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Summary of the Detector Characterization Sessions

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LIGO Scientific Collaboration Meeting
LIGO Hanford Observatory
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S2 & S3 Analysis

- **S2 investigation teams very active but splitting efforts between S2 and E10/S3 → Busy!**
  - → **Mixture of S2 / E10 / S3 run reports at this meeting**
- **Search groups making rapid progress now in understanding detector artifacts**
  - → **Burst & Inspiral groups close to completing veto studies**
  - → **Stochastic group confirms reduced inter-IFO coherence in S2, even better in S3**
  - → **Pulsar group confronting frequency domain artifacts**
  - → **Data quality flags proving useful (more flags in the pipeline for vsn 4)**
  - → **Groups making good use of hardware signal injections**

Sampling of progress reports at this meeting

Noteworthy developments since S2:

- **Acoustic mitigation on all three IFO's**
  - » Important contamination in S2 critical inspiral band reduced in H1/H2 by >100
  - » Also reduces H1/H2 coherence
- **Calibrations far advanced**
  - » Real-time reference functions / constants in S3 as good as final S2 (but still having start-up troubles at LLO)
  - » SenseMon and LineMon substantially enhanced since S2
  - » Time-domain calibrations [h(t)] on the near horizon
- **Hardware signal injections upgraded**
  - » Injecting 10 pulsars / IFO throughout S3 (11^{th} with GEO?)
  - » Long-duration, low-level stochastic signal
  - » Many non-trivial technical obstacles overcome, thorough monitoring in place

Sampling of progress reports at this meeting

Noteworthy developments since S2 (cont.)

- **Timing system**
  - » New atomic clock system installed / commissioned at both sites
  - » Permits checks of standard GPS-based timing to O(50-100 ns)
- **Reduced Data Sets**
  - » Real-time RDS generation / transmission (2-3 hours from sites to Tier 2 centers)
  - » Multiple RDS levels and inter-IFO merging supported
- **Data quality flagging**
  - » Real-time S3 segment definition and characterization being commissioned

Sampling of progress reports at this meeting

Noteworthy developments since S2 (cont.)

- **Angular control**
  - » All wave-front sensing / beam-centering loops closed on some IFO's
  - » Look at the 4K beam spots!

- **DMT Monitors**
  - » Old standard monitors more robust and somewhat upgraded
  - » Better figures of merit
  - » Several new monitors (BicoMon, PTMon, SegDirectory, SuspensionMon)

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Data Running

Mini-runs M3 (LHO) and M4 (LLO) in September

- → Resurrected dormant / dysfunctional DMT monitors after months of commissioning
- → Surprised how well things went (but had low expectations)

Engineering run E10 October 17-24

- → Dress rehearsal for S3
- → Time at LLO given over mostly to commissioning (wise decision!)
- → Time at LHO devoted to understanding detector / fixes (good investment)
- → Model of 1-week on, 1 week off just before science running seems a good one!

Science run S3 started October 31

- → Not quite done with start-up transients at LLO, but otherwise in good shape overall
- → Stan: "I expect it to be better in nearly every measure than S2"

