

StrainBandsMon and SixtyHertzMon

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(for Ramon Armen & Junyi Zhang)

LIGO Scientific Collaboration Meeting
LSU – August 16, 2006

StrainBandsMon

(Ramon Armen)

E-mail from Rana last September (from Hannover):

Why doesn't LIGO track band-limited RMS calibrated strain?
(the way GEO does)

Ramon Armen (U. Michigan freshman) walked into my office about a week later to inquire about LIGO research opportunities

Bingo!

Over the next several months, Ramon dug into the DMT infrastructure (especially Patrick Sutton's EasyCalibrate class) and created **StrainBandsMon**

StrainBandsMon

StrainBandsMon now running online:

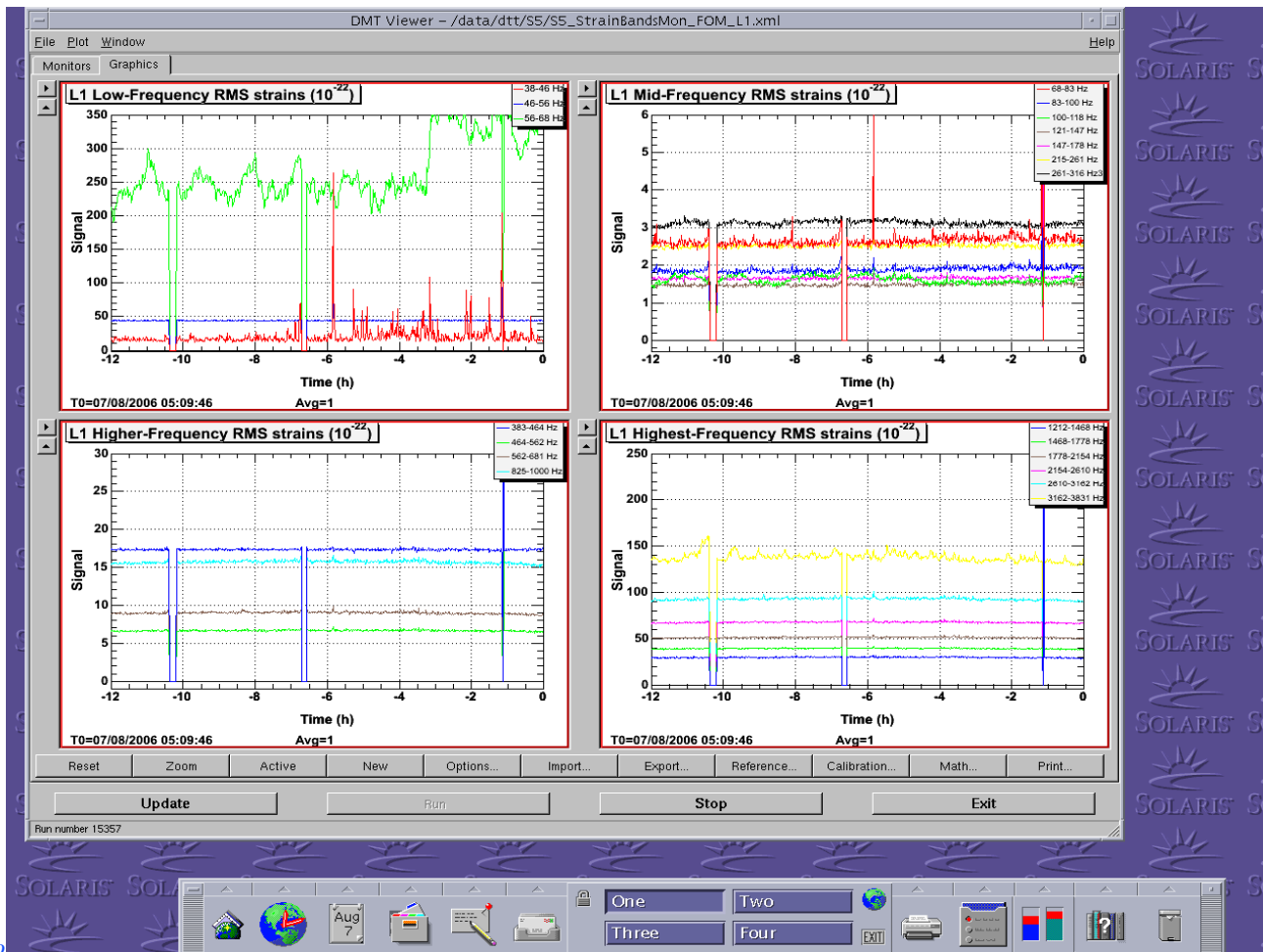
Produces DMT viewer figure of merit

Produces minute trends

Produces status web page

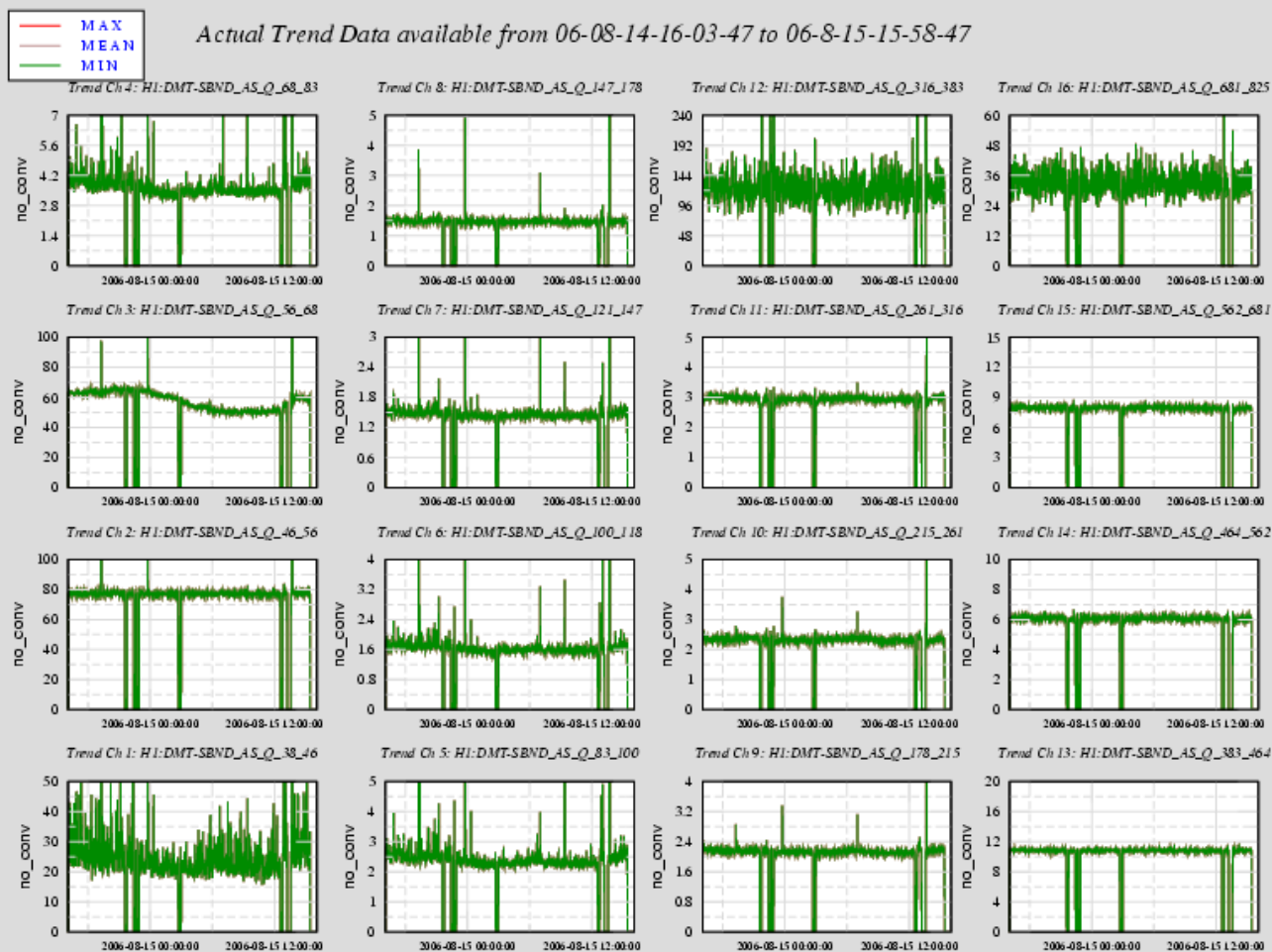
And documented!

