



Summary of Detector Characterization Sessions

Keith Riles (University of Michigan)

***LSC-Virgo Meeting
MIT – July 23-26, 2007***



DC Parallel Session Highlights

S5 environmental disturbances – Robert Schofield

Investigations of table floating effects; periodic H2 glitches; wind farm tests; magnetic storms; vacuum flange backscatter

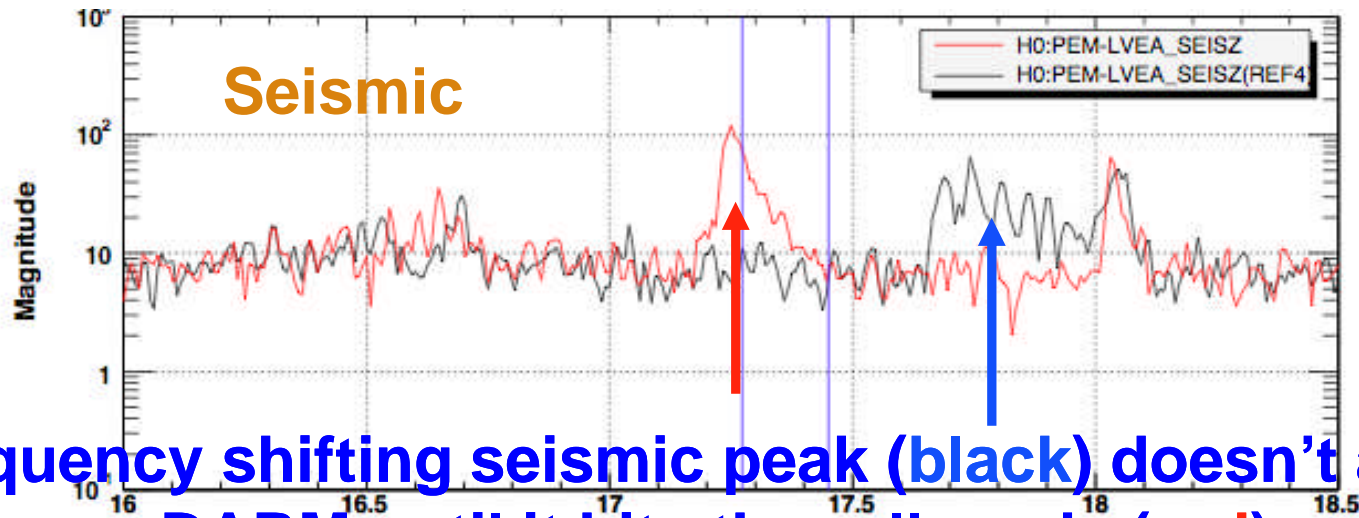
S5 timing stability – Szabi Marka

Timing in good shape, odd periodicities at sub- \circ s level; making plans for LIGO/Virgo synchronization check)

