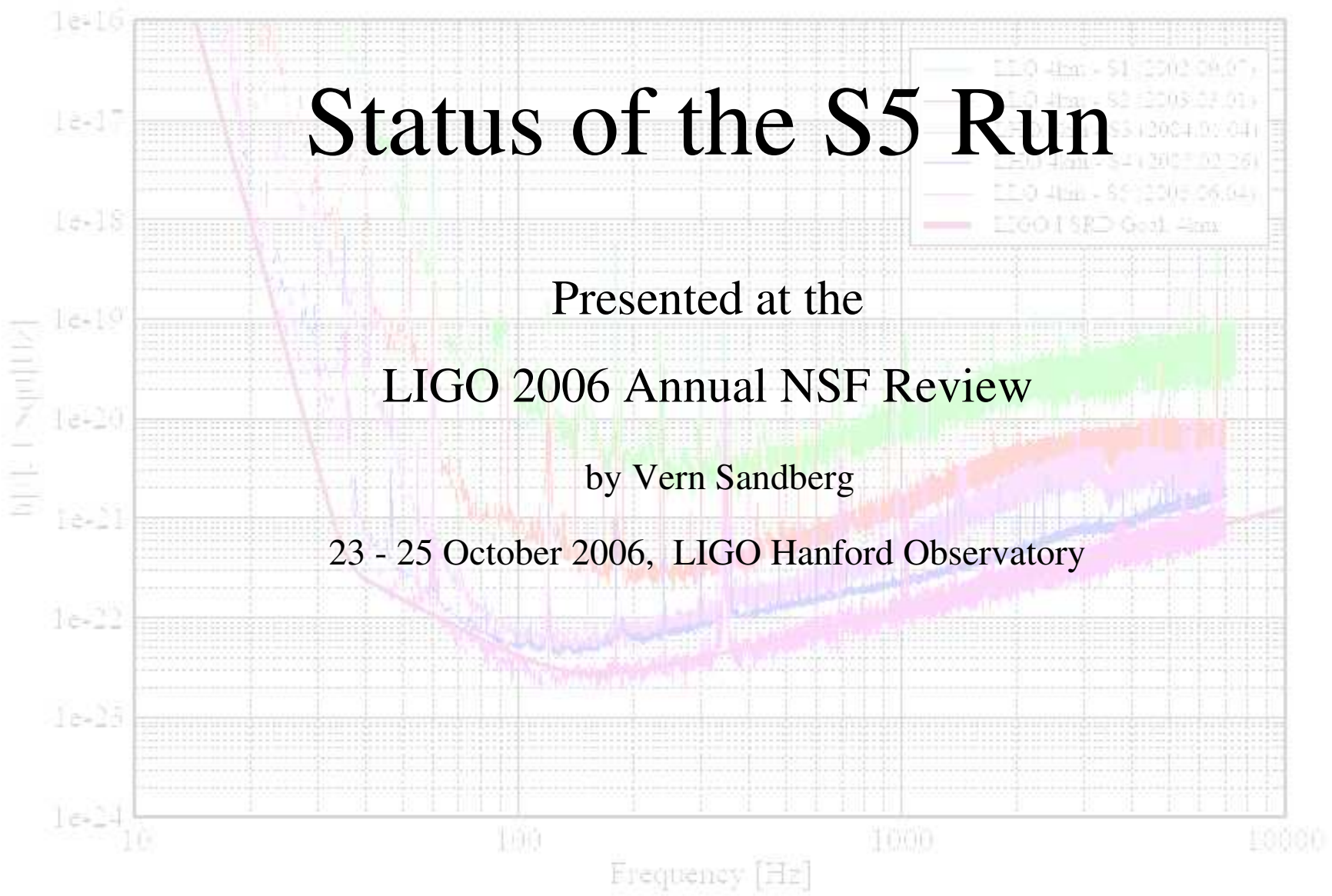


Status of the S5 Run

Presented at the

LIGO 2006 Annual NSF Review

by Vern Sandberg

23 - 25 October 2006, LIGO Hanford Observatory


LIGO Livingston Observatory (LLO)