DMT Viewer Figure of Merit



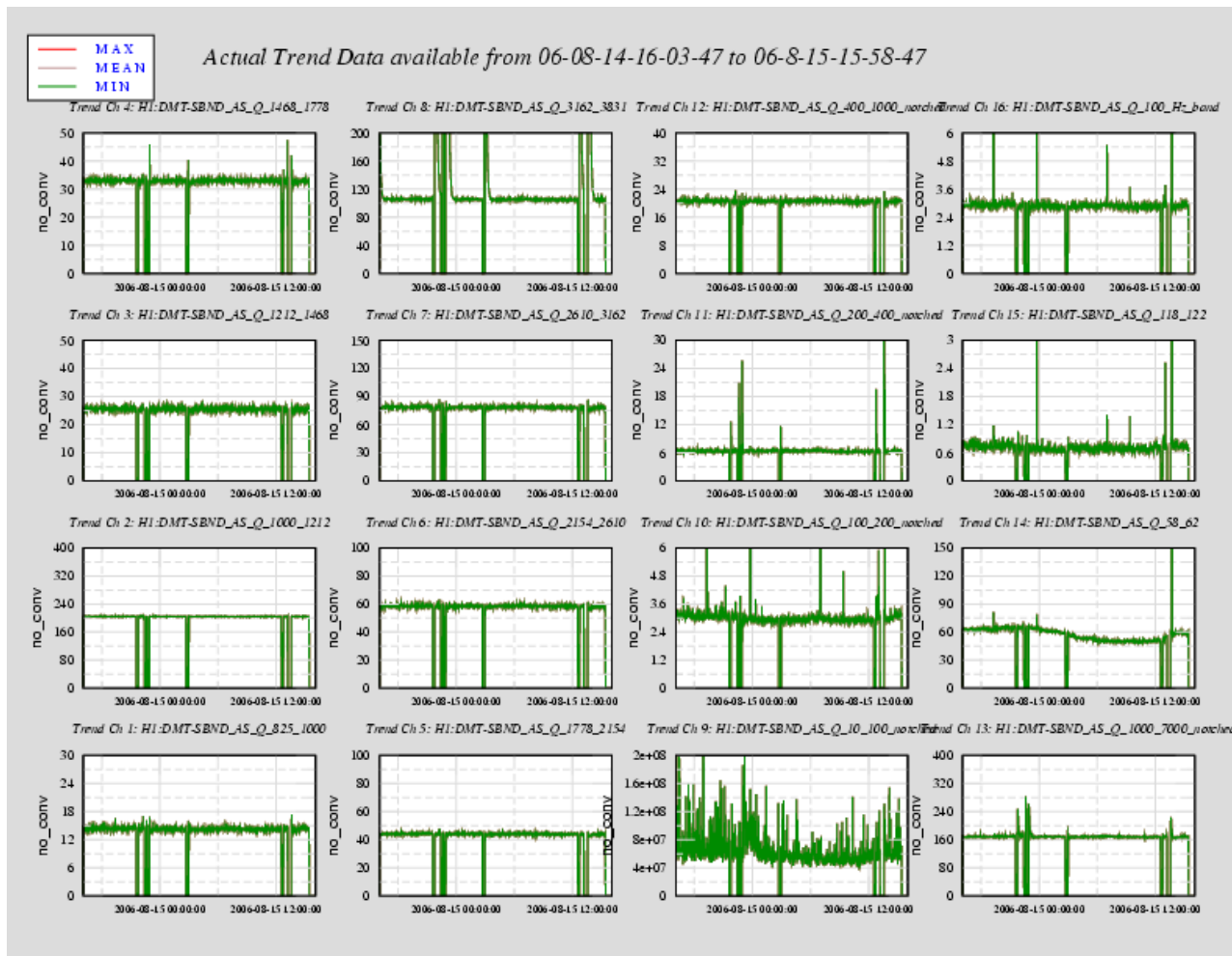
Daily summaries

(low frequency bands)



Daily summaries

(high freq / broad / special bands)



Daily summaries

(high freq / broad / special bands)

[Link to status page](#)

[Link to documentation page](#)

SixtyHertzMon

(Junyi Zhang)

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)

