BurstMon

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- **motivation & documentation**
- **description & results**
- **noise stationarity for S2&S3**
- **summary & plans**

motivation

- **display performance of LIGO detectors to identify (new) problems during data taking runs (maintain high *data_for_analysis/data_on_tape* ratio)**

- **give a reference point for burst searches in terms of sensitivity and rate**

- **express detector performance in few burst FOMs**

  ➢ **detector sensitivity: range or strain (preferably for astro-motivated burst sources)**

  ➢ **noise non-stationarity & non-Gaussianity**

- **latency**

 ➢ **Short (few minutes) to be useful in control room**

BurstMon

- **DMT monitor:** Measures hrss amplitude of injections at 50% of detection efficiency and produce burst FOMs.

- **Method:** The BurstMon performs real time injection of simulated bursts and detect them using burst analysis in wavelet domain.

- **Input:** single detector AS_Q channel & injection waveforms

- **Output:** dmtviewer & trends (min, sec)
  - ➤ detector sensitivity, hrss @ 50%
  - ➤ noise variability (non-stationarity)
  - ➤ rates (complimentary to glitchMon)

- **reference:** **http://www.phys.ufl.edu/LIGO/burstmon/**

- **LIGO Note:** BurstMon, T040162-00-Z

AS_Q
channel

wavelet transform,
data conditioning
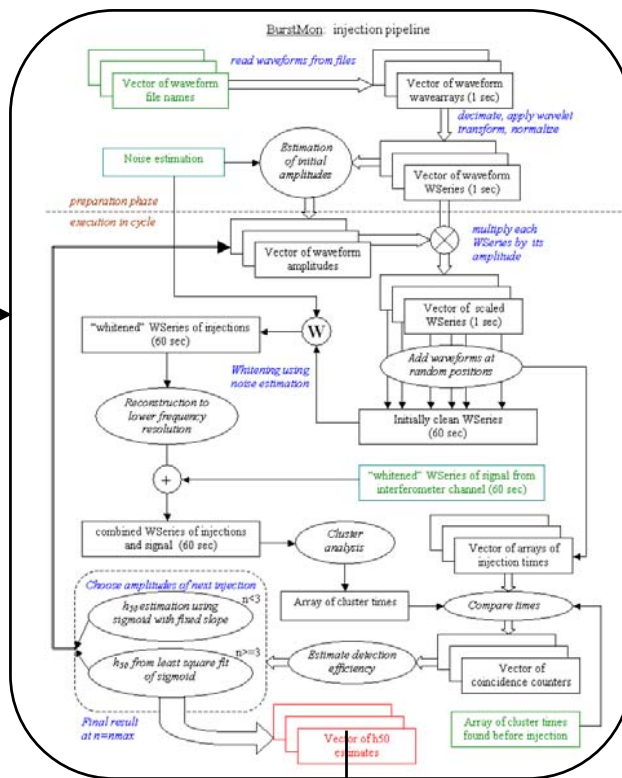
injection
waveforms