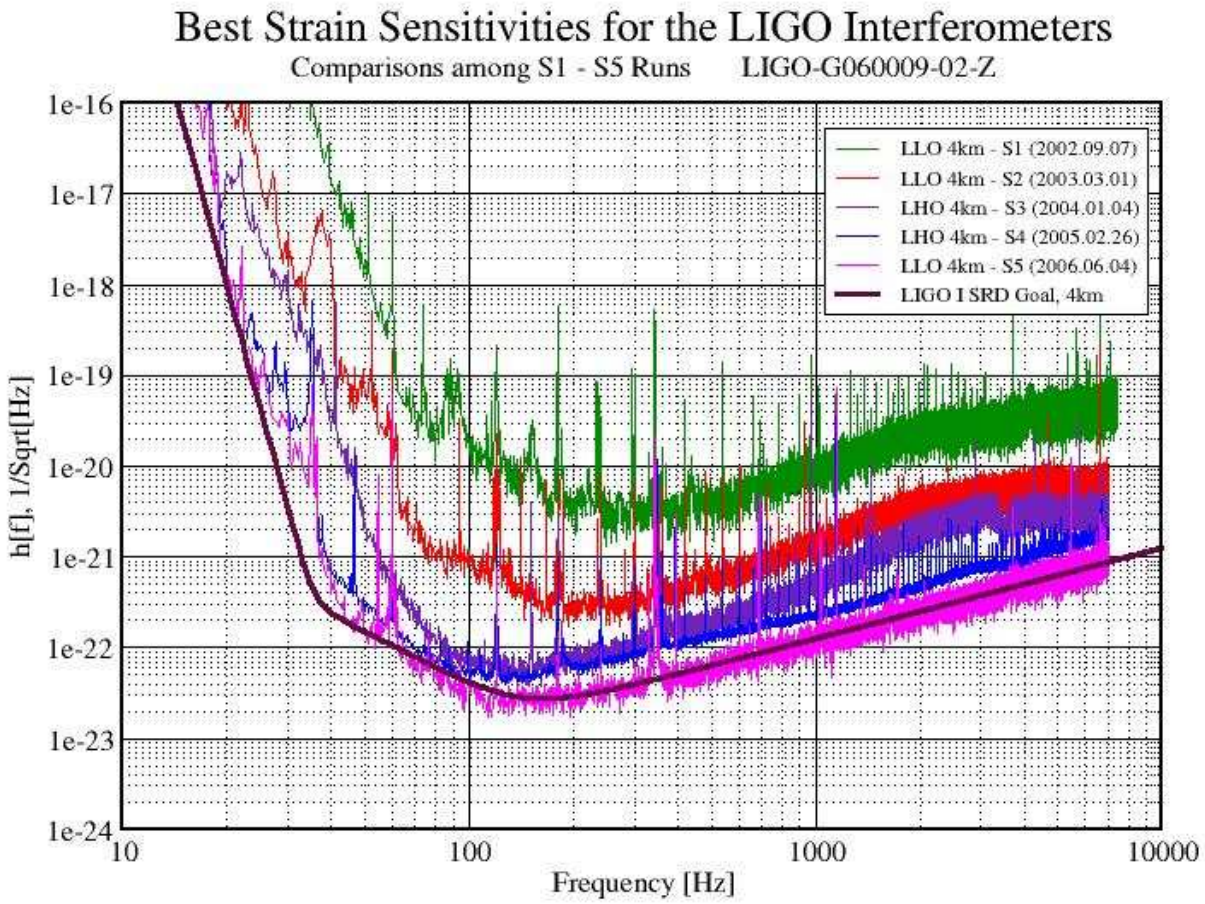

LIGO Hanford Observatory (LHO)