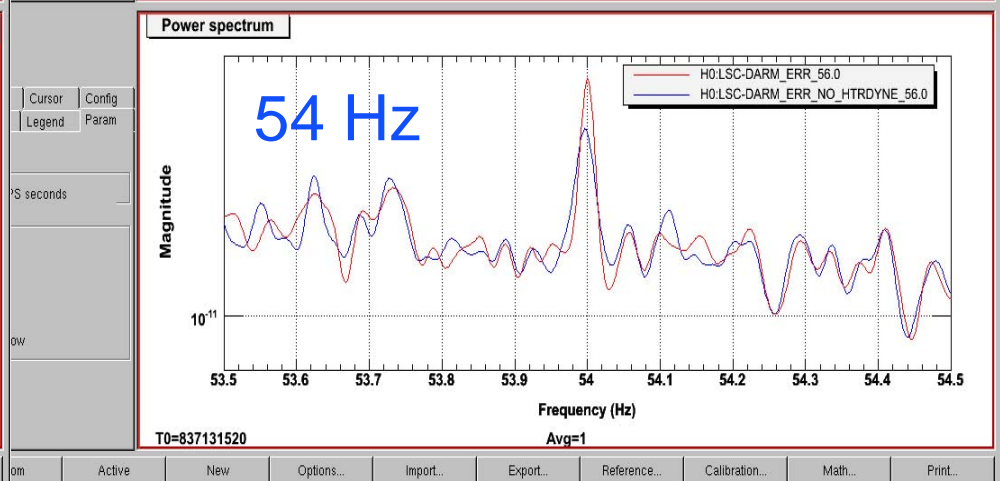
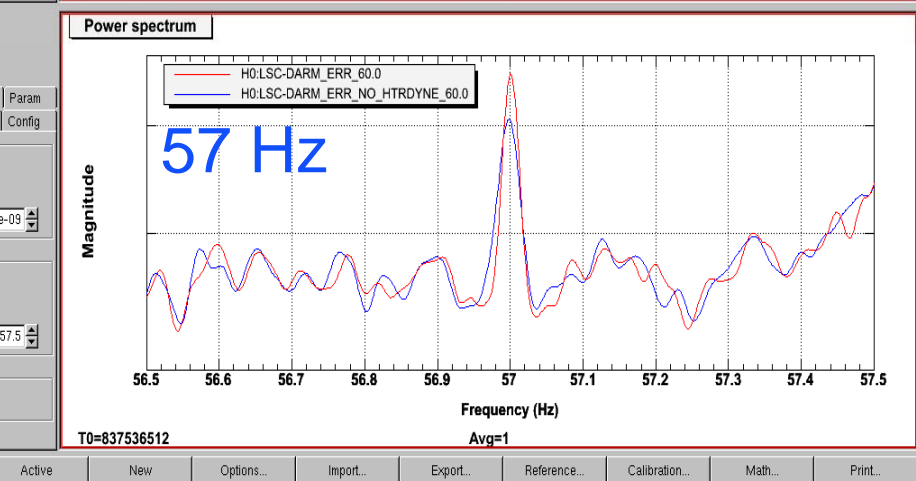
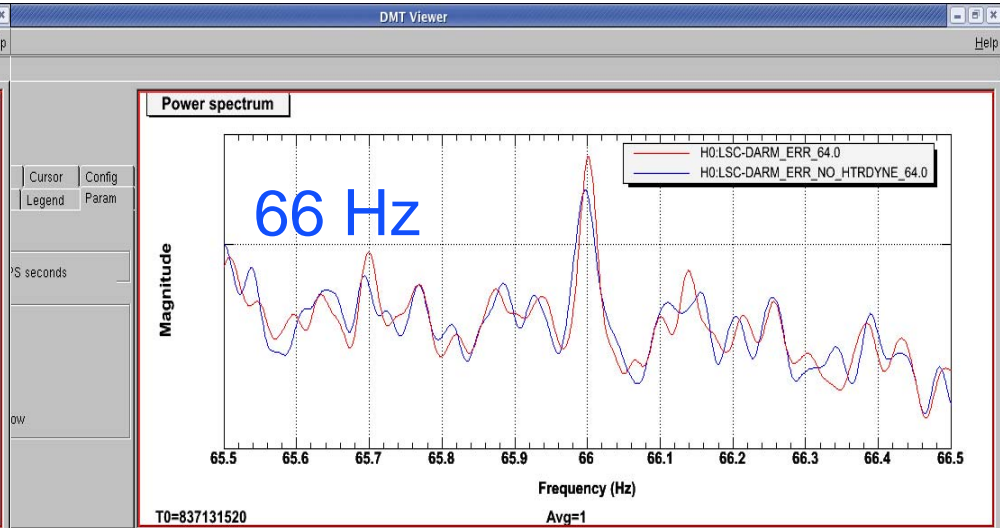
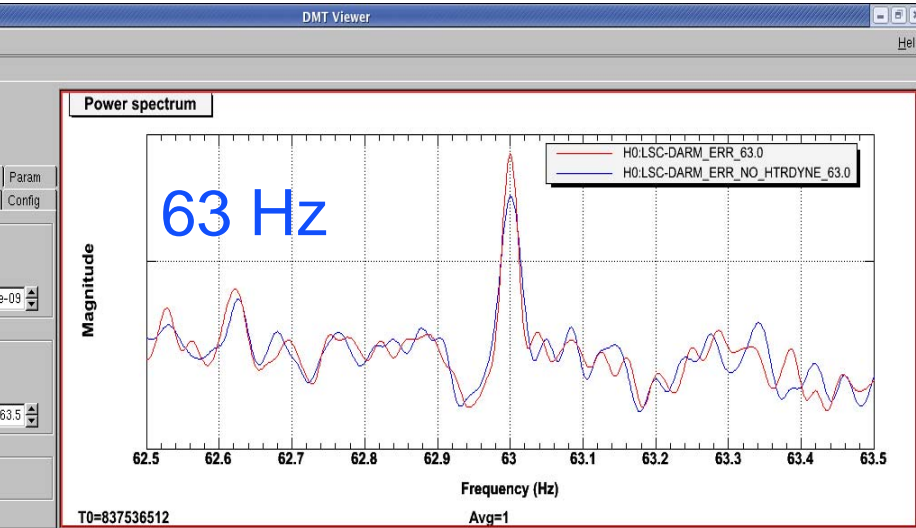
Compare spectra near 60 Hz (or higher harmonic) from 1) and 2):