calibration,
wavelet transform,
data conditioning,

50-100 injections/point

hrss@50%

Test with stationary white noise
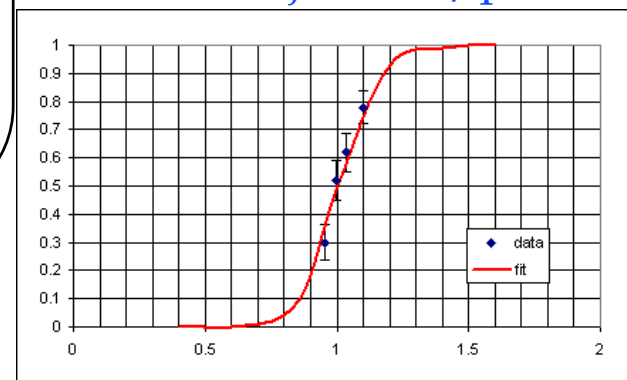
- **un-calibrated hrss for SG235 Hz injection:**
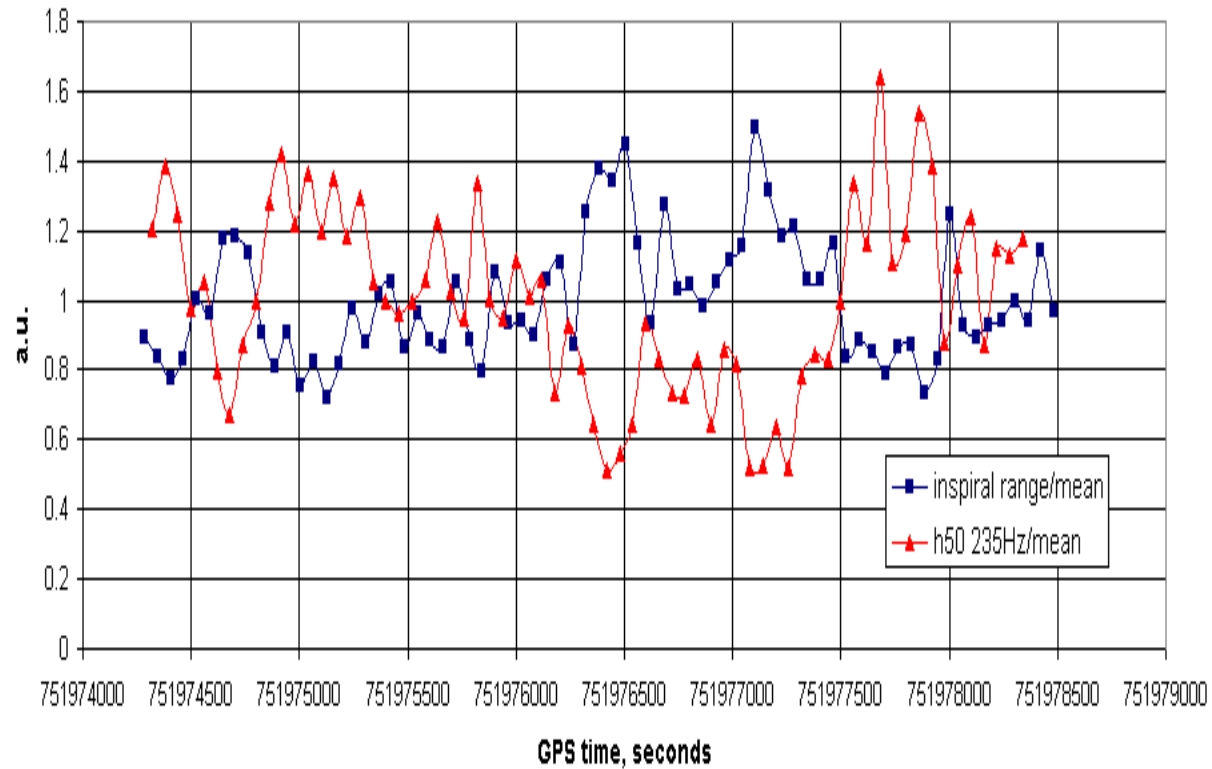 - ➢ estimated from average noise (like SensMon)
  - ➢ estimated with injections
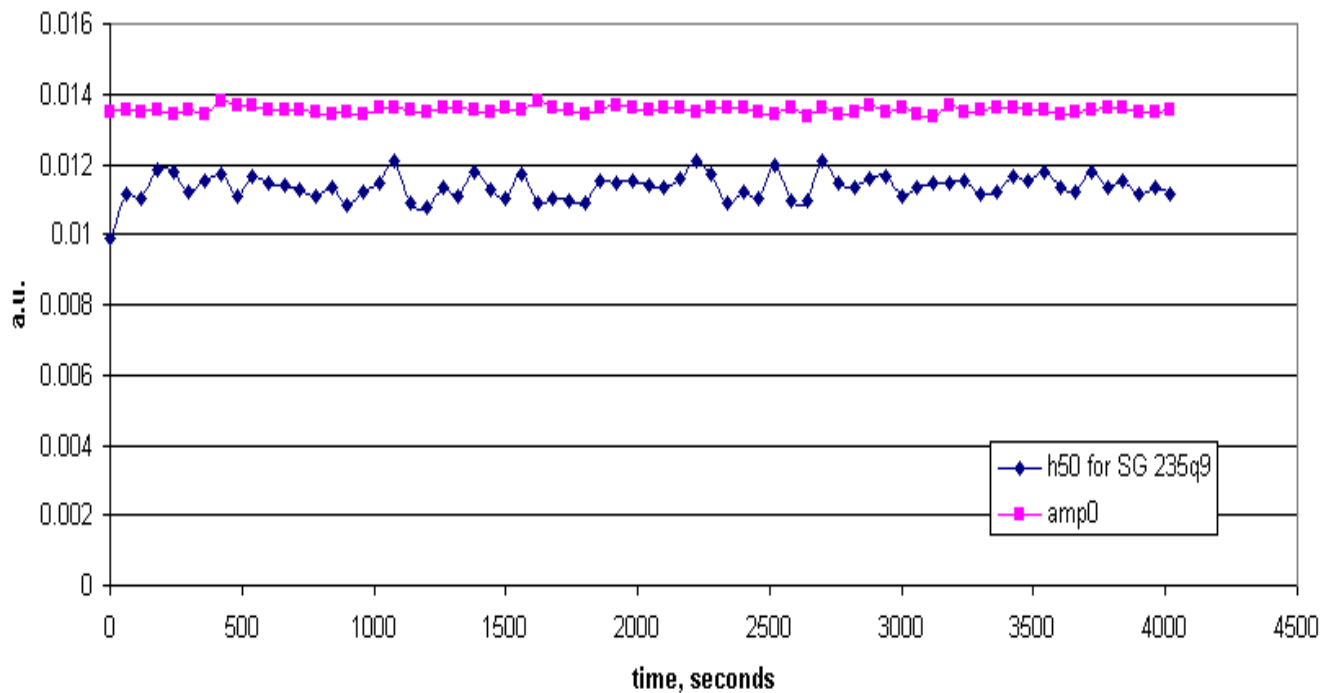
- **un-calibrated hrss for SG235 Hz injection:**
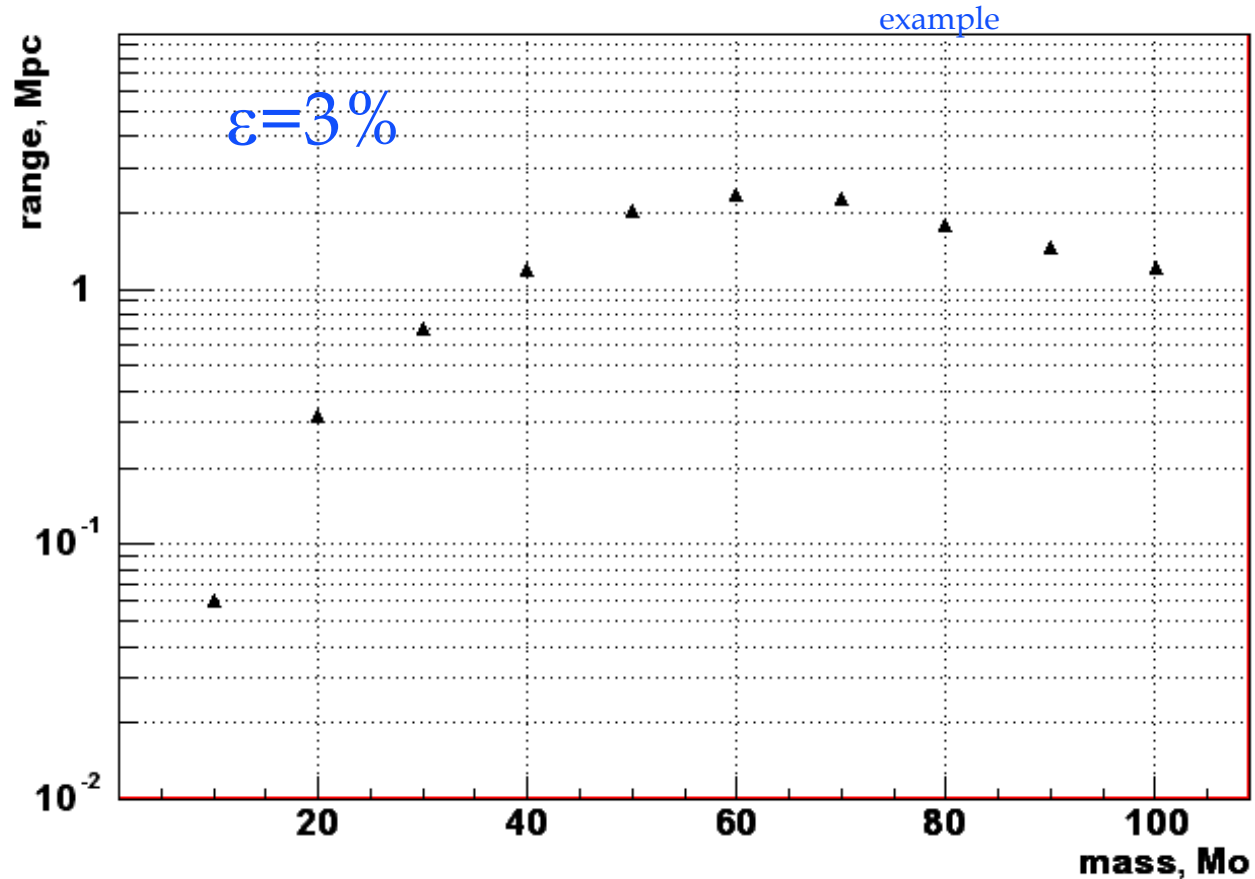 - ➢ estimated from average noise
  - ➢ estimated with injections
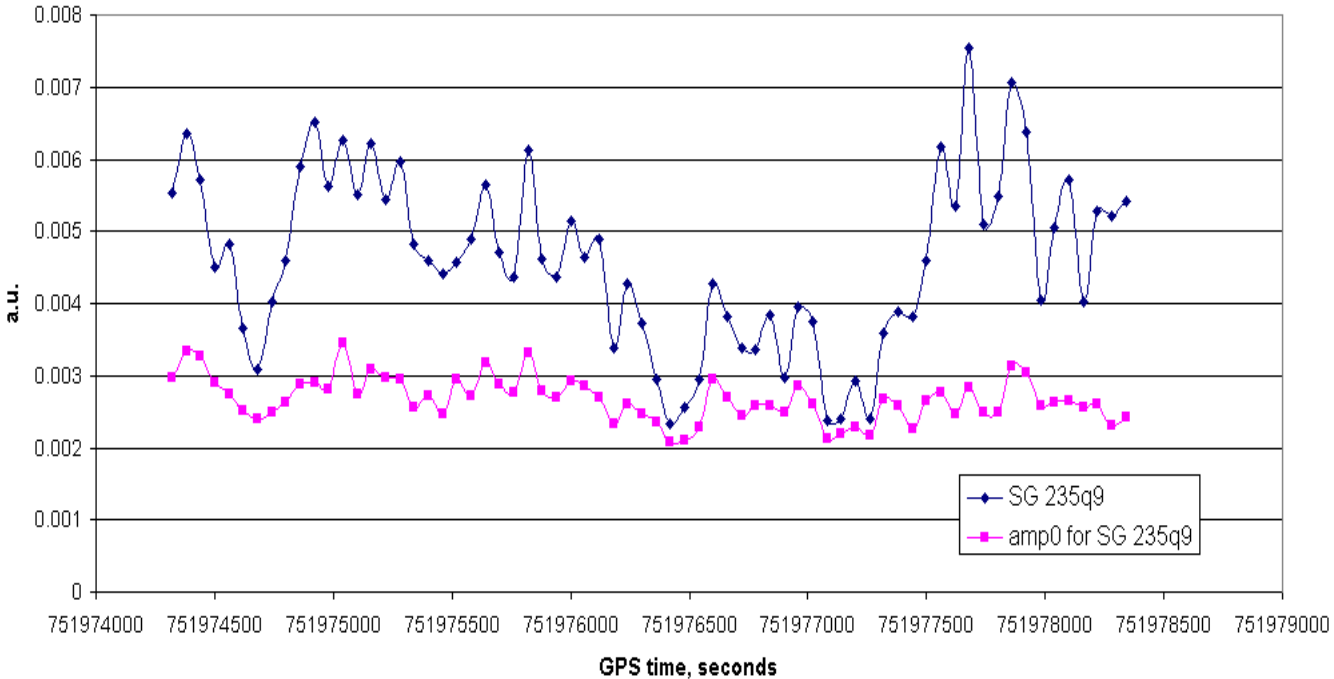
S3 data, H1

