

## *State of the LIGO Lab*



*Stan Whitcomb*

LSC meeting

Livingston

21 March 2005



# Overview

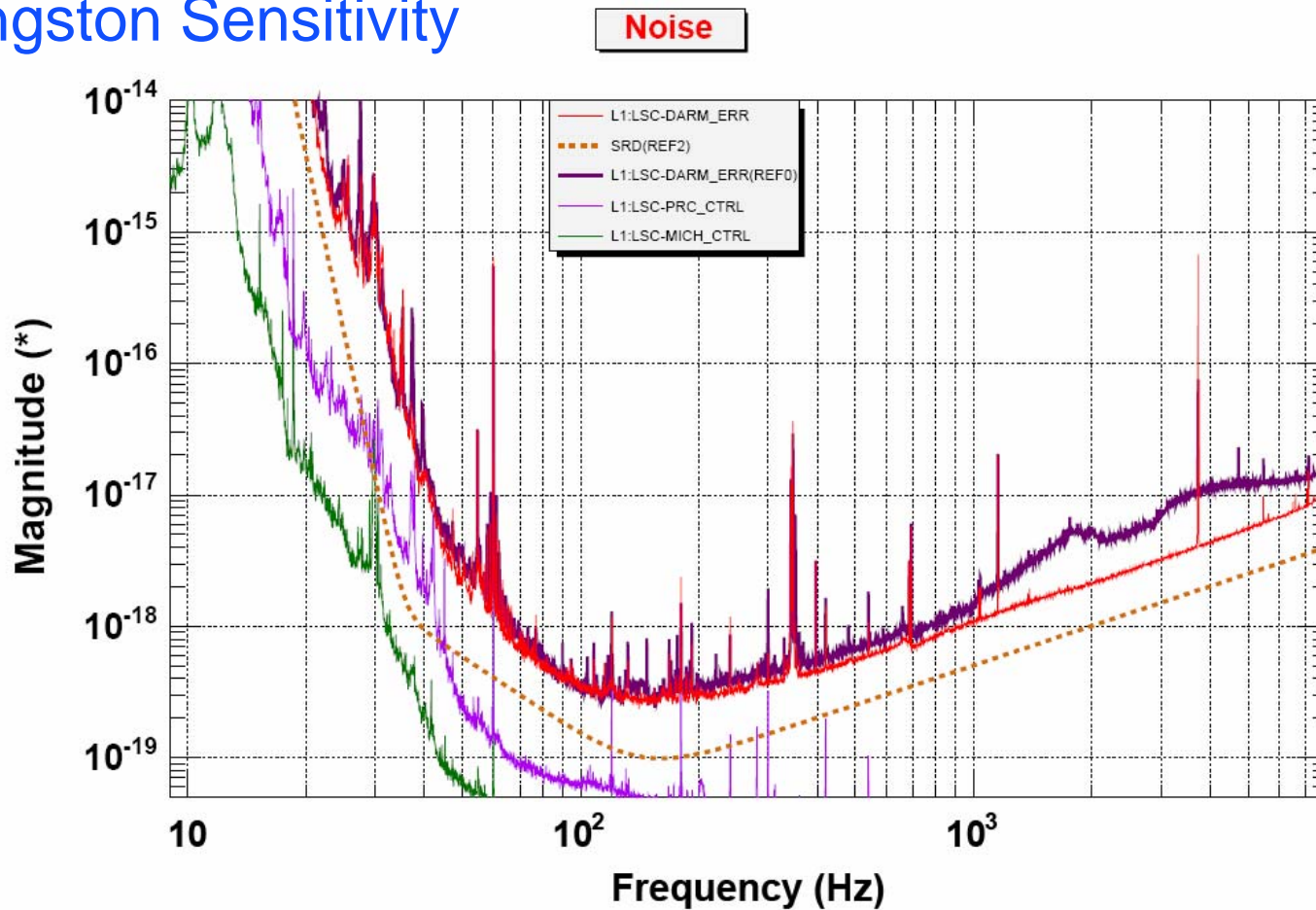
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- Progress
- Challenges
- Directions



