

Status of StochMon, A DMT Monitor of Stochastic Sensitivity

Marc J. Cenac mjcenac@loyno.edu

Loyola University New Orleans

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Stochastic Figure of Merit

Basis for figure of merit: Assuming flat GW spectrum ($\Omega_{\text{GW}}(f) = \text{constant}$), the stochastic background strength we could detect in time T is Ω_S :

$$\frac{1}{\Omega_S^2} \propto T \left(\int_{f_{\min}}^{f_{\max}} df \frac{\gamma^2(f)}{f^6 P_1(f) P_2(f)} \right)$$

- Use Ω_S^{-2} instead of Ω_S so sensitivity grows linearly with observation time.
- $P_1(f)$ & $P_2(f)$ are (calibrated) noise PSDs of two detectors
- $\gamma(f)$ is the overlap reduction function
(known function of frequency, $\equiv 1$ for H1-H2)

Single-live VS Double-live

- Single-live means one of the PSD's is a reference read from file so only one channel is actually live.
- Dual-live or double-live means that StochMon is calculating both PSD's in real time

Summer Developments

- Newer (single-live) version put in GDS
- Added channel Ω_S to view in DMTVIEWER
- New option to output PSD file a specified number of strides
- Updated channel names to conform with new naming conventions
- Finished first version of a dual-live StochMon (H1-H2)

Dual-live StochMon

The ideal solution is to analyze both channels in real time

- These channels come from the local DAQ system
- Easiest implementation @ LHO with

H1:LSC-AS_Q and H2:LSC-AS_Q

- In order for a dual-live LLO-LHO monitor to work, it is necessary to make data from both sites visible on the same system in near-real-time.

Dual-live StochMon

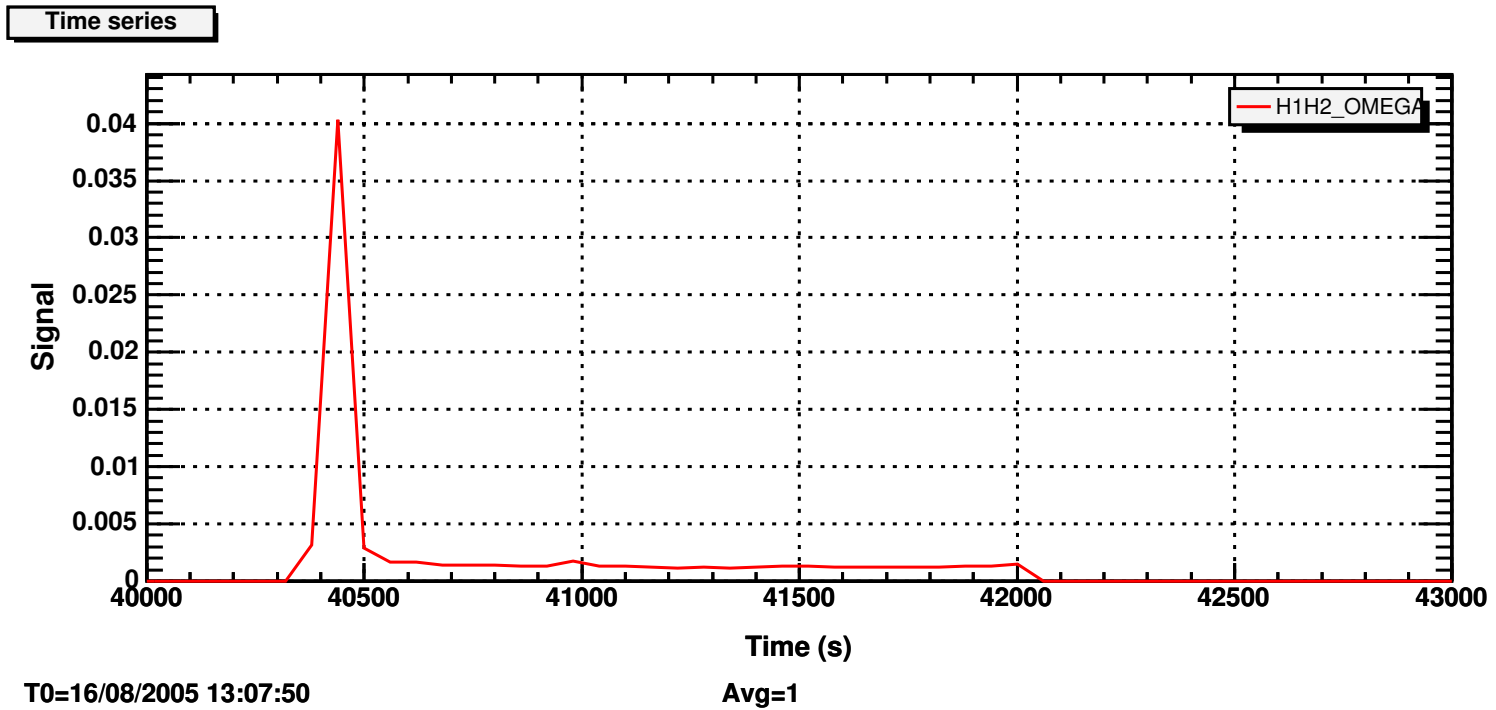
Potential fallback is to use a low-tech script to transfer files via internet