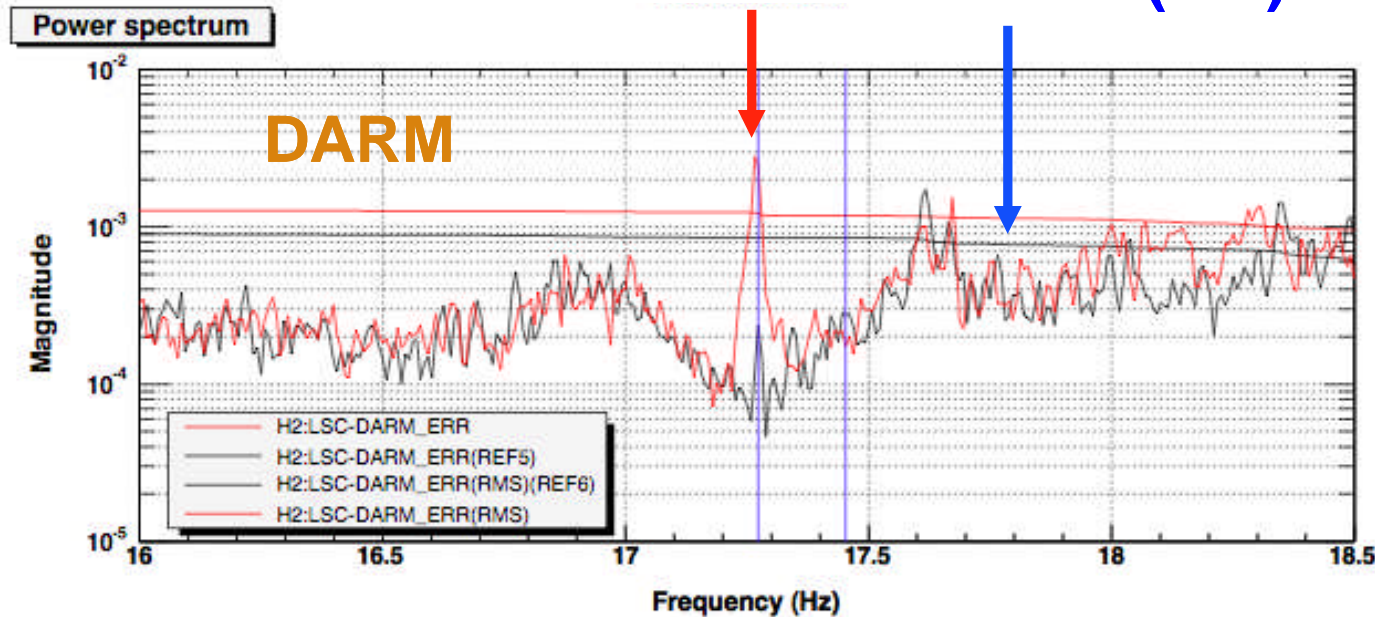
Listening to glitches – Peter Saulson

If you've heard one H1 glitch, you've heard all H1 glitches; ditto for H2 & L1, but different IFO's have different audio characters

Why? Test mass roll mode excited every 30 minutes.



Frequency shifting seismic peak (black) doesn't affect DARM until it hits the roll mode (red)



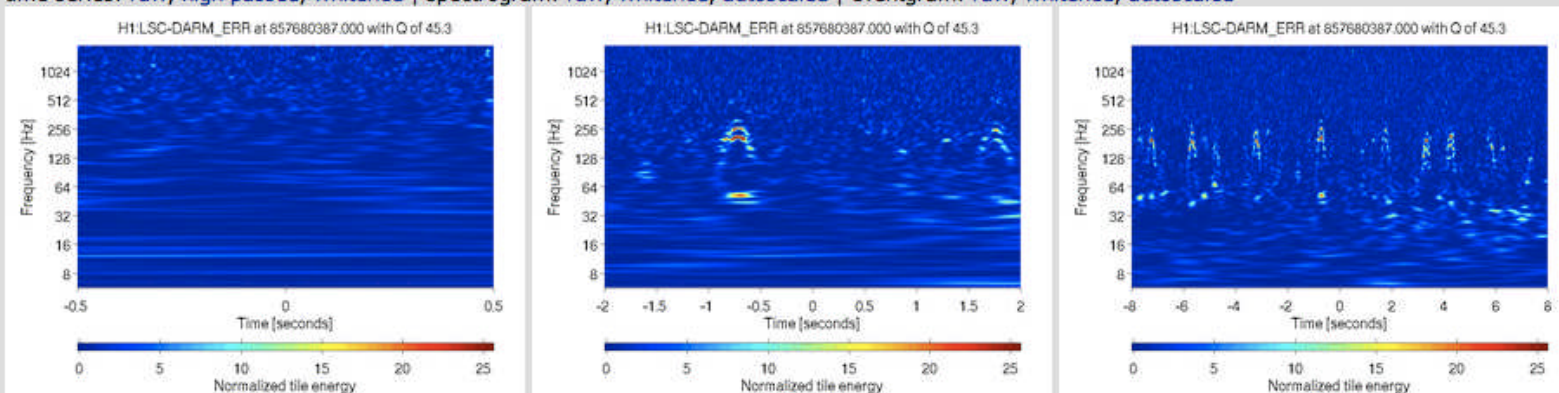
Can back-scattering produce H1-H2 events that are not present in auxiliary channels?

R. Schofield

H1

✓ H1:LSC-DARM_ERR (t = 857680387.078 s, f = 1.9×10^3 Hz, Q = 4.5×10^1 , Z = 7.7×10^0 , X = 3.0×10^{-8} Hz^{-1/2})

