Block-Normal, Event Display and Q-scan Based Glitch and Veto Studies

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for

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And

Glitch Working Group

Outline of Talk

- First part will be continuation of talk given in DetChar session in March LSC meeting on "Event Display and loud Block-Normal events".

- In the second part will talk on Block-Normal based veto safety studies on LSC-POB_I

Updates since last meeting

- Got rid of SPOB channels. Added power-line channels,TCS channels, and the newly added L0:PEM-RADIO_ROOF and H0:PEM-RADIO_LVEA_H1.
- Event display can now run on CIT grid computer.
  (thanks to Stuart)
- Event display can also access channels in raw frames.
- Stand-alone code available which can make spectrograms for any channels, any frequency range, with and without LPEF.
- Q-scans of loud Block-Normal events being produced since June 1st.

# Features of loud Block-Normal events

- Lot of overlap between loud Block-Normal events and loud inspiral triggers (SNR > 25).

- Number of loud L1 events have drastically reduced since the May commissioning.

- Most of LHO loud events are caused by seismic noise in (0.5-2 Hz) band. Possible to identify them visually. *(Desperately need a seismic DQ flag)*

- No clue as to the cause of many loud Block-Normal and inspiral triggers based on event display and Q-scan based studies.

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New things seen

- Power line and magnetic glitches.

- TCS glitches seen . However they do not seem to cause loud DARM-ERR events.

- Data corruption (most recently seen ~ 2 weeks ago)

- Broken PEM and auxiliary channels
  (eg. H0: PEM-COIL_MAGX, L0:PEM-COIL_MAGX,
  L0:PEM-COIL_MAGZ and H2:LSC-POY_DC)
  (Shourov creating DQ flags for auxiliary channels.)

- Auxiliary channels showing 0s in frames.

Open Question : Airplanes
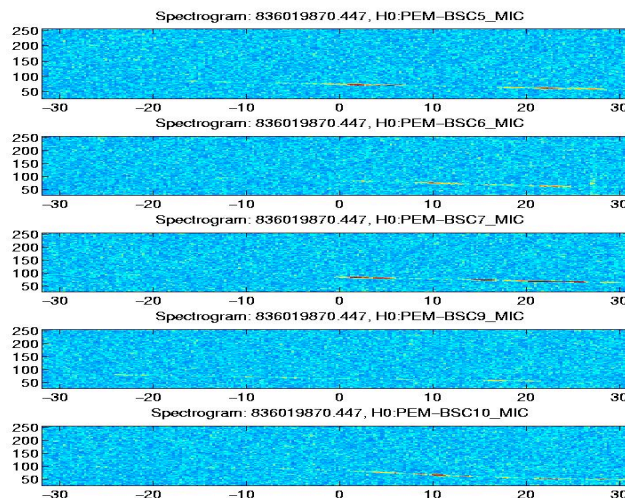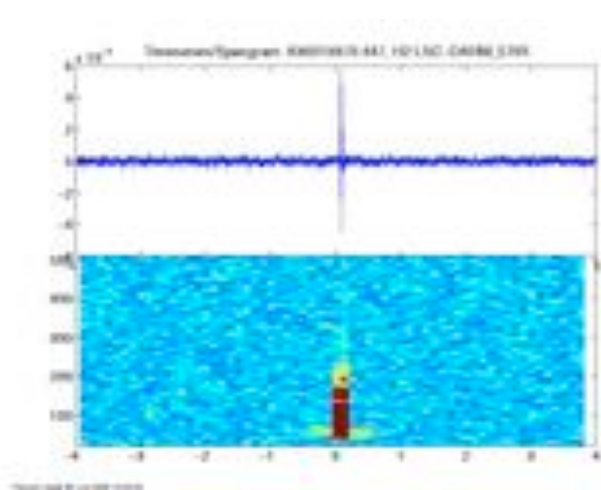
- Airplane events seen in overlap with loud LHO events.
- Before May, few airplane (and 1 possible helicopter) events seen in overlap with loud LLO events. After May, no loud event seen during L1 airplane events.
- Is this a chance coincidence or are airplane events causing loud or moderate amplitude DARM-ERR events?

Conclusions and Future plans

- Use more help from onsite people, Scimons etc in tracking these events. *(Just yesterday Malik informed me that most of 51 loud H1/H2 events on 2006-08-11 were seen during very windy times)*

- Create an event display which will look at channels in raw frames as maybe the current event display may have reached saturation in terms of usefulness.