- **S2 noise, Lazarus waveforms**
- **average over all sky**
- **Gives a detail picture of the detector performance in frequency band below 1.5 kHz**
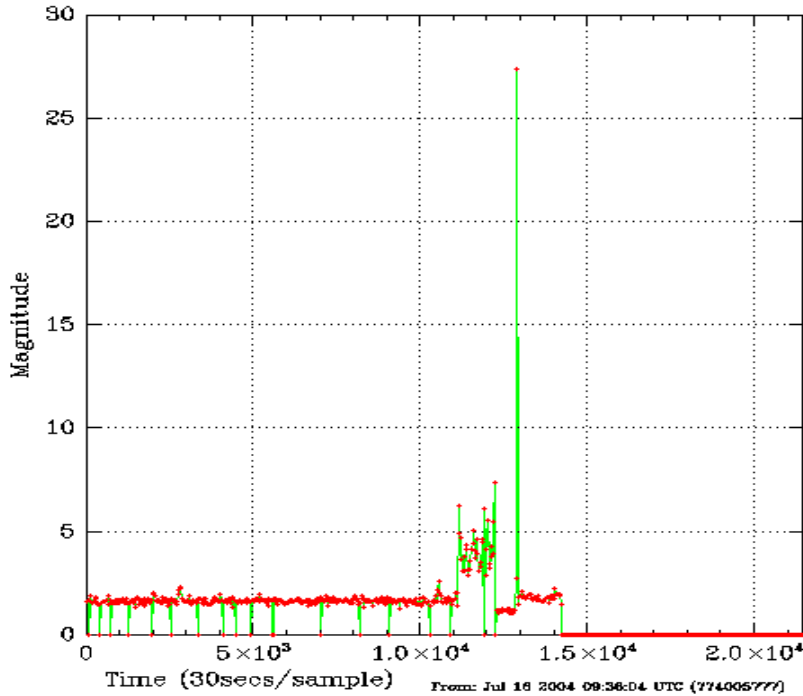
example