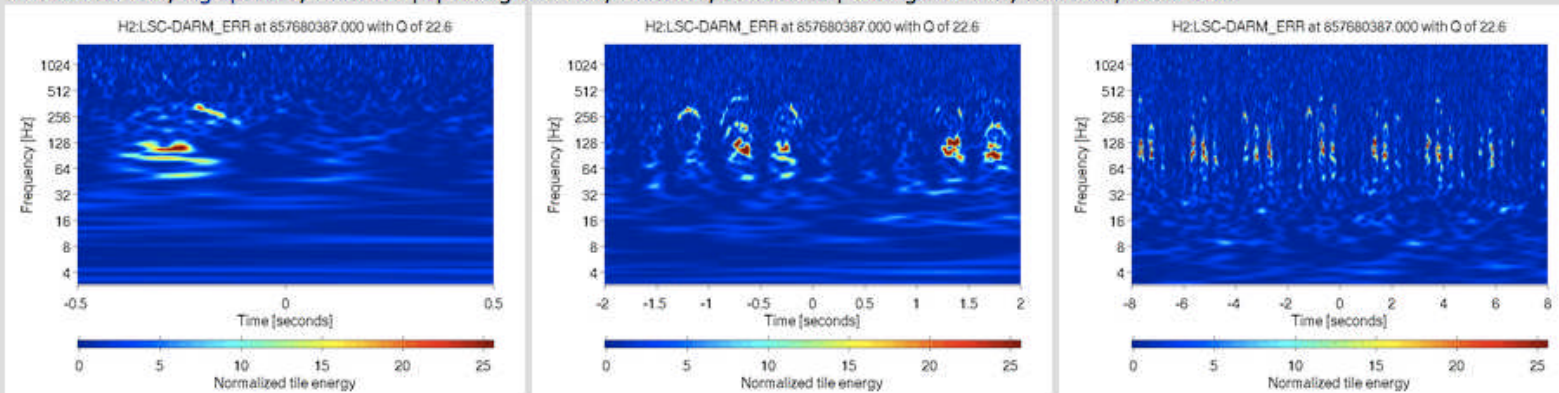
time series: raw, high passed, whitened | spectrogram: raw, whitened, autoscaled | eventgram: raw, whitened, autoscaled



H2

✓ H2:LSC-DARM_ERR (t = 857680386.750 s, f = 1.1×10^2 Hz, Q = 2.3×10^1 , Z = 3.2×10^1 , X = 4.8×10^{-6} Hz^{-1/2})

time series: raw, high passed, whitened | spectrogram: raw, whitened, autoscaled | eventgram: raw, whitened, autoscaled



These events during H2 malfunction (in science mode), but show that multi-bounce back-scattering paths exist between H1 and H2