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

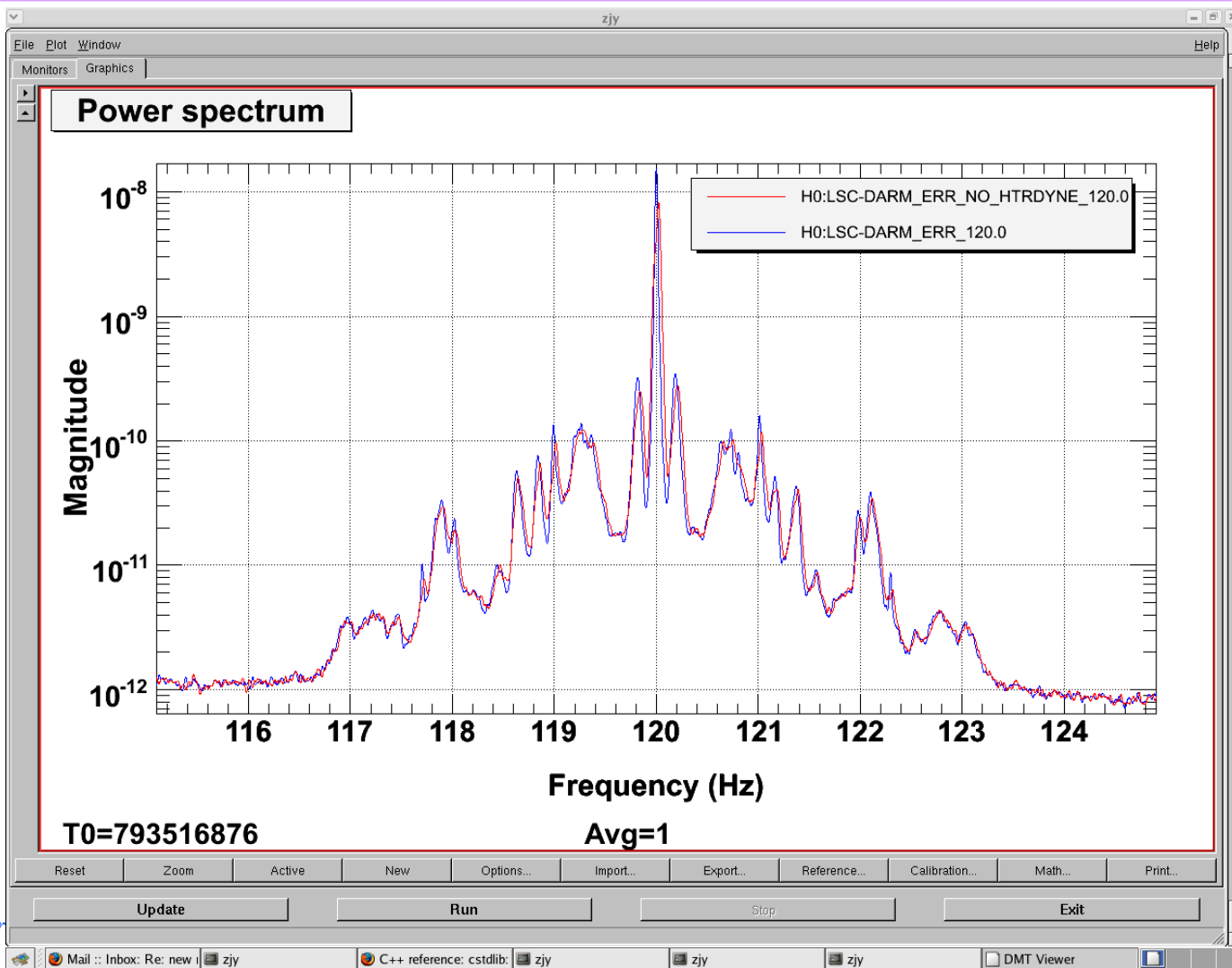
Examples