$\varepsilon = 3\%$

dmtviewer plots

H1

almost real-time

Trends

S3

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732631083

time resolution 1/16 sec

- **L1**

- **H1**

window

● **H2**
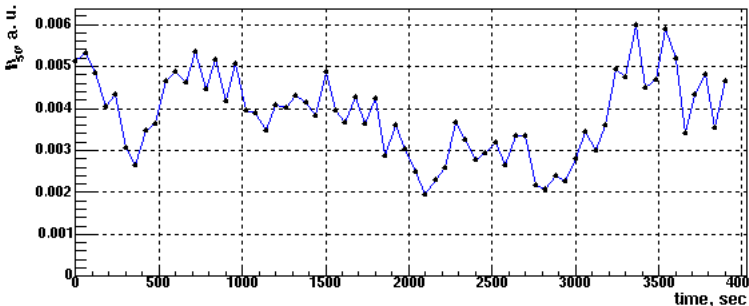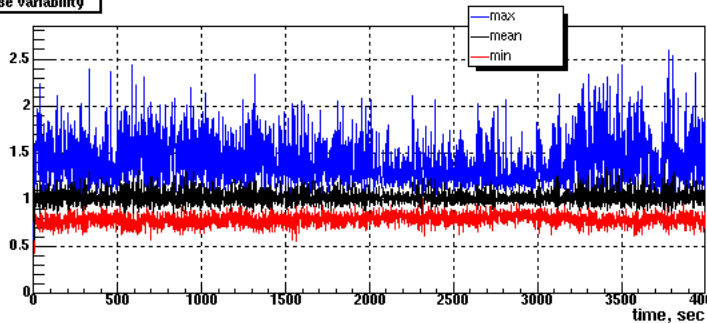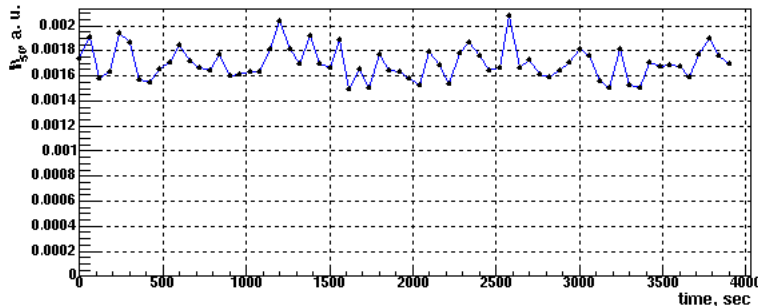