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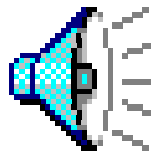
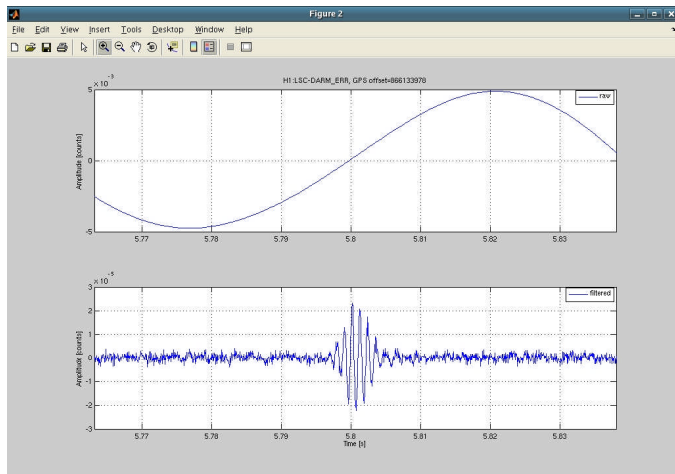
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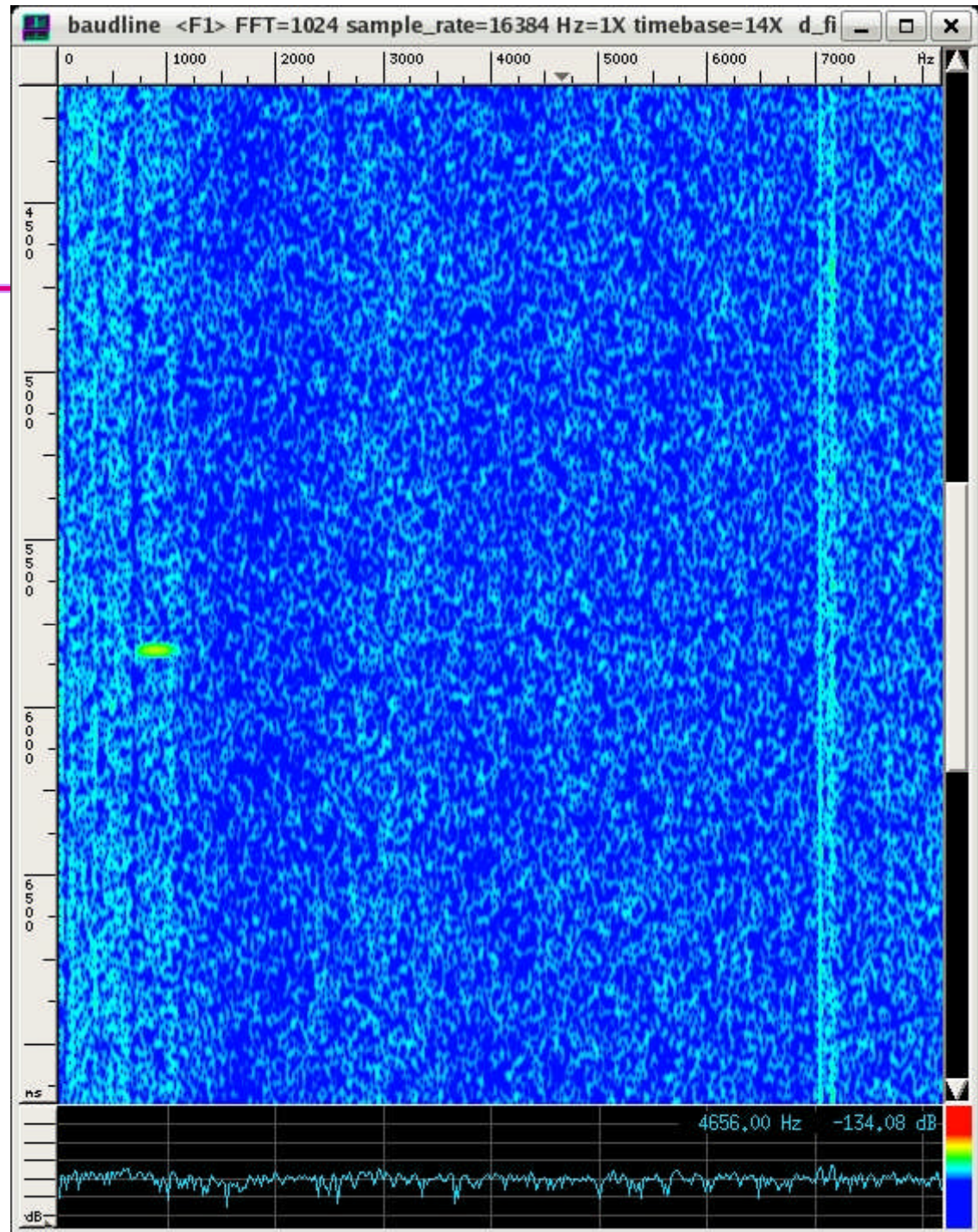
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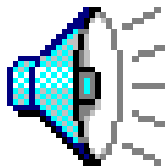
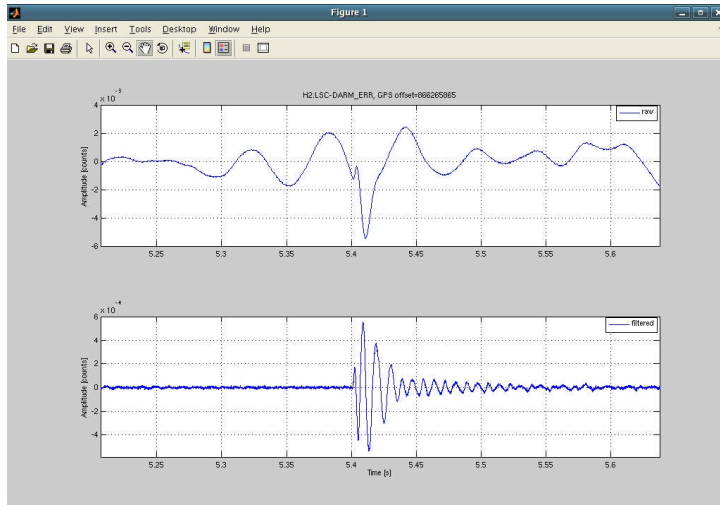