(S5 $\pm 3\text{Hz}$, $\pm 6\text{Hz}$)



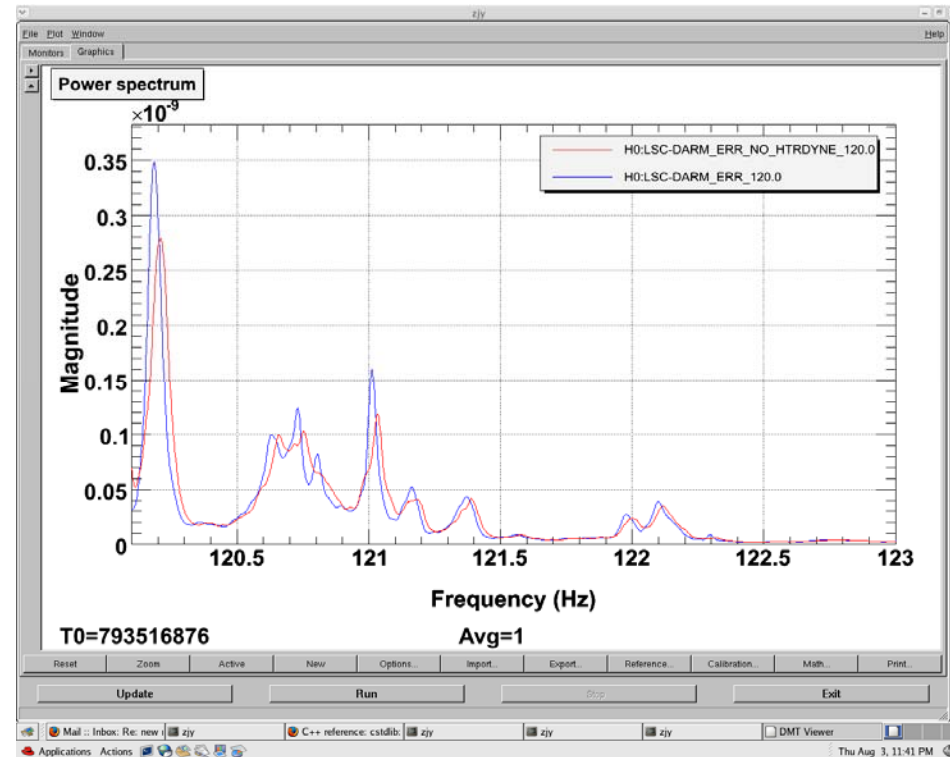
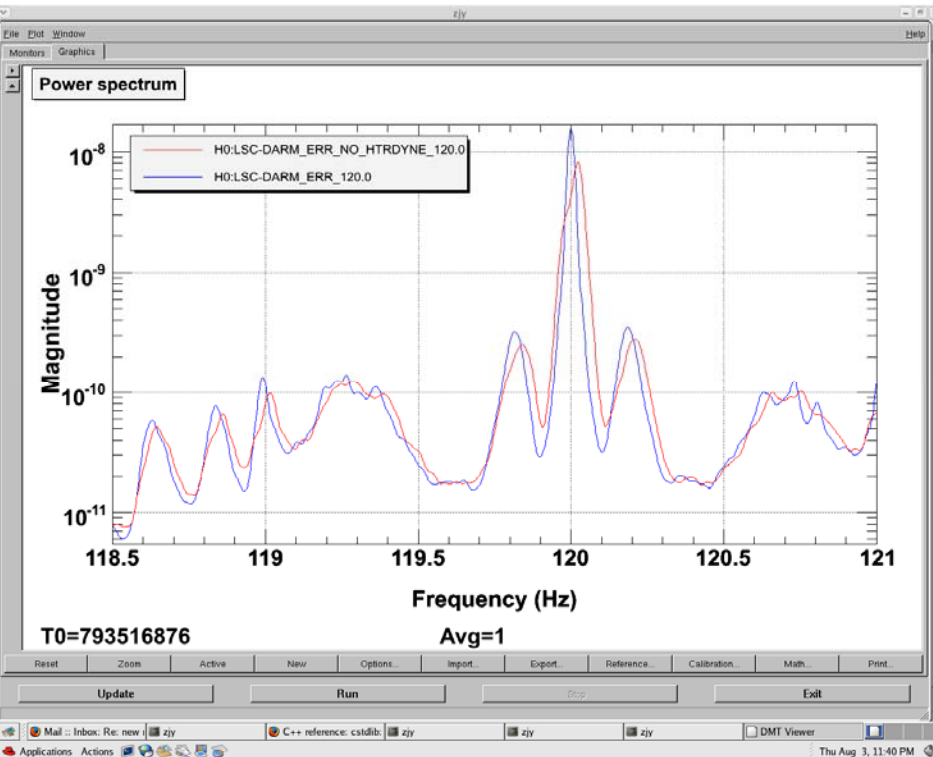
Examples