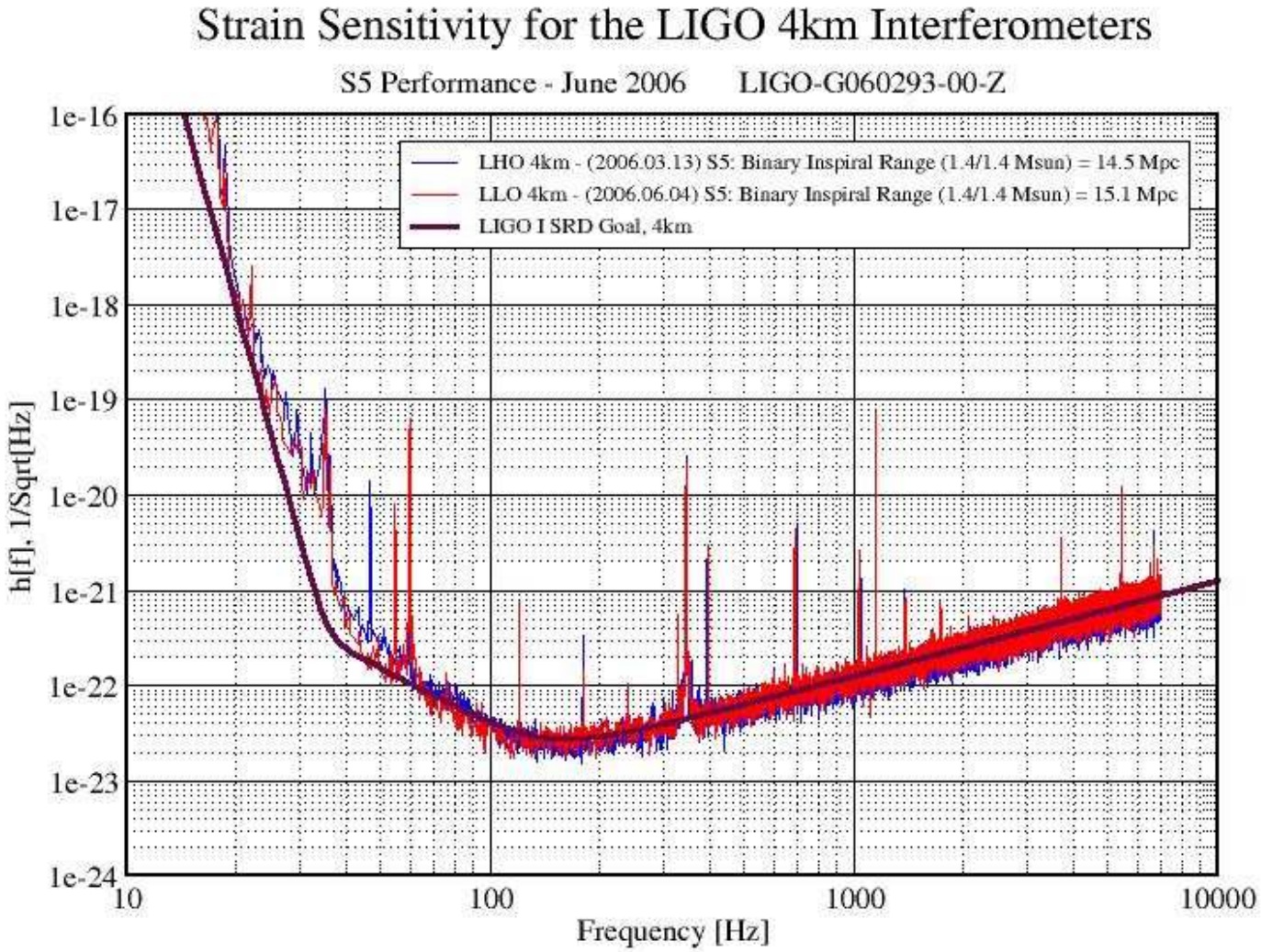
Calendar Duration

Science Run #5	**04Nov2005 – ongoing**	**> 8230 hrs**
Science Run #4	22Feb2005 – 23Mar2005	708 hrs
Science Run #3	31Oct2003 – 9Jan2004	1680 hrs
Science Run #2	14Feb2003 – 14Apr2003	1415 hrs
Science Run #1	23Aug2002 – 9Sep2002	408 hrs