Injection sample

Detector Characterization Summary

LIGO-G070082-00-Z

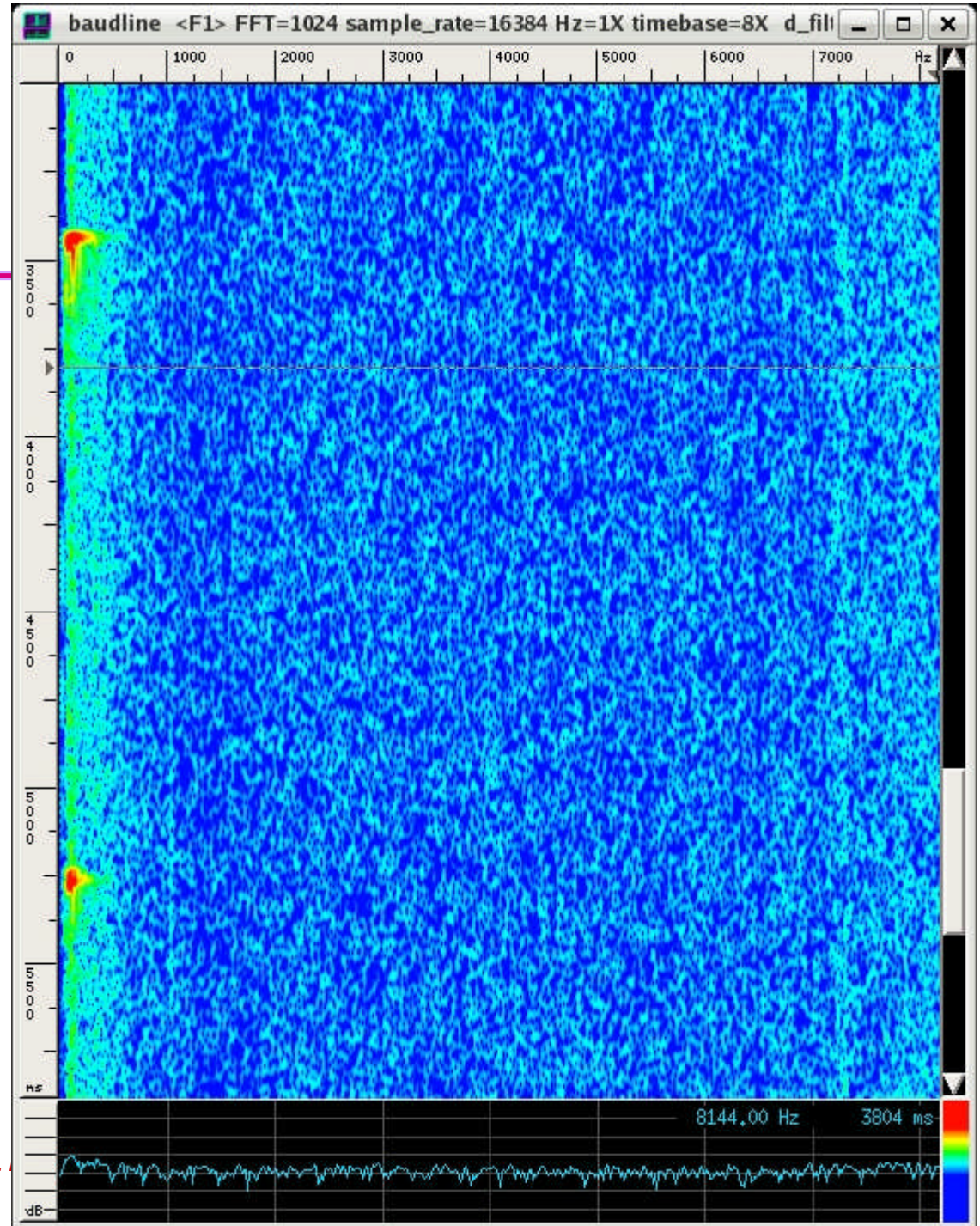




Glitch sample

Detector Characterization Summary

LIGO-G070082-00-Z



K.



DC Parallel Session Highlights

New kinds of Block-Normal triggers – Shantanu Desai

New creatures keep popping up to populate the zoo; many old friends linger

Barkhausen noise studies – Rai Weiss

Strong evidence that domain-flipping in actuation magnets causing upconversion – proposal to replace NdFeB with SmCo