(S4 120 Hz – short period)



Examples

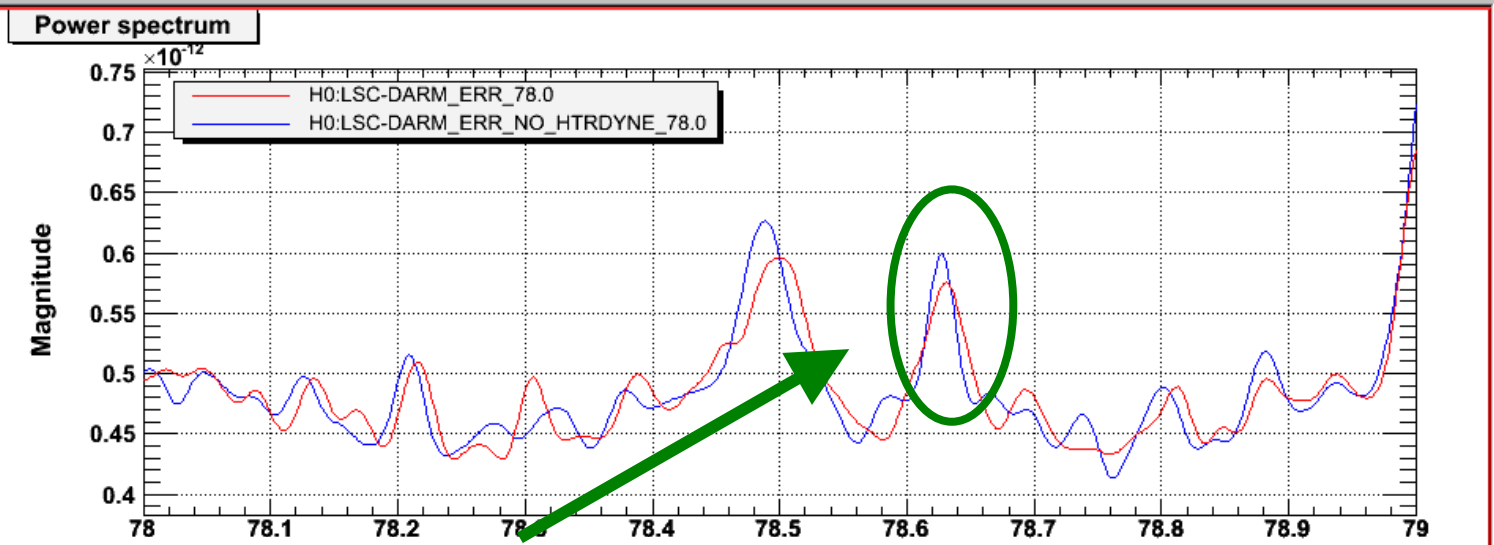
(S4 120 Hz – short period)