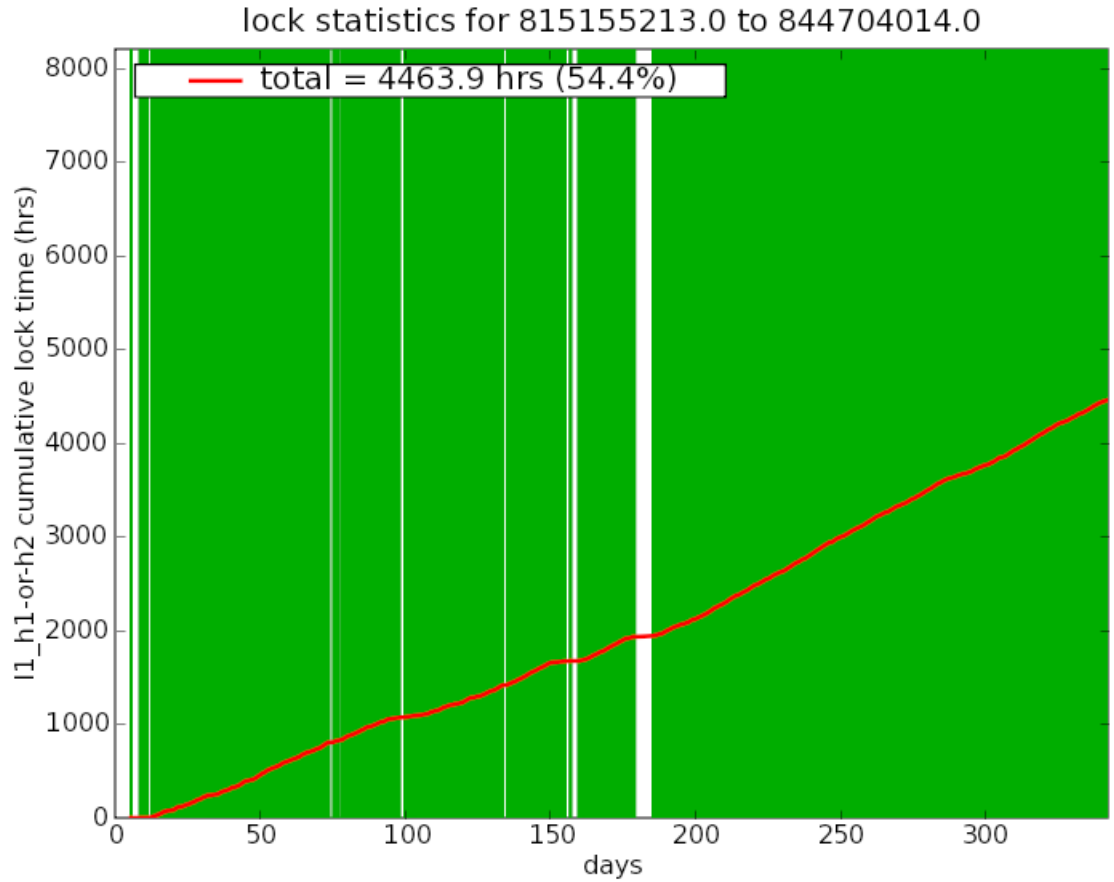
1 year = 8765.8 hours

S5 Run Sensitivity Compared to S1, S2, S3, S4




Strain Sensitivity for the LIGO 4km Interferometers
S5 Performance - June 2006
LIGO-G060293-00-Z
LHO 4km - (2006.03.13) S5: Binary Inspiral Range (1.4/1.4 Msun) = 14.5 Mpc
LLO 4km - (2006.06.04) S5: Binary Inspiral Range (1.4/1.4 Msun) = 15.1 Mpc
LIGO I SRD Goal, 4km
h[f], 1/Sqrt[Hz]
1e-16
1e-17
1e-18
1e-19
1e-20
1e-21
1e-22
1e-23
1e-24
10
100
1000
10000
Frequency [Hz]