- Needs the functionality to calculate 1 minute's PSD while waiting for the previous minute's PSD to arrive from the other site (for LLO-LHO)
- StochMon also would have to check whether the PSD files exist at the appropriate GPS times

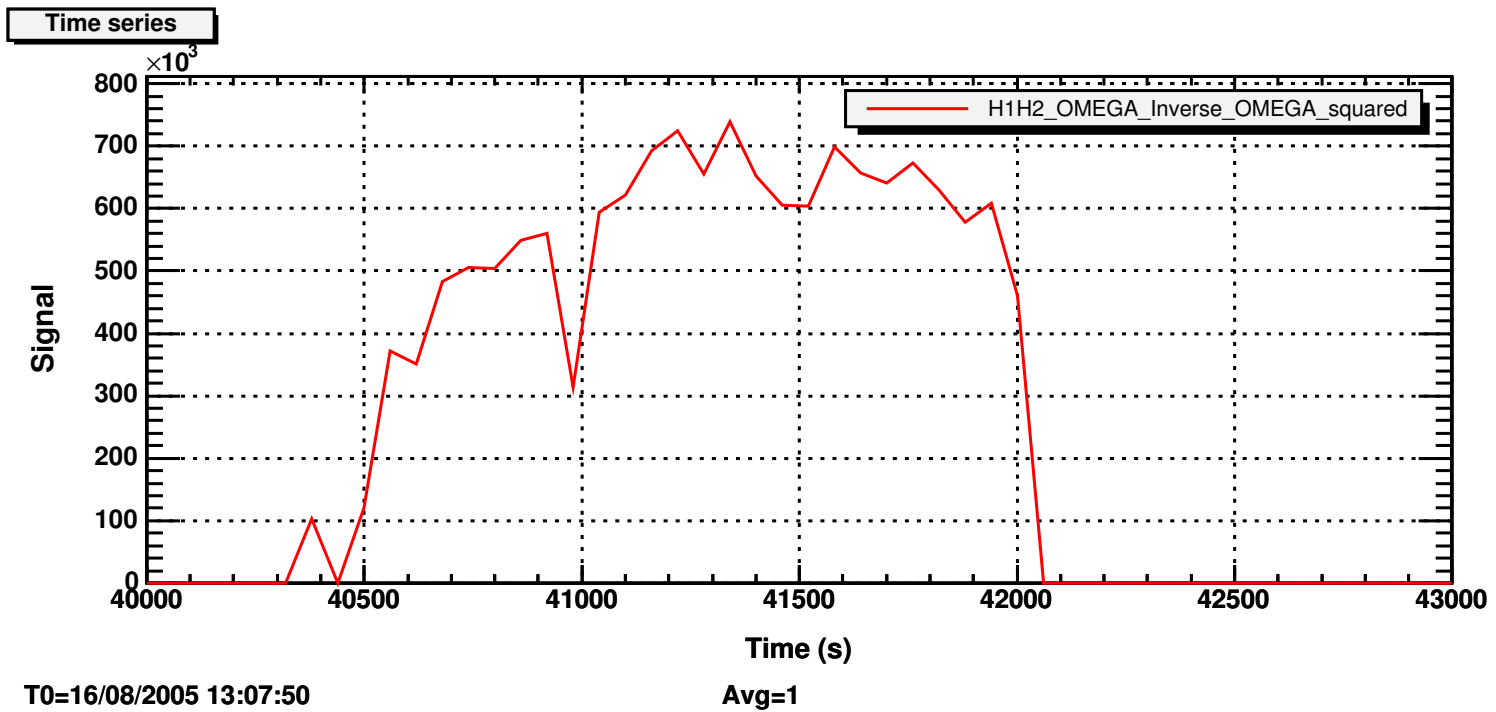
Progress on Dual-Live StochMon

- Preliminary version compiles and runs on FC3 with Junwei's offline dmt build
- Now it also compiles and runs on stone (thanks to John Z)
- Still need to think of a creative naming convention

Dual-live StochMon plot



Dual-live StochMon plot



Changes for Dual-Live StochMon

- This is the contents of the modified configuration file

```
-OSCfile  LockLoss.conf  
-xmlfile_1 ReferenceCalibration_H1.xml  
-xmlfile_2 ReferenceCalibration_L1.xml  
-fmin 30.0  
-trend H1 L1
```

- This is an configuration file from a single-live version

```
-OSCfile  LockLoss.conf  
-xmlfile_1 ReferenceCalibration_H1.xml  
-refpsd L1_CalPSD_GPS_752364240.txt  
-fmin 30.0  
-trend H1 L1
```

To-do list

- Finish fallback double-live version of StochMon
- Update webpage documentation