- Look at low amplitude Block-Normal events as well as events with large values of CorrPower Gamma(just recently started)
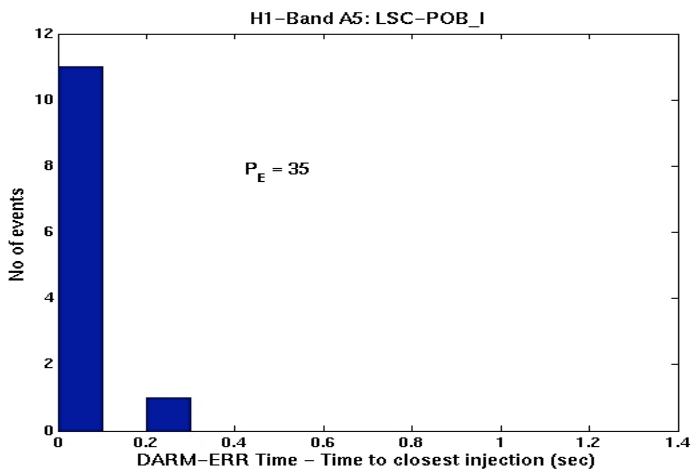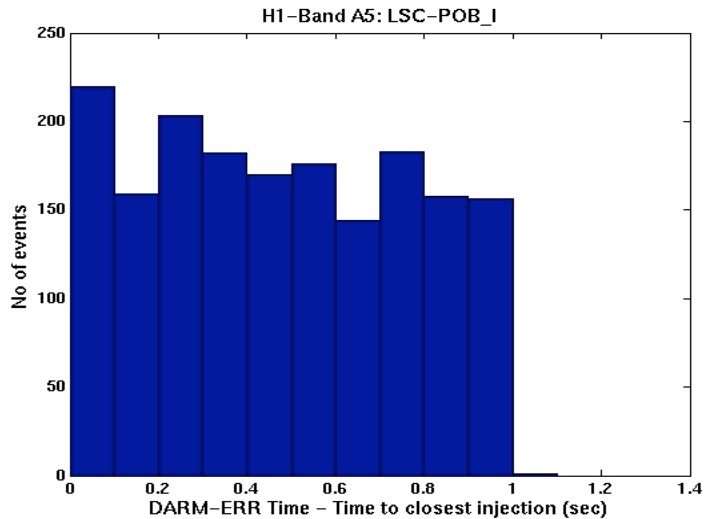
- Create a similar event display for GEO.

Veto Safety Studies

- Create segment lists containing hardware injections having overlap with science mode segments so that they are at least 300 secs in duration *(with P. Shawhan's injdatasegs script)*
- Applied B-N to DARM-ERR as well as POB-I.
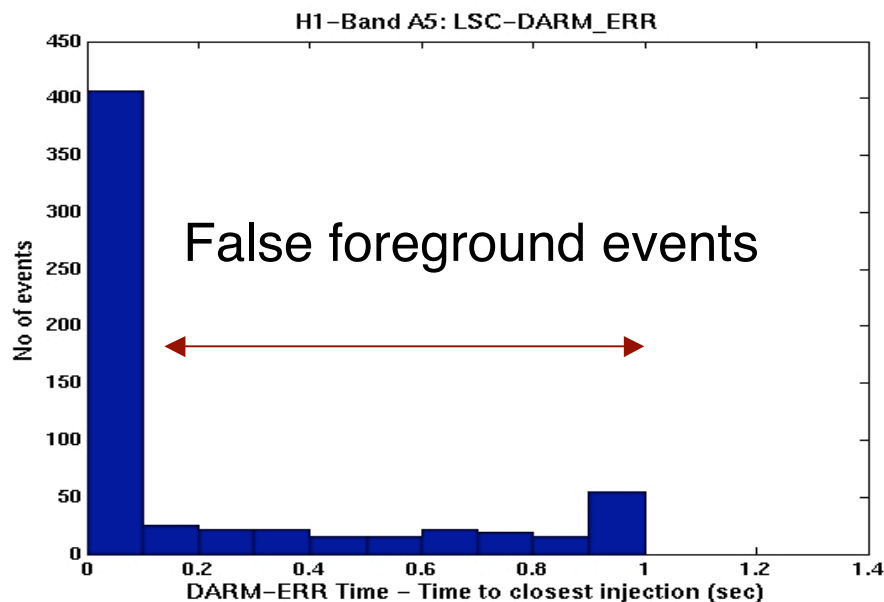
POB-I veto safety results