variability correction
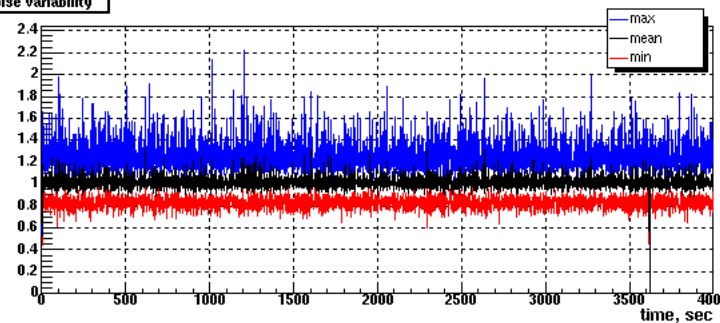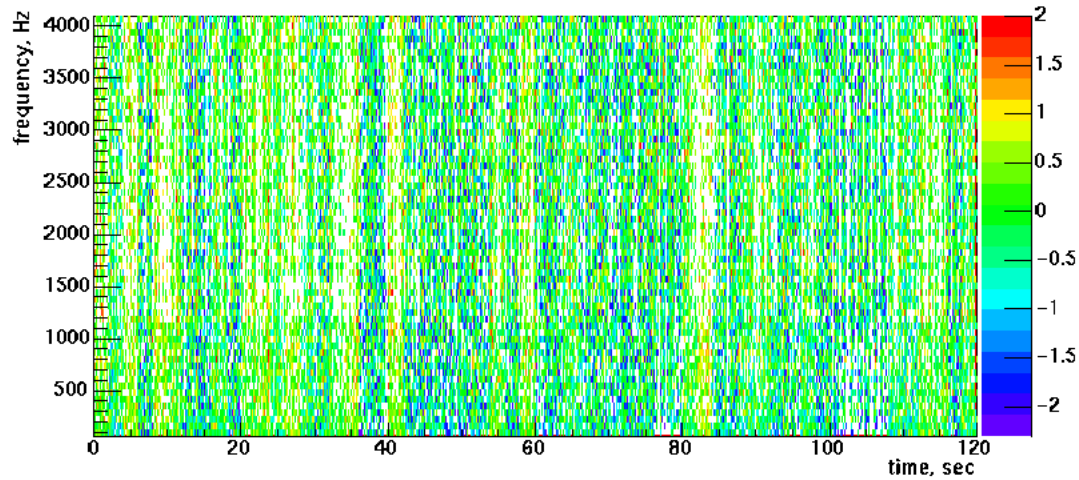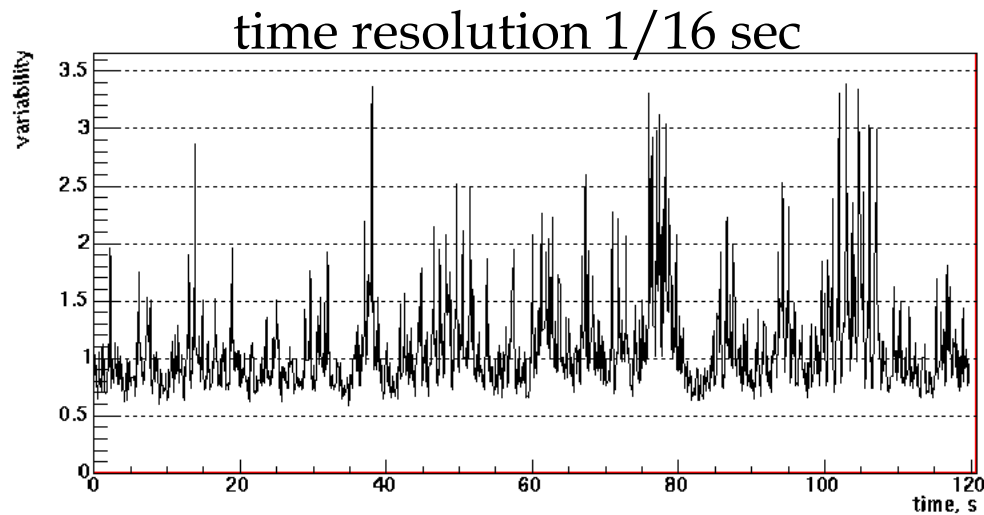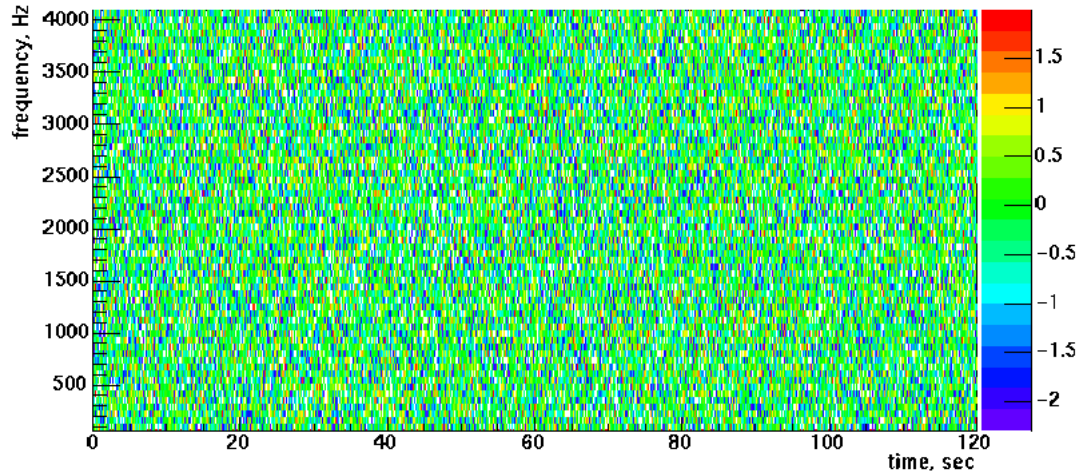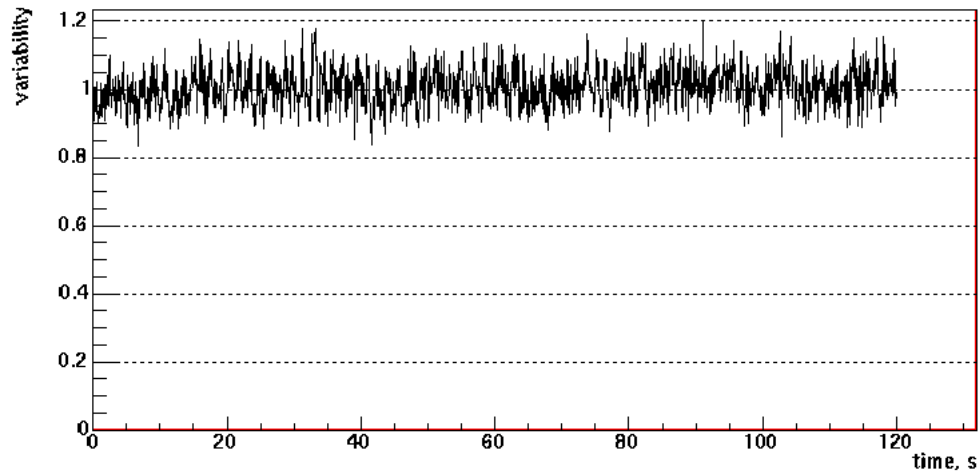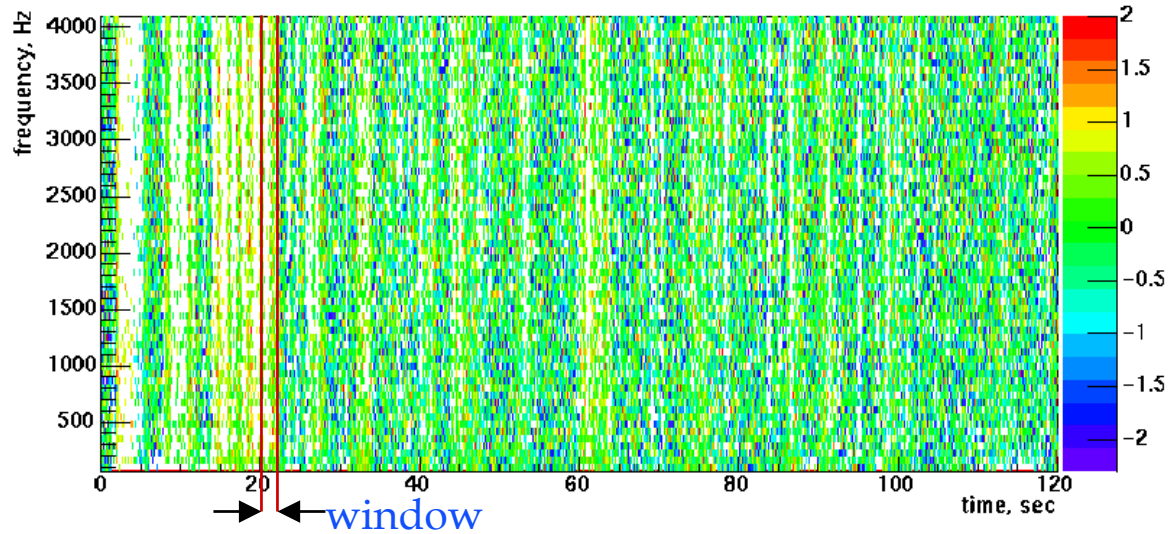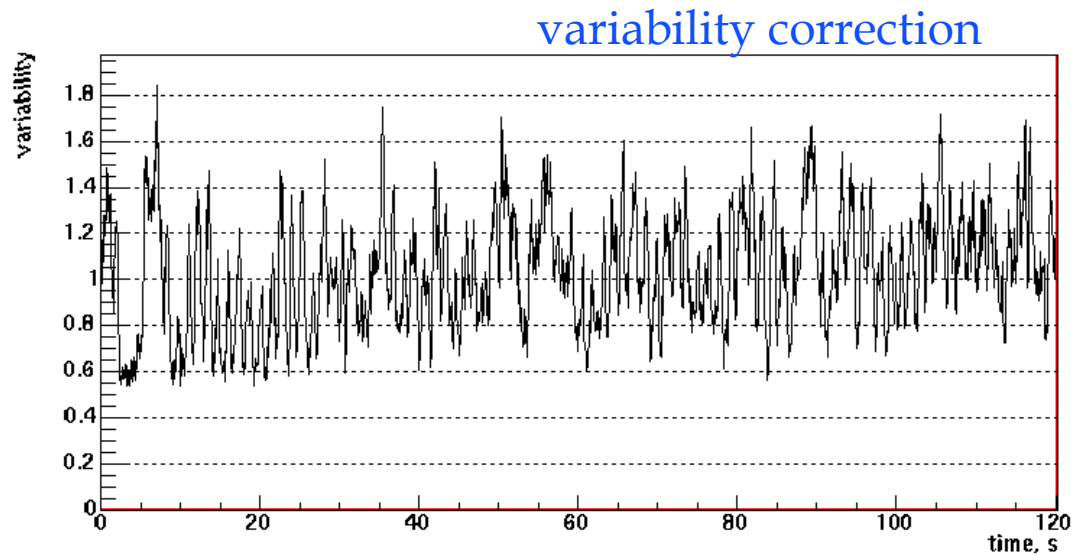
Noise Gaussianity

