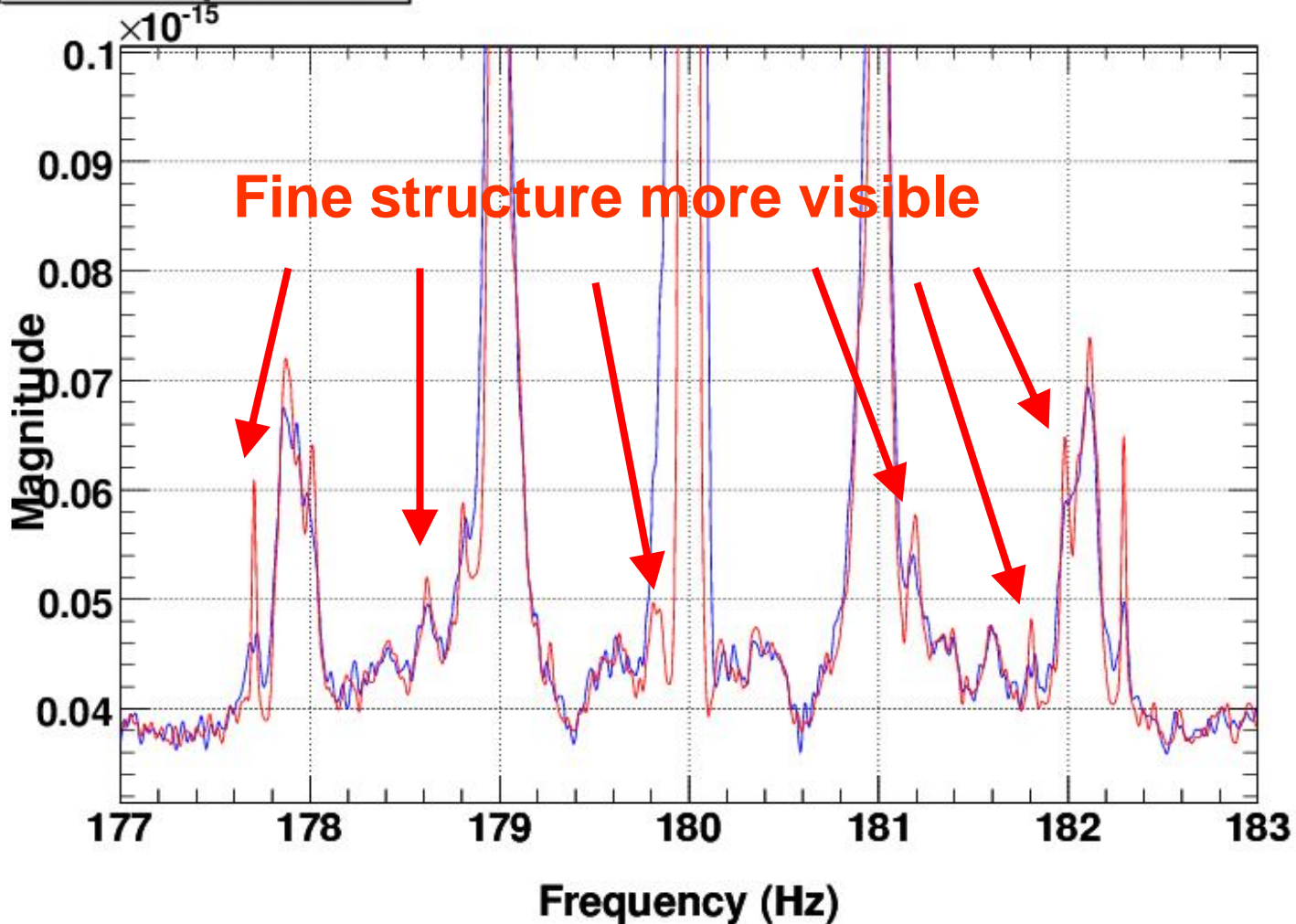


T0=854436687

Avg=1

# Zooming in power

**Power spectrum** (magnified by factor of  $180/60 = 3$ )