S5 Data Quality Investigations – John Zweizig

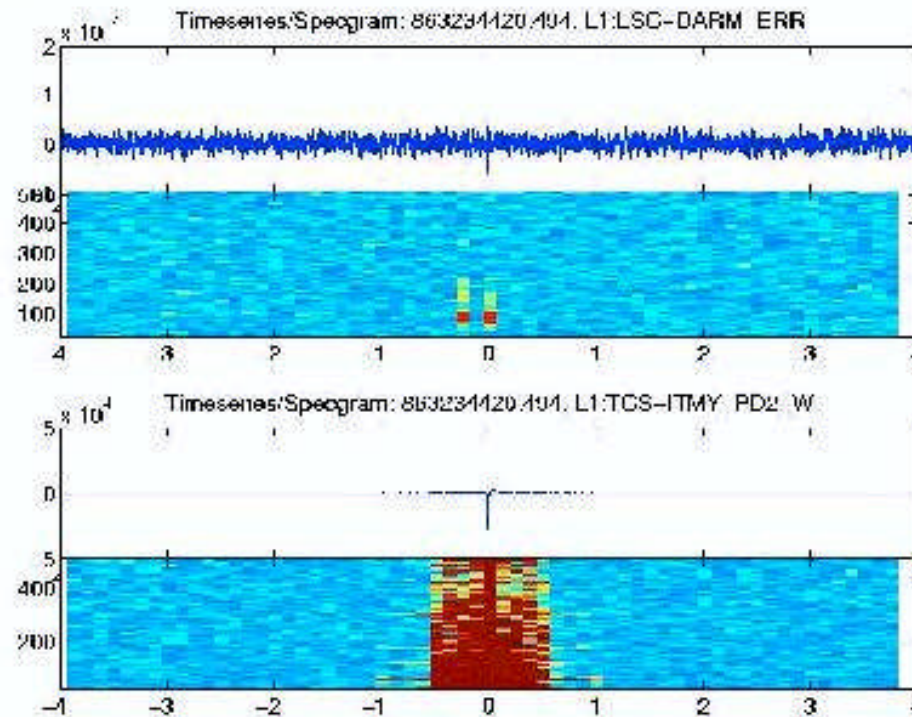
New and updated DQ flags; more on the horizon; some issues still pending



S. Desai

LLO TCS glitches

- Does LLO TCS glitch and do mode hops in LLO TCS laser affect DARM (similar to LHO)?



Yes they do, but corresponding DARM-ERR events lower amplitude than at LHO.

Need to look at second trends to create DQ flags
Because of non-existence Of relevant L1 TCS channels in Level-1 RDS

https://www.ligo.caltech.edu

G070105-00-2



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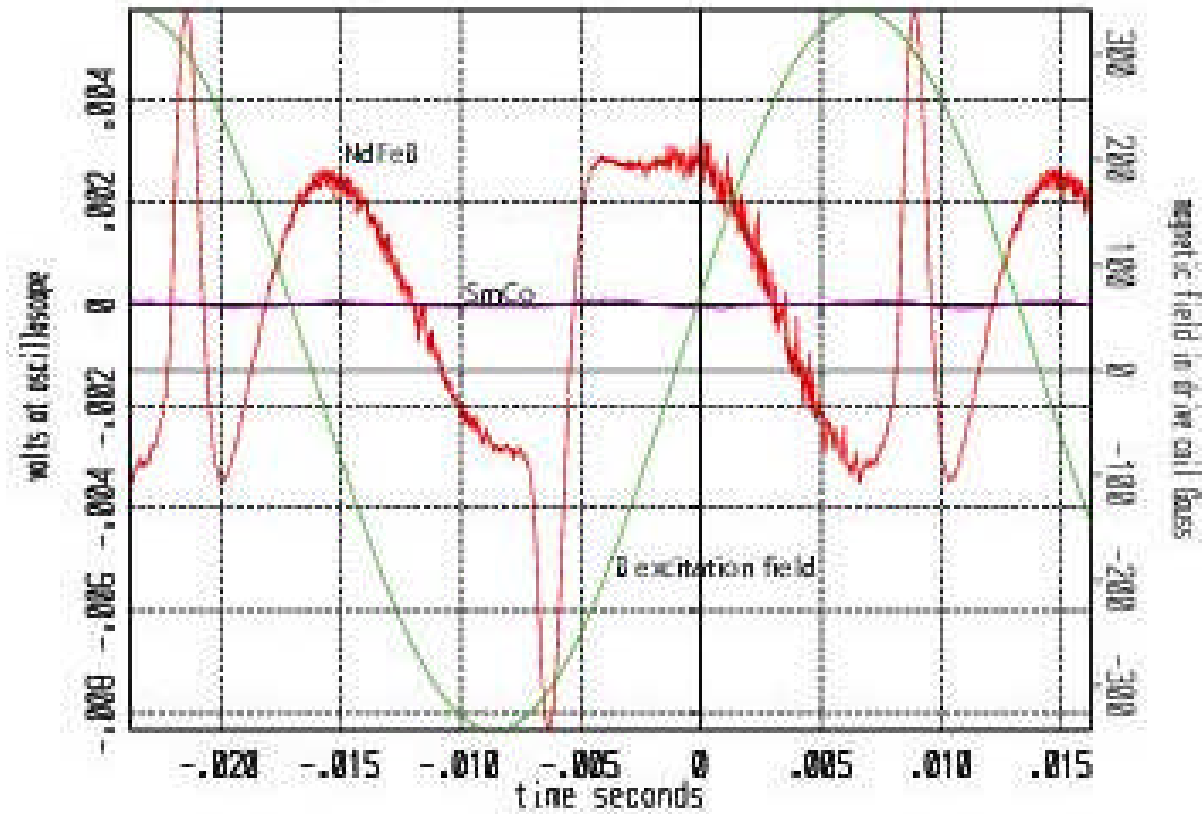
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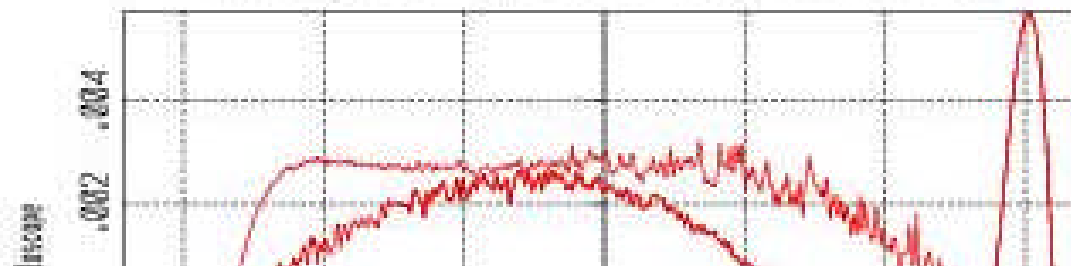
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NdFeB magnet and SmCo magnet in 33Hz drive field