- **red – normalized noise**
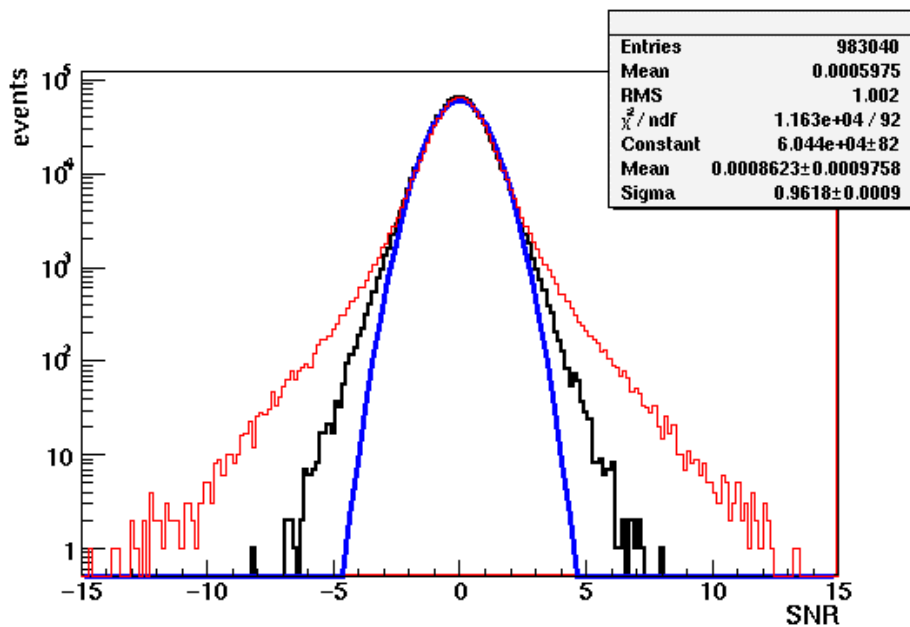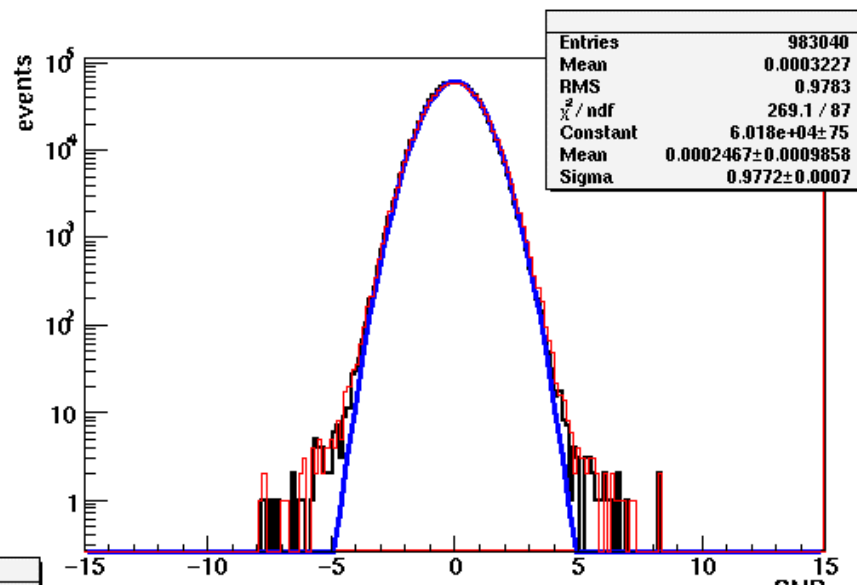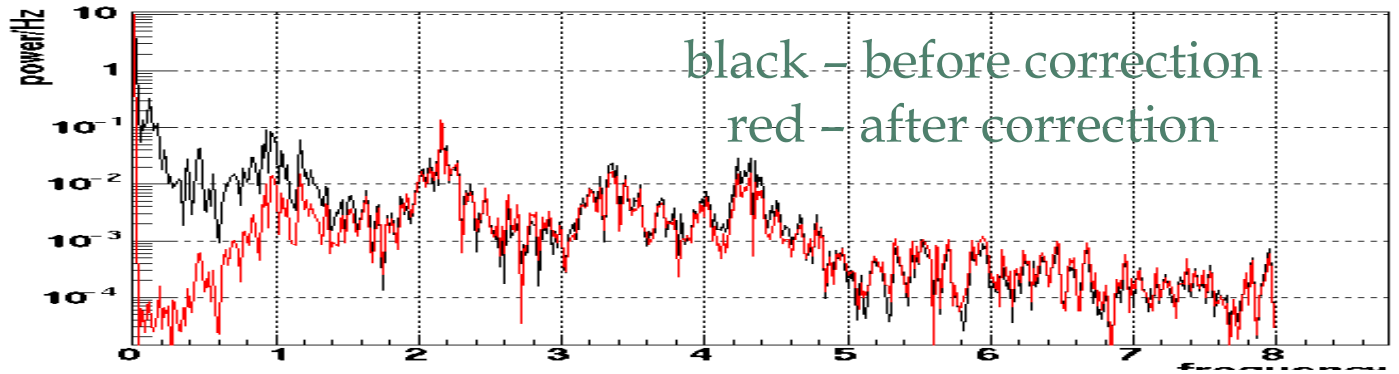- **blue – Gaussian fit**
- **black – corrected with 1 sec window**