S5 Lock Statistics (H1 or H2) & L1 Coincidence

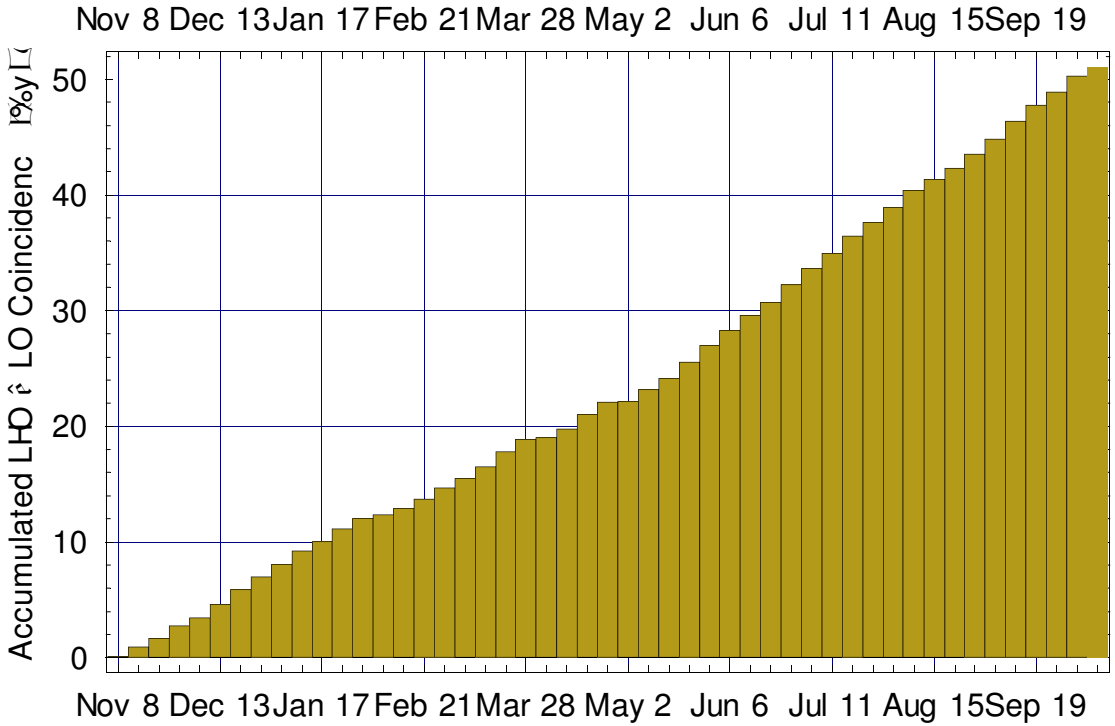


51% of 1 year

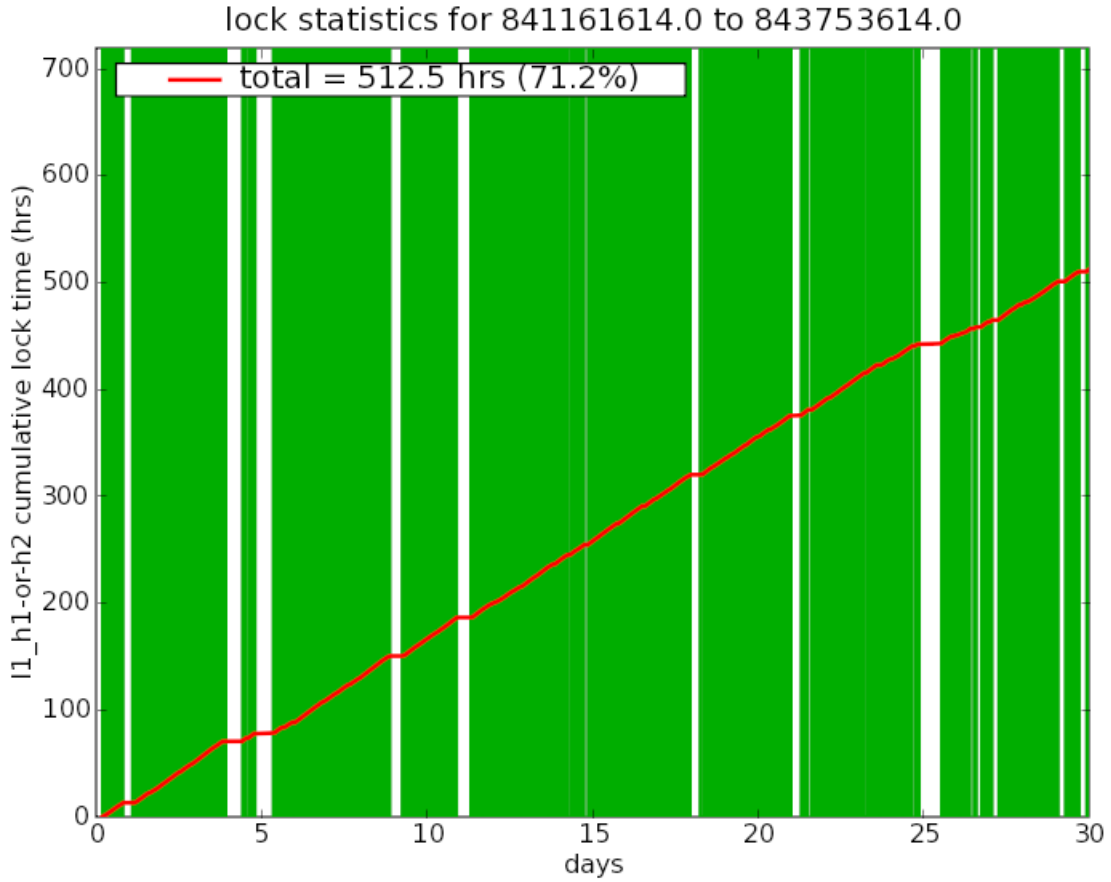
Duty Factor = 54.4%

Total Locked Time 51% of one year

(1 year = 8765.8 hours)


Nov 8 Dec 13 Jan 17 Feb 21 Mar 28 May 2 Jun 6 Jul 11 Aug 15 Sep 19
Accumulated LHO ê LO Coincidenc I%y L(
50
40
30
20
10
0
Nov 8 Dec 13 Jan 17 Feb 21 Mar 28 May 2 Jun 6 Jul 11 Aug 15 Sep 19

S5 Lock Statistics (H1 or H2) & L1 Coincidence, Past Month



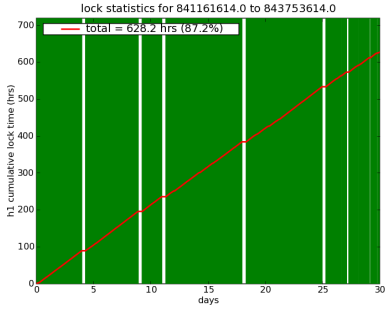
duty cycle is **71.2%**
total locked time: 512.5 hrs
longest segment was 14.2 hrs

Statistics for science data from Sep 01 2006 to Oct 01 2006.

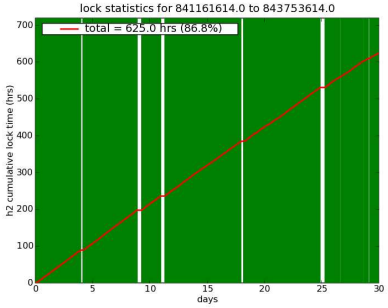
S5 Lock Statistics: Single Detector, Past Month

Statistics for science data from Sep 01 2006 to Oct 01 2006.

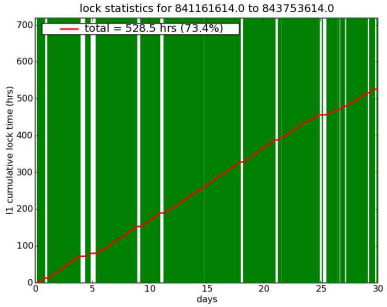
h1.window.txt
duty cycle between 841161614 and 843753614 is 87.2%
total locked time: 628.2 hrs
longest segment was 39.1 hrs starting at 843027157



h2.window.txt
duty cycle between 841161614 and 843753614 is 86.8%
total locked time: 625.0 hrs
longest segment was 26.2 hrs starting at 841377648



l1.window.txt
duty cycle between 841161614 and 843753614 is 73.4%
total locked time: 528.5 hrs
longest segment was 17.3 hrs starting at 842449013



(1 year = 8765.8 hours)

S5 Run Coordination

Herding Cats

Local Run Coordinators

Environment Activities

Data Analysis

IFOs

S5 Run Operations

General Guidelines:

- Maximize Coincident Science-Mode Time
- Maintain Optimal Range and FOMs

Tuesday Maintenance Periods Coincident between sites

- LHO 08:00 - 12:00 PST
- LLO 10:00 - 14:00 CST

> 25-hour/month “Special” Activity Budget

Calibrations and Injections

S5 IFO-based maintenance tasks

Below are links to task lists for monthly IFO maintenance and investigations. This page will be updated regularly by the local run coordinator to reflect usage of allotted times. Usage includes downtime induced by the maintenance activity, e.g. if an IFO will not relock after a given experiment, this time is charged against that experiment.

Maintenance tasks and other IFO investigations require the approval of the local run coordinators. Current local run coordinators are: LLO - Brian O'Reilly, and LHO - Keita Kawabe.

Note