NdFeB magnet in sample coil voltage vs drive field





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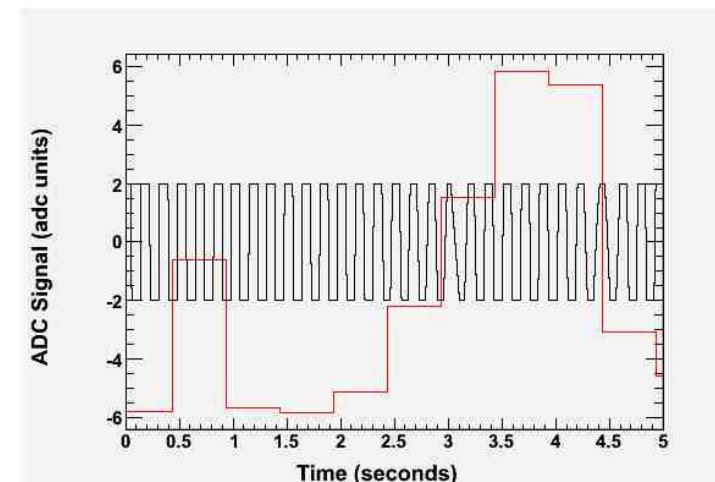
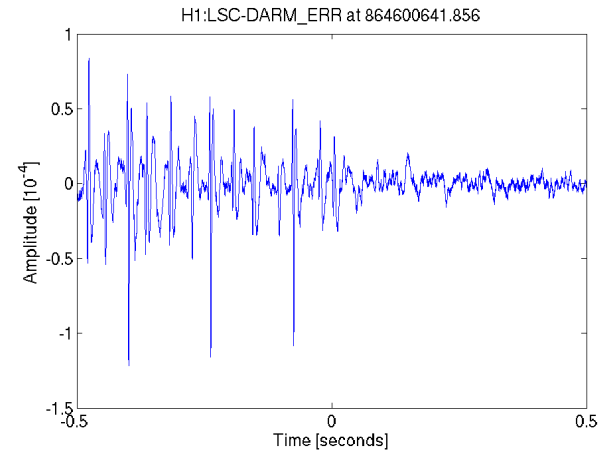
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ETM Side Coils

- Side coil drivers go into seismically initiated oscillations at ~6 Hz
 - » Mechanical resonances ~1Hz
 - » Unknown driving mechanism
 - Servo instability?
- Diagnosis
 - » Laura creates ETMY_SIDE flags based on Vmon channel (16Hz)
 - » Overflow channels don't work
 - » Coil readback at LHO only and doesn't cover full range (readback $\pm 2V$, DAC $\pm 5V$)
 - » Extrapolate from coils assuming sinusoid.