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S2 noise variability PSD

black – before correction
red – after correction

- **L1**
- **H1**
- **H2**

S3 noise non-stationarity

- **L1**

- **H1**

- **H2**

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S3 noise after correction
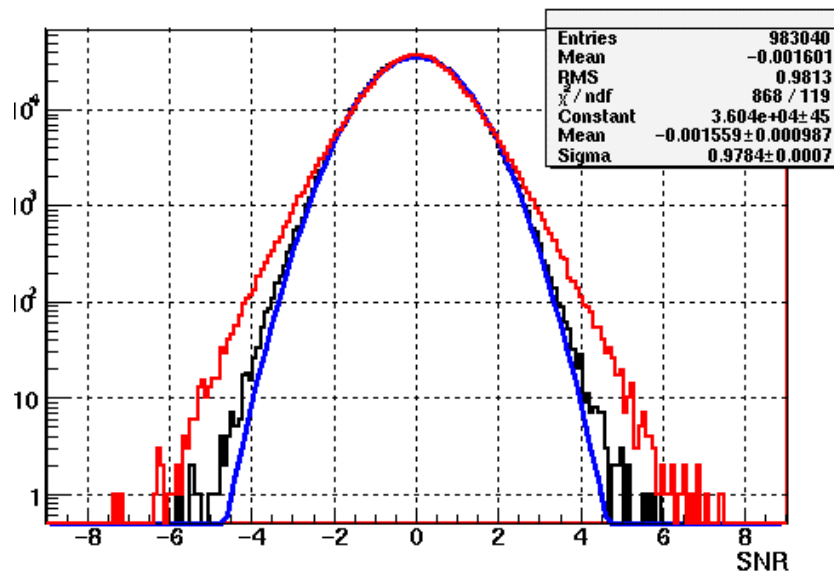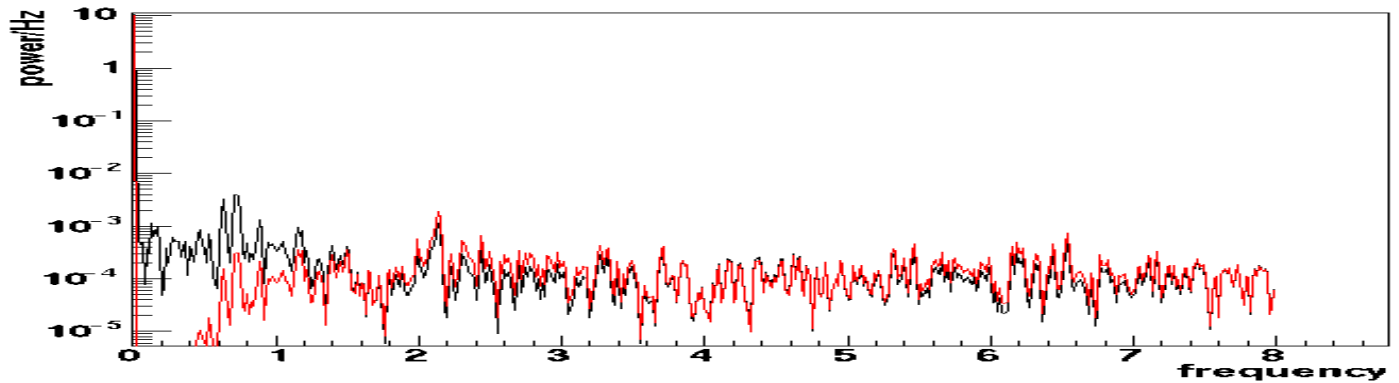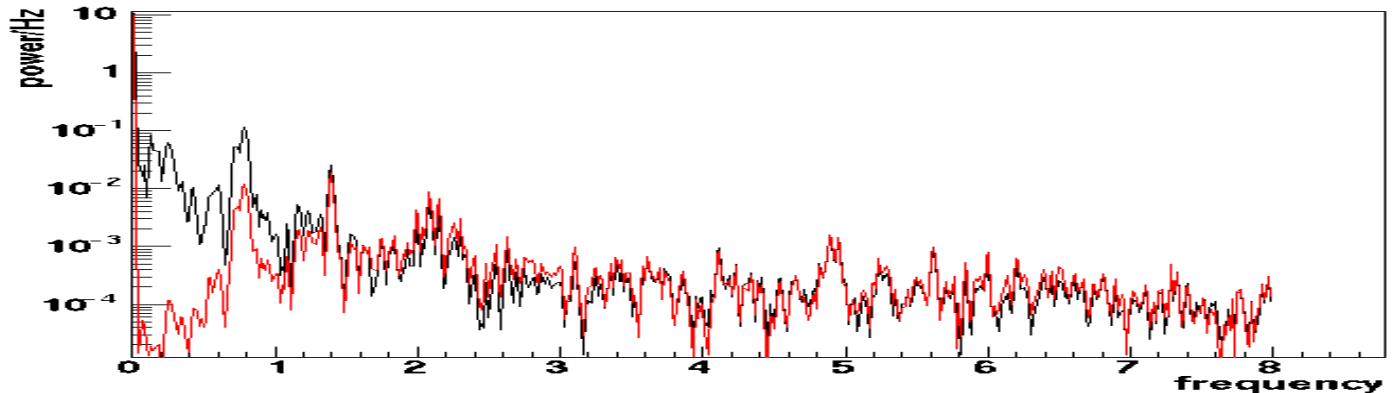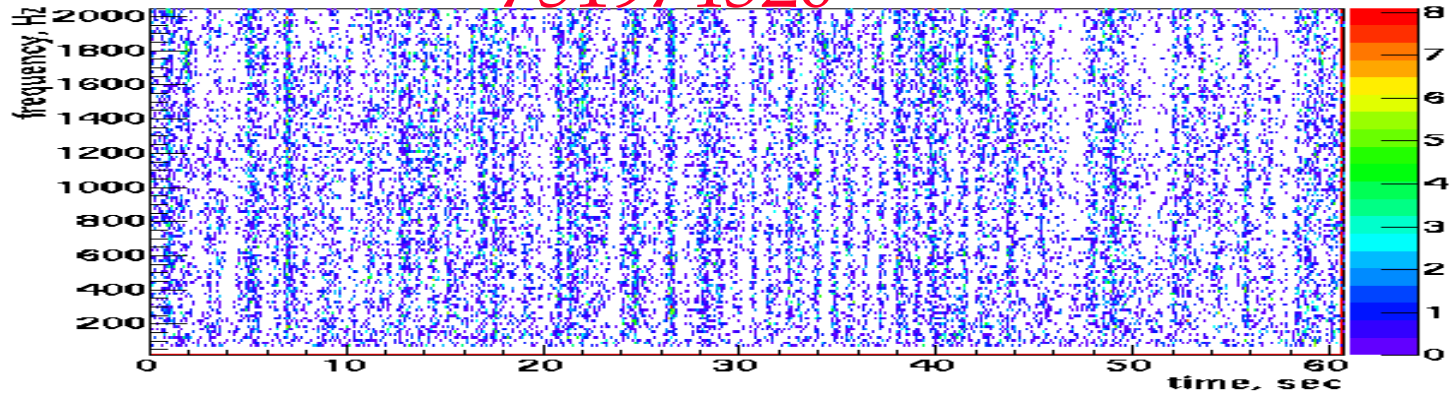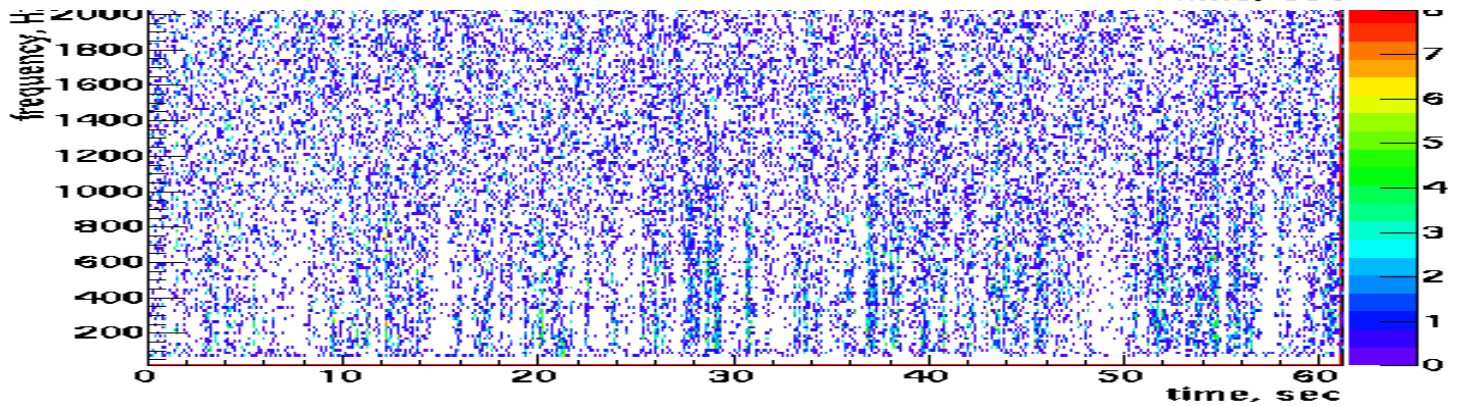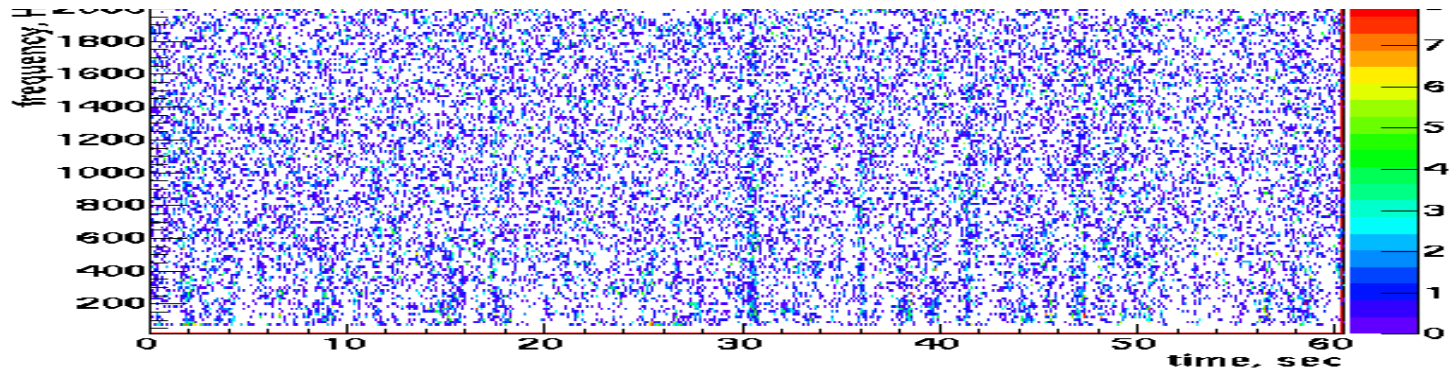
- **L1**
- **H1**
- **H2**

