Summary of Detector Characterization Sessions

Keith Riles (University of Michigan)

LIGO Scientific Collaboration Meeting
LIGO Hanford Observatory
August 14-17, 2005

Presentations in DC Sessions

Lots of interesting talks!

Can't do justice to all of these in this brief summary

Will just try to hit the highlights

Agenda page:

http://gallatin.physics.lsa.umich.edu/~keithr/lscdc/agenda_aug05.txt

DC Session Highlights

Calibrations & timing:

- S4 calibrations nearly final, improved validation procedures; some subtleties at higher frequencies; preparing for S5 (GabyG)
- h(t) now being exercised by several search groups – promising – but problem with DARM_CTRL lines requires rerun (BruceA, MikeL, AlbertL, IgorY, SaikatM)
- Photon calibrator commissioned – agrees with regular calibration at ~10% level; will run in S5 at least part of the time (PeterK)
- S4 Timing stability very good; S5 will be even better (SzabiM)

Data quality:

- S4 investigations advanced; ~40 DQ flags defined; automation for S5 underway (JohnZ)

DC Session Highlights

DMT improvements and new monitors:

- **New workstations & configuration; automake(!) (JohnZ)**
- **StochMon – Stochastic FOM (Ω) – now "dual-live" (MarcC)**
- **MNFTMon – Non-stationarity of noise floor (SomaM)**
- **PlaneMon – Airplanes(!) – speed & range (EvanG)**

S3/S4 Glitch investigations:

- **Many important artifacts found in S4 data and feedback given to commissioners; veto safety studies; DQ flag choices (ErikK, ShantanuD)**

DC Session Highlights

Environmental disturbances & lines:

- Recent insight into backscattering noise; line detective work; acoustic/seismic mitigation (RobertS)
- S4 spectral line catalog – collecting information – will make punchlist for commissioners (KeithT)

S4 hardware injections analysis:

- Inspiral injections – right magnitudes (5-25%), times (~ms) (PatrickB)
- Burst injections – right magnitudes & veto safety checked (LindyB)
- Stochastic injections – right magnitudes but wrong sign! (Sukanta)
- Pulsar injections – Ditto! (GrahamW)

DC Session Highlights

End-to-end modeling and filter issues:

- **Violin mode dynamics – position/angle cross coupling (SanyY)**
- **Beam fluctuations in input optics – more realistic MC (NafisJ)**
- **Error function filter – useful for pulsar analysis? (BobC)**

DC Session Highlights

Went over issues to settle before S5 begins (October 21)

- **Finish new DMT monitors & confirm operation in M7 mini-run at LLO (Sept 24-25)**
- **Practice injections well before run begins with final hardware – verify hardware injections are reconstructed correctly, including sign(!)**
- **Scimon shift procedures & interaction with search group "war-rooms'**
- **Will be organizing first several months of scimon shifts soon**

Getting ready for S5 - Scimons

Plan for S5 start similar to those for S4:

- **24/7 shift staffing at both sites – 1 expert**
- **Three 8-hour shifts / day**
- **First 1-2 weeks likely done mostly by Observatory & local university scientists**
- **Training slots available for new persons**
- **Allocation based on FTE counts**
- **Will soon solicit request for group constraints / preferences with prompt response requested**
  - » **Will accommodate requests within reason and where possible**

Getting ready for S5 - Scimons

BUT…

S5 is ~18 times longer than S4!

→ More shifts per person

→ Argues for much longer visits by scientists to save on travel overhead (weeks instead of days)

→ Burden likely disproportionately borne by postdocs & graduate students (except in summer)

On the bright side…

All of the above will lead to scimons with better, more uniform expertise

Previous scimon experience quite mixed:

Splendid examples of attentiveness and on-the-fly investigations

But some pretty dismal efforts too…

Getting ready for S5 – Investigation teams

S4 investigation teams provided valuable feedback to commissioners before and during S4

(special honor to the Glitch Team which focused on burst artifacts)

Important to continue and strengthen such effort in S5

- **Investigations tied to search analyses especially valuable**
- **Peter's proposed search group "war-rooms" to find artifacts that impede marquee searches could guide control room investigations:**
  - **Daily detector elog summaries with key FOM(s)**
  - **More detailed reports on weekly basis for start of S5**
  - **Migration of search FOM studies to control room as we gain experience**

Daily scans of data quality is one reason we have scimons – use them!