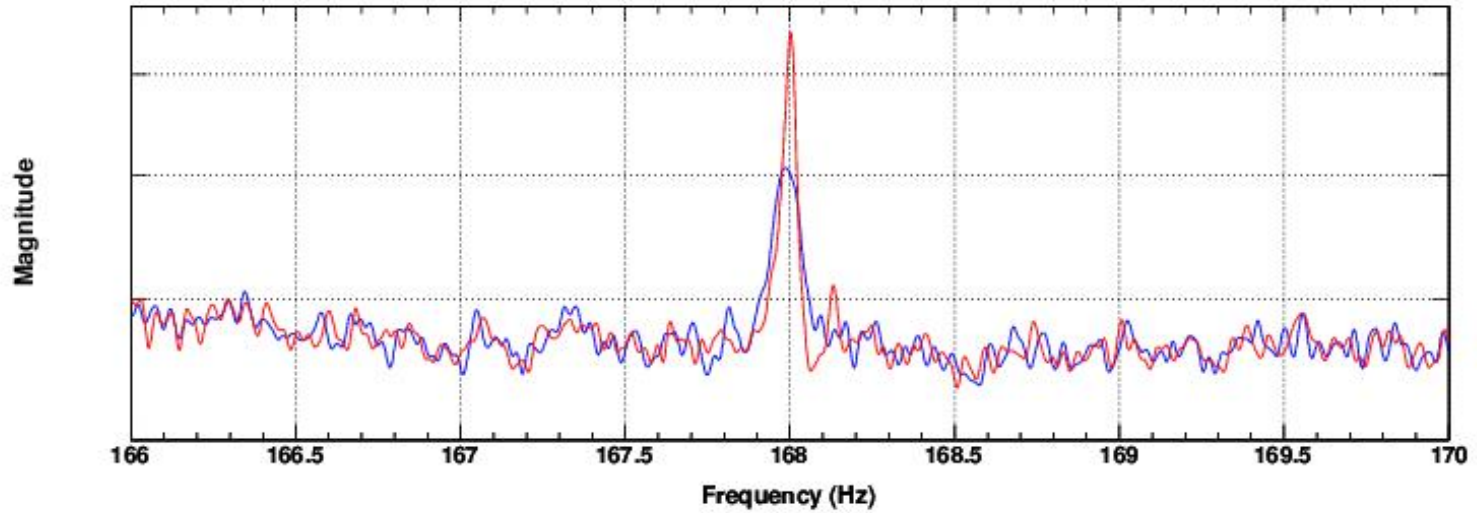


**T0=854436687**

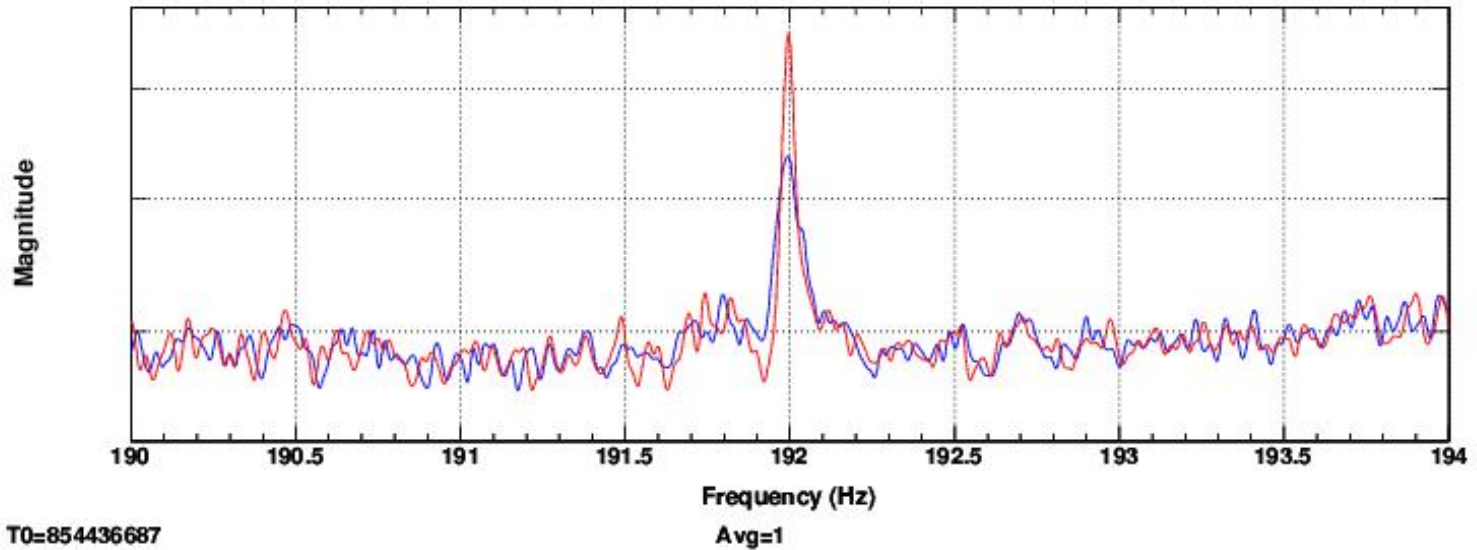
**Avg=1**

# H1 12-Hz sidebands

Power spectrum