- **BurstMon is a single interferometer burst detection engine implemented as a DMT monitor.**

- **It has real-time simulation pipeline for estimation of the detection efficiency for injected waveforms.**
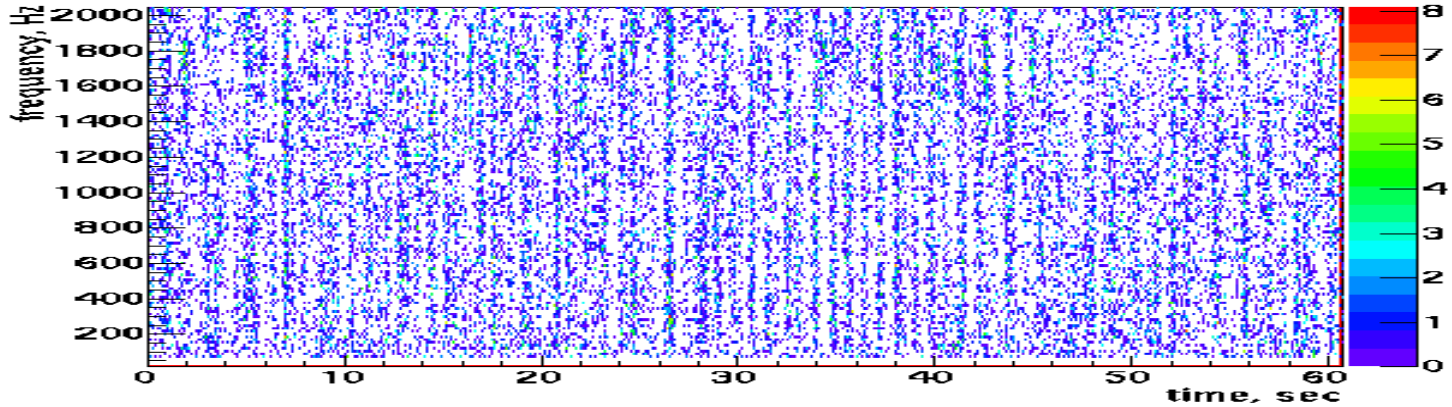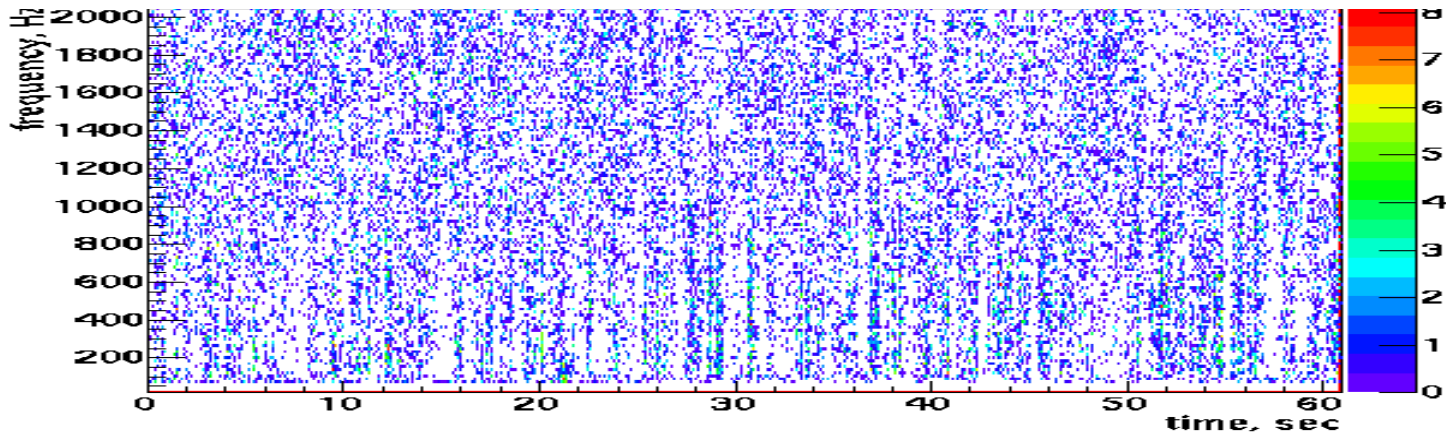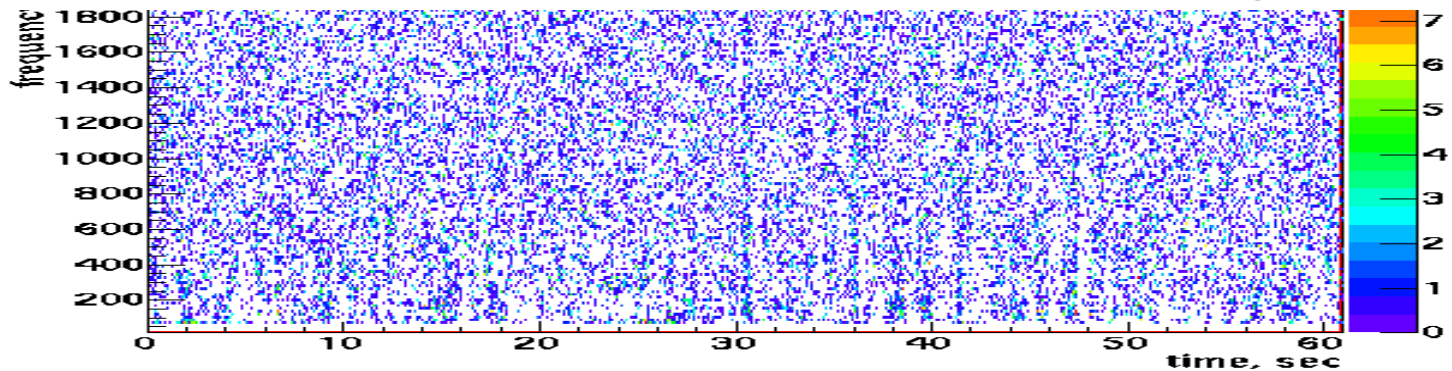
- **Several FOMs are produced:**
  - ➢ **hrss @ 50% detection efficiency (for each type of waveforms)**
  - ➢ **noise variability, rates,...**
  - ➢ **suggestions are welcome**

- **Plans**
  - ➢ **finalize implementation issues**
  - ➢ **include real-time calibration as soon as available**
  - ➢ **some minor optimization (almost in real time)**
  - ➢ **commissioning - run on regular basis**
  - ➢ **get ready for the next engineering run**