DC Parallel Session Highlights

S5 cosmic ray studies – Ray Frey

Data compiled from scintillators at Hanford – list of intervals for DQ flagging → Look for effects in GW channel

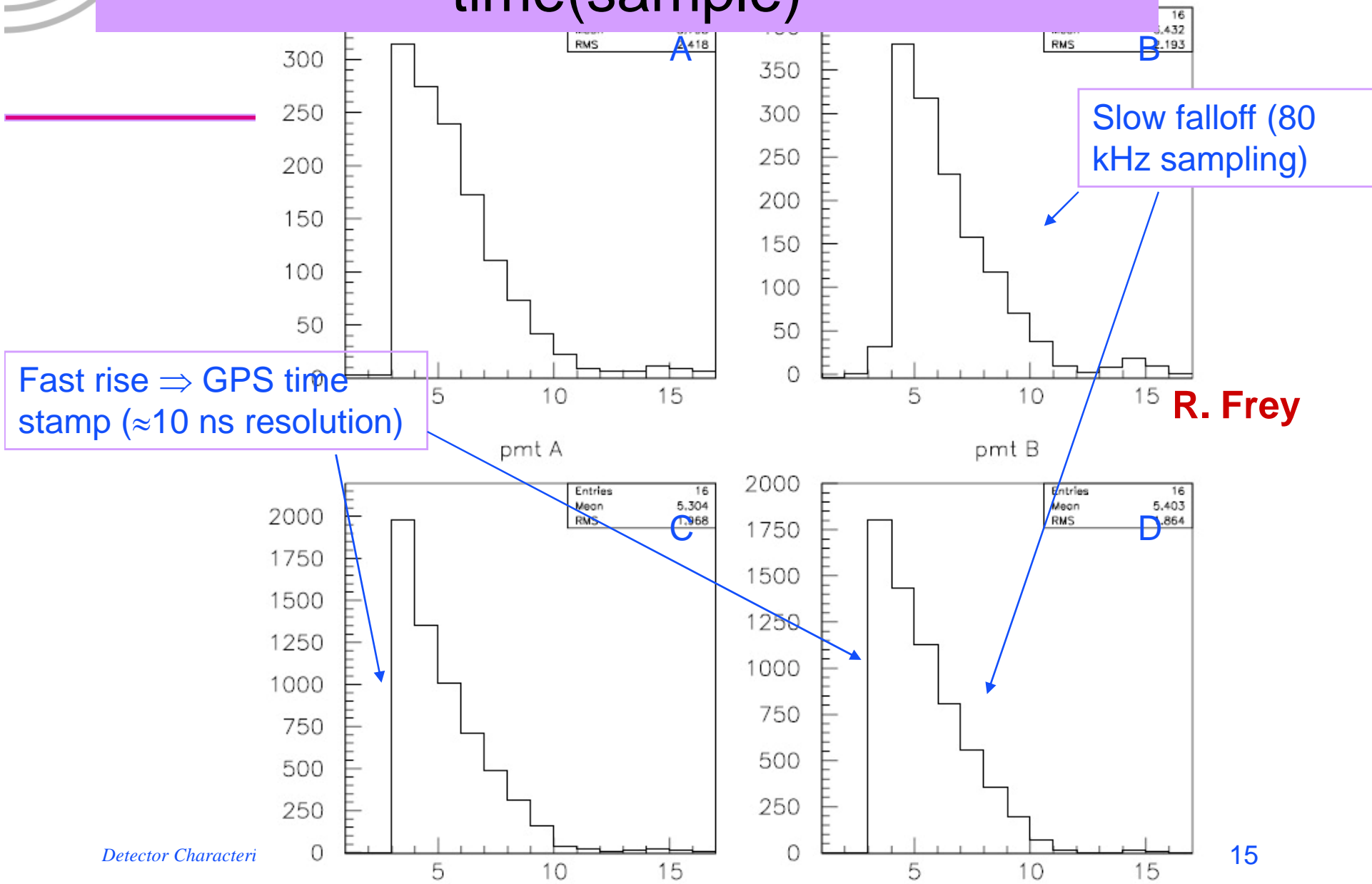
DMT infrastructure updates – John Zweizig

New release with many fixes and upgrades; some new monitors and utilities [PD asymmetry, online-h(t)]

S5 coherence investigations – Nelson Christensen

New automated infrastructure for following up on spectral lines; month-by-month coherence signals allow tracking of wandering lines (examples shown by Keith Thorne)

A typical CR event – pulse height vs time(sample)





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