96-192 Hz

Power threshold = 0
No of events within 0.1 sec. = 220
False Foreground events = 153

Power threshold = 35
No of events within 0.1 sec. = 11
False Foreground events = 0.1

Clearly at low-frequencies
POB-I not a safe veto
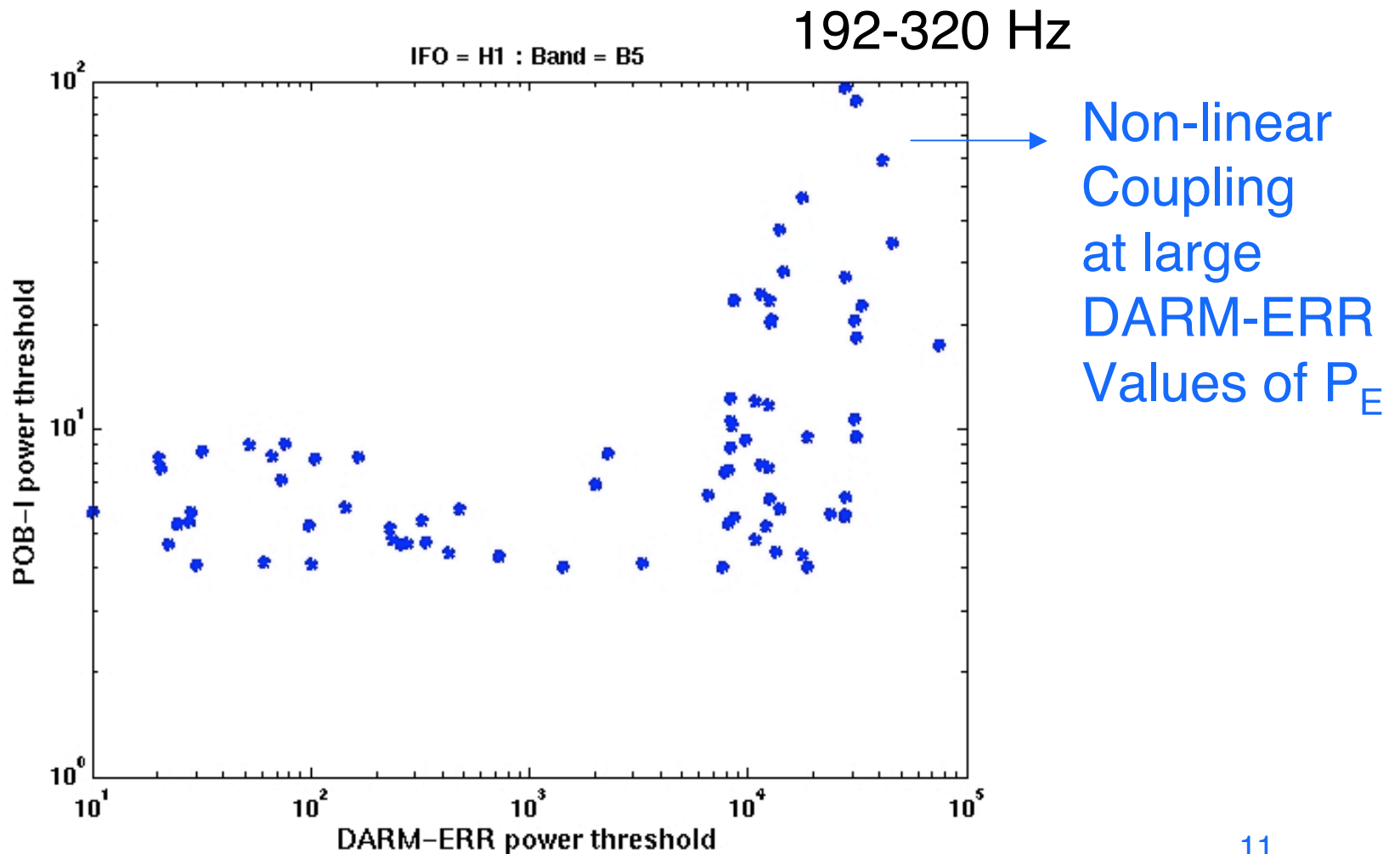(using this method)

POB-I veto safety (contd)

- Same story true for other IFOs in low frequency bands A5 (96-192 Hz), B5 (192- 320 Hz)
- Bands above this frequency range are safe.