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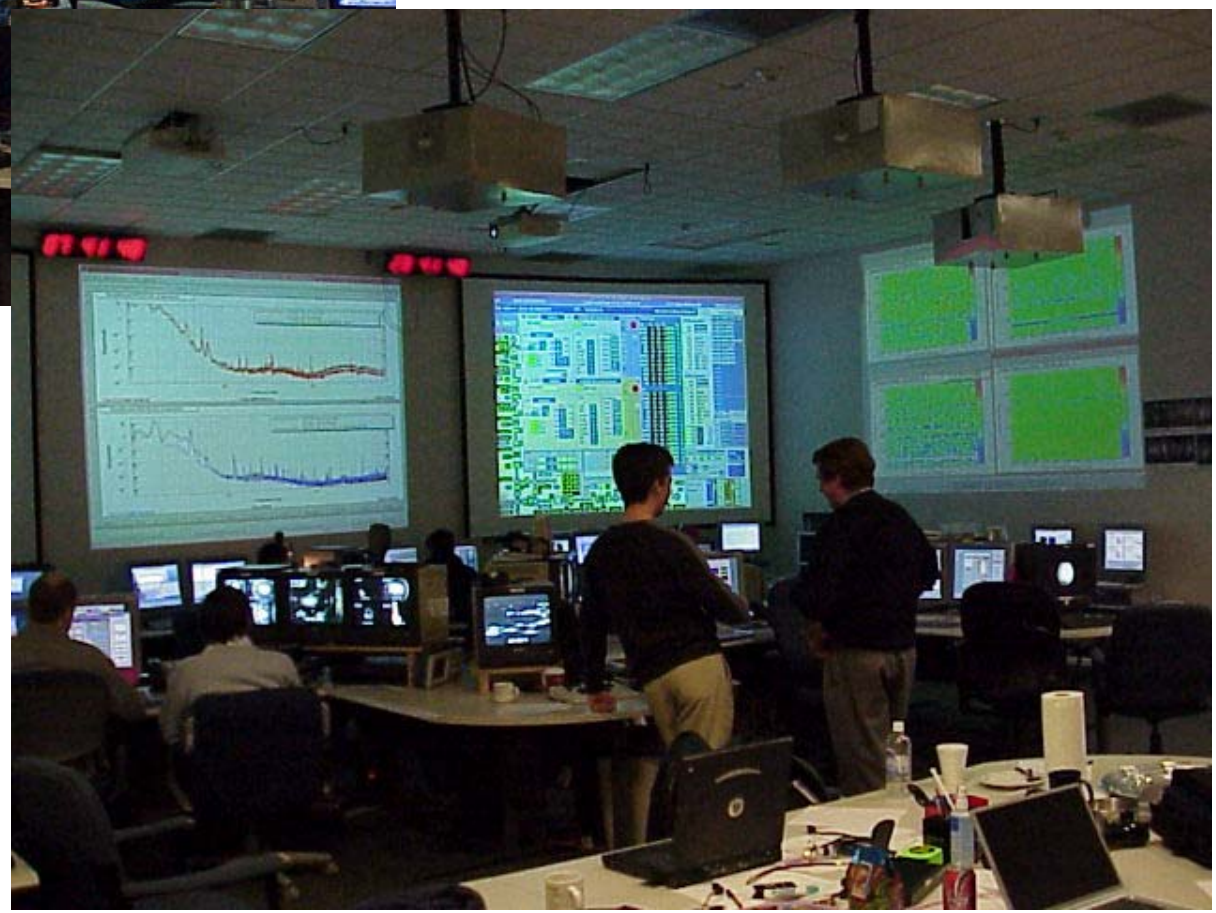
Data Running

Scimon shifts for E10 / S3:

- **438 eight-hour shifts over 10 weeks (about 3 shifts / LIGO 1 FTE]**
- **Names filled in for 434 expert slots, 92 trainee slots**
- **More automation since S2 – more time to study plots instead of merely creating them**
- **Diagnostics increasingly sophisticated**
- **Monitors more useful (and reliable!)**
- **Figures of Merit now essential to operations**

LHO Control Room

(2 nights ago)



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Running a scimon shift

- **Not a punishment, not a sentence**
  → Don't treat it as "serving time"
- **View it as an opportunity:**
  - **Primary task: Monitoring IFO performance**
  - **But many other benefits:**
    - **Understanding the data / interferometers better**
    - **Solving puzzles (see "open issues" web page)**
    - **Learning to use new software tools**
    - **Can work on astrophysical search problems in "multi-media" environment**
    - **Talking to operators and other true experts on detectors**
- **If instructions / reference files obsolete/incorrect, fix them!**

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Data Running

Online Search Analysis:

- **Need to work on getting DSO's up and running earlier in a science run (inspiral is only online DSO running right now)**
- **Even if absolute event rates hard to interpret on untuned monitor, relative rate changes probably meaningful (and good to know about in control room)**
- **Pre-LSC-meeting S2 analysis clearly impeded pre-S3 preparation for some groups (probably not for last time)**
- **Need more spectrally robust DSO's?**
- **Give higher priority for developing online DSO's?**
- **Schedule LSC meetings more than 10 days after run start?**
- **Make use of the DMT / other infrastructure to measure event rates?**

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Presentations in DC Sessions

Lots of interesting talks!

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

Agenda