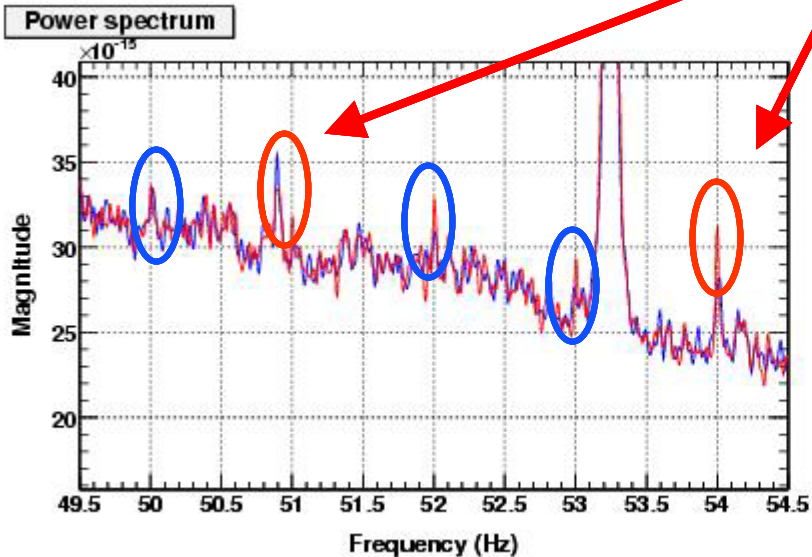
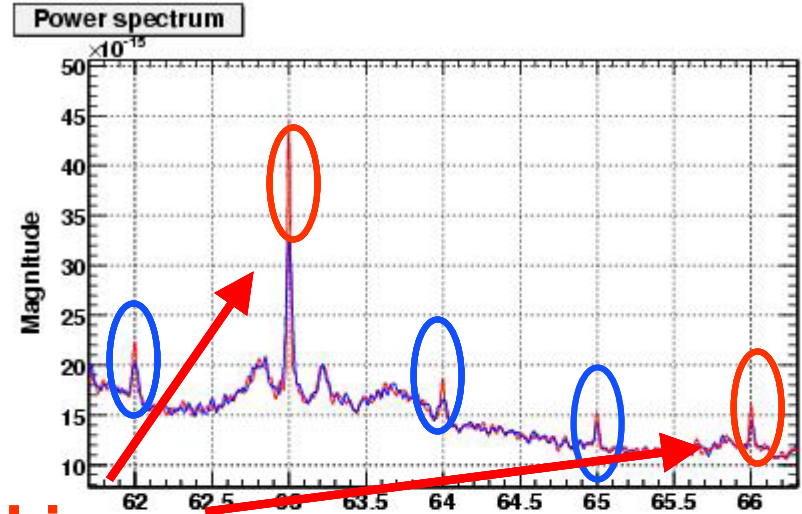
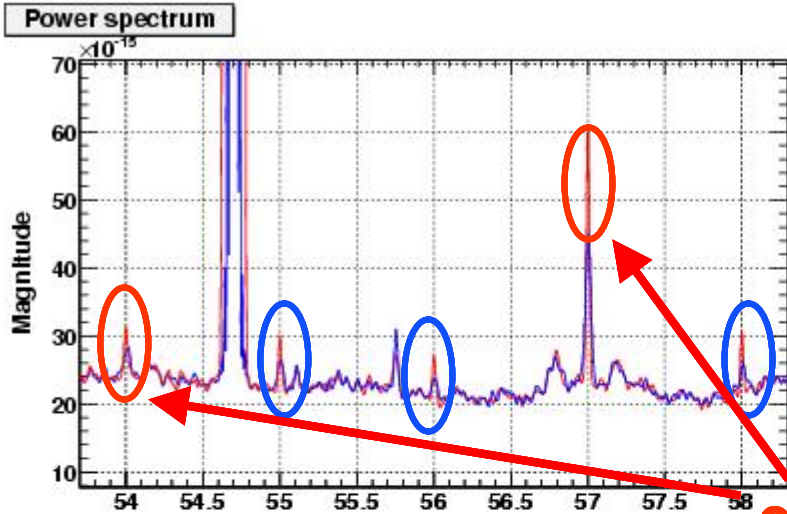
Power spectrum