X-axis	Y-axis	Legend	Param
Range	Units	Cursor	Config

linear log
 automatic manual
 5.43299e-13 To 9.85272e-09

linear log
 automatic manual
 78 To 79



1) is sharper than 2)

→ NOT 60 Hz sideband

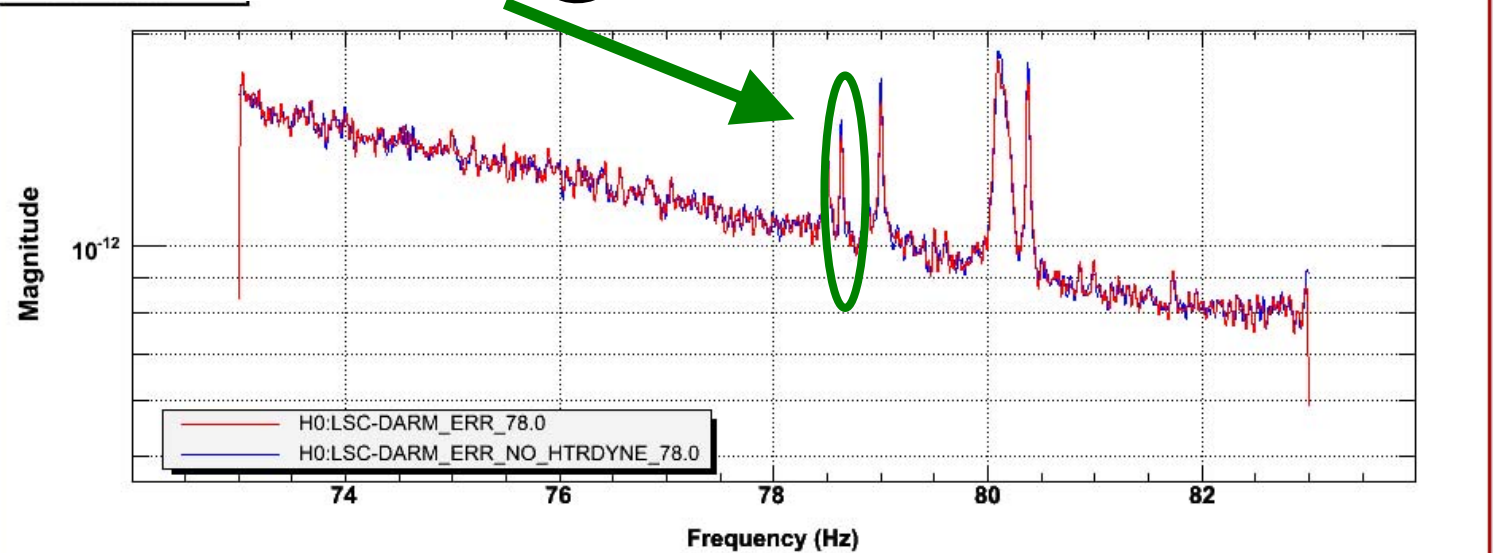


Range	Units	Cursor	Config
X-axis	Y-axis	Legend	Param

Top right
 Bottom right
 Y: 0.00 Size: 1.0

User:

2 3 4 5 6 7



Help

Status

- Program under active development
- Has been run on archived S4 & S5 data and on online data (fortress & marble)
- More infrastructure & documentation needed
- Plan to incorporate into online production following standard S5 protocol