Band A5 (Similar numbers for B5)

IFO	P_E	H.W. events	False foreground events
H1	35	11	0.1
H2	21	9	0.2
L1	20	11	0.1

POB-I vs DARM power thresholds

192-320 Hz

Non-linear
Coupling
at large
DARM-ERR
Values of P_E

Event Display Based Diagnosis
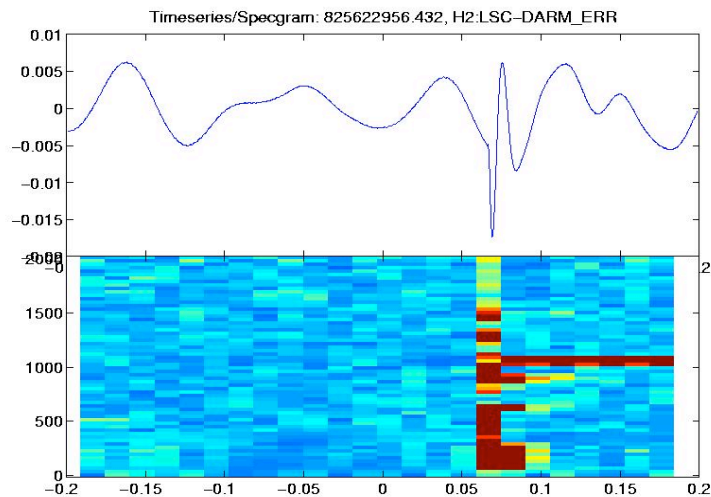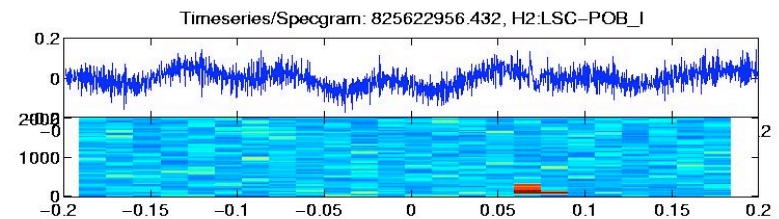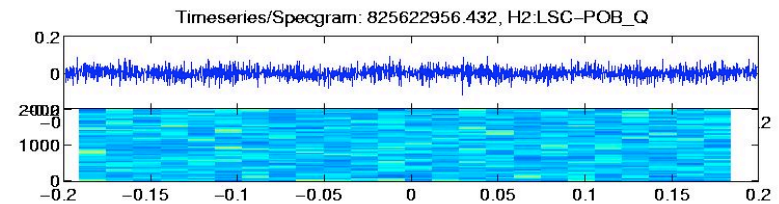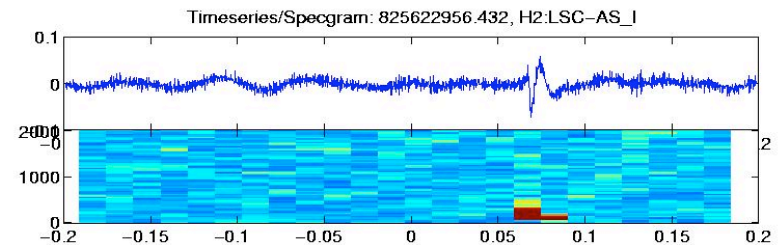
Clearly glitch in POB-I associated with H.W.
Glitches also seen in MICH-CTRL, PRC-CTRL, AS-I
and for some of them in REFL-Q, REFL-I and POB-Q

Peter Shawhan's Observations

Warning: This info may be outdated. More extensive studies and tests done by Gaby. See also Myungkee's talk

- Most of these are loud 3068 Hz sine-Gaussians which produced LSC-MASTER_OVERFLOW flag.

- POB-I (and glitches in other channels) produced from overflow conditions caused by ringing.

- Not clear if the hit is in the sensing chain or because of limited dynamic range of the system.

- This channel unsafe for only spectacularly loud signals in 96-320 Hz range for moderate POB-I thresholds.