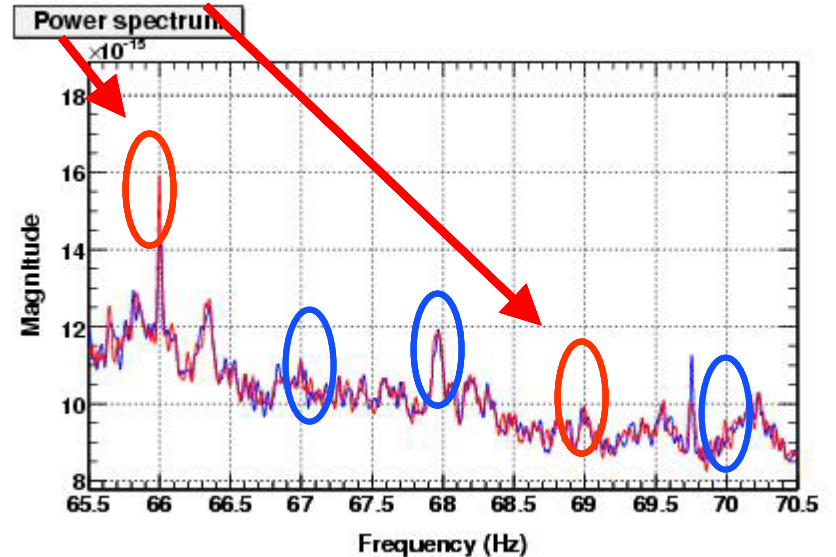
T0=854436687



## Other 1 Hz Lines



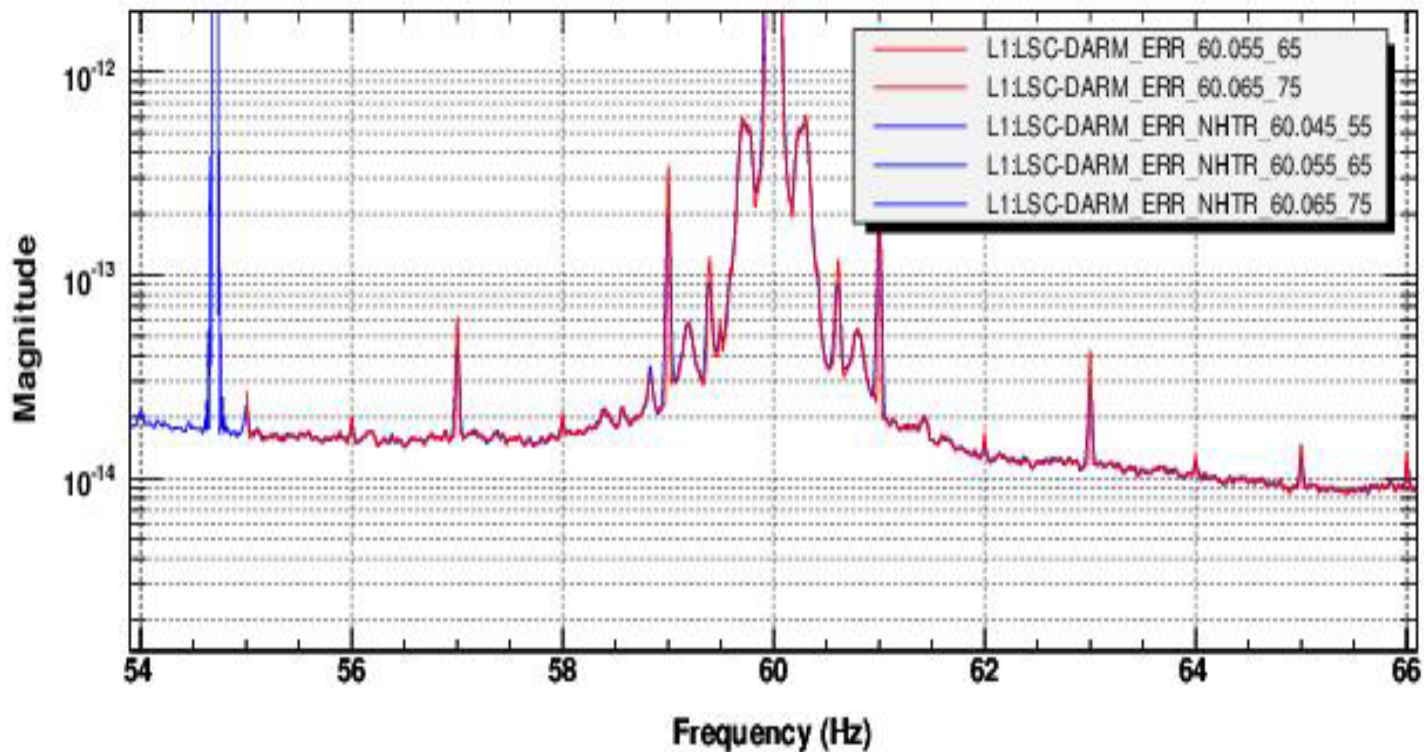
## 3 Hz Lines





# L1 structure

Power spectrum



T0=19/03/2007 16:17:49

BW=0

# Summary

- **SixtyHertzMon running stably and documented**
- **Flagging 60 Hz / 120 Hz / 180 Hz sidebands in archived log files**
- **Producing online plots for follow-up investigation of reported sidebands**