# Progress: Sensitivity

## Livingston Sensitivity



**\*T0=10/03/2005 20:57:35**

**\*Avg=20/Bin=47L**

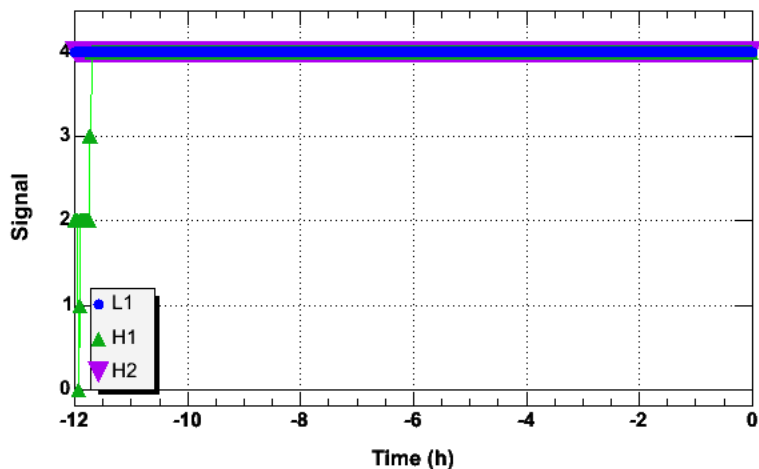
**\*BW=0.0234246**



## Progress: Duty Cycle

Date	3/14	3/15	3/16	3/17	S3
L1	88%	81%	88%	48%	22%
H1	94%	91%	92%	29%	69%
H2	92%	89%	89%	63%	63%

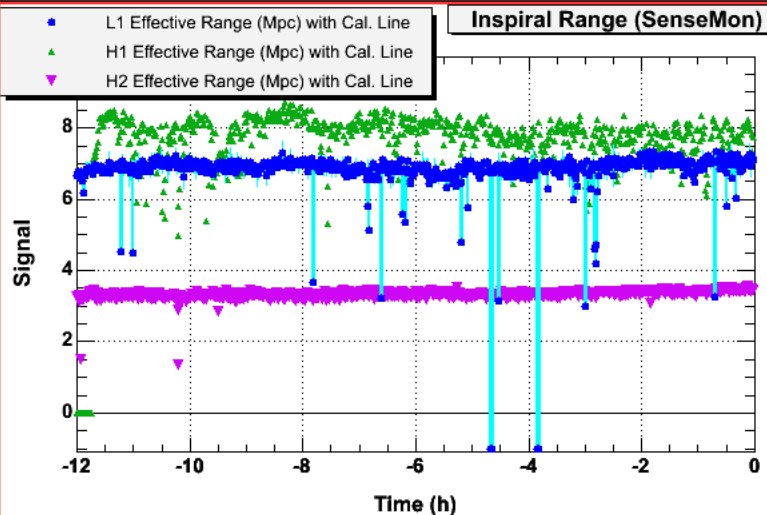
### State Vector (1=MC, 2=Arms, 3=Ready, 4=Science)



T0=18/03/2005 08:01:39

Avg=1

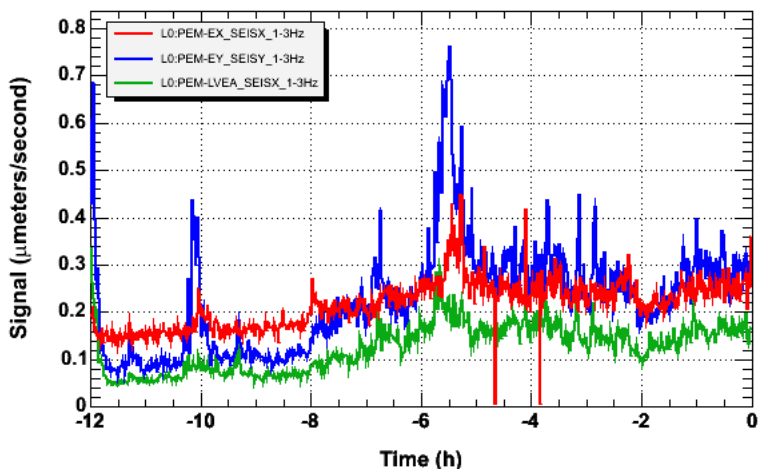
### Inspiral Range (SenseMon)



T0=18/03/2005 08:00:47

Avg=1

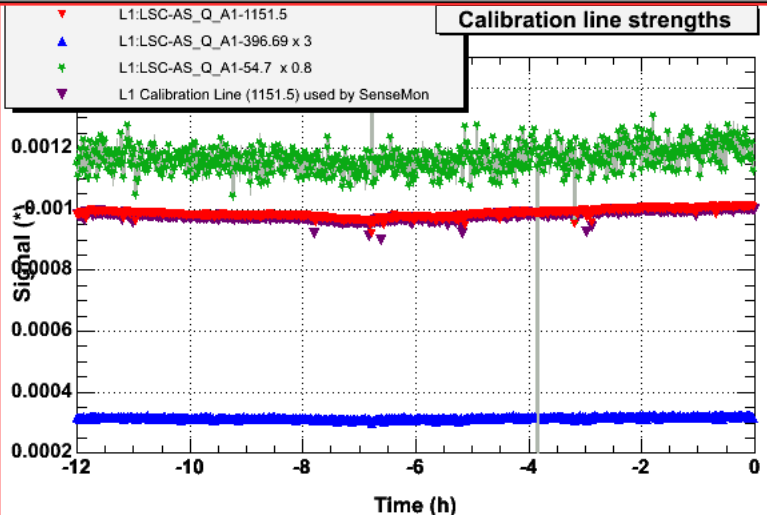
### Anthropogenic noise



T0=18/03/2005 08:01:18

Avg=1

### Calibration line strengths



T0=18/03/2005 07:59:57

Avg=1

Reset

Zoom

Active

New

Options...

Import...

Export...

Reference...

Calibration...

Math...

Print...

Update

Run

Stop

Exit



## *Progress: Science*

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- Five (5) papers in final or nearly final form
  - » Lively discussion over past two days
- Although subtle, there is evidence that the pace of the analysis has picked up
- Starting to think in terms of detection and getting out of upper limit mode



## *Progress: Advanced LIGO*

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- Advanced LIGO approved as MREFC project by National Science Board (Oct '04)
  - » "...Advanced LIGO is sufficiently advanced and the intellectual value of the project sufficiently well demonstrated to justify consideration by the Acting Director and the National Science Board for funding in FY 2007 or a future NSF budget request..."
  - » "...the existing LIGO Program will collect at least a year's data of coincident operation at the science goal sensitivity before initiating facility upgrades..."
- Administration Budget (Feb '05) indicates FY08 start
- Cost-schedule baseline due late 2006/early 2007
- Technical progress
  - » Substrate downselect
  - » Laser power demonstration
  - » Suspension prototypes



## *Challenges: Budget*

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- 2005 is a bad year for NSF—more later
  - » Overall budget down 3.2%
  - » R&RA budget down 1.7%
- LIGO Lab budget cut
  - » FY05 budget cut by \$1M
  - » FY06 budget to be cut by \$1M
- **Lab will have to reduce some activities**
- Emphasis will remain on:
  - » Observatory operations
  - » Data management and analysis
  - » Core science and engineering
  - » AdvLIGO R&D
- FY2007??





## *Challenges: Organization*

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- Agreed on integrated structure for LIGO, encompassing Laboratory and LSC—currently being implemented
  - » LIGO Directorate (LIGO Director, LSC Spokesperson, LIGO Lab Deputy Director) functioning well
  - » External Oversight Committee for LIGO Lab and LSC still to be implemented
  - » Revised charter for LSC in progress
  - » Arrangement for integrated project structure for AdvLIGO nearly complete
- New MOU process
  - » LSC committee met to assess progress and plans for need, realism, completeness, and overlap
  - » General agreement that the process is promising
  - » Next cycle (August) may start one-year renewal terms



## *Challenges: Leadership*

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- Barry selected as Director of Global Design Effort for the International Linear Collider
  - » “Not as big a job as the technology decision (first part of 2004)”
- Intends to continue in LIGO at a significant level
  - » Important pre-conditions
    - No relocation
    - Will continue >20% on LIGO
    - Orderly transition—no sooner than summer 2005
- Implications for LIGO?
  - » Some evolution of management responsibilities
  - » No abrupt changes in management
  - » No indications of reduced commitment by Caltech, MIT or NSF
  - » LSC input important



## *Directions: S5*

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- S5 goal is to meet NSB condition for AdvLIGO funding
  - » “at least a year’s data of coincident operation at the science goal sensitivity ”
- Tentative plan
  - » S5 to start fall 2005
  - » Run Committee to guide exact timing and preparations
- Performance goals for S5
  - » Develop sensitivity goals and duty cycle goal
  - » Optimized plan
    - Review with PAC, NSF
  - » Overall “Science content” ~ 100 times S4



## *Directions: Initial LIGO Upgrades*

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- Several years between “full exploitation of initial LIGO” and initiation of AdvLIGO
  - » Modest improvements in sensitivity could be very useful-- factor of 2 would increase rate by factor of 8
- Budget constraints force us to evaluate all proposed upgrades in terms of available resources, time
  - » Capital funds limited (\$1M?, \$1.5M?)
  - » Need plan to exploit improvements (~one year integrated minimum, without delaying AdvLIGO)
- Session tomorrow to discuss possibilities



## *What Should We Do?*

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- Experimenters
  - » A factor of 10 sensitivity improvement is good—  
a 10% improvement is still good
  - » Increased attention to duty cycle
- Analysts
  - » Detection will require prompt analysis—  
need to have our analysis done before the machine changes
  - » Every new paper does not require a new analysis technique—  
Improved data and limits can be enough!
- Need to develop a consensus about balance  
between AdvLIGO vs. initial LIGO upgrades
- Focus limited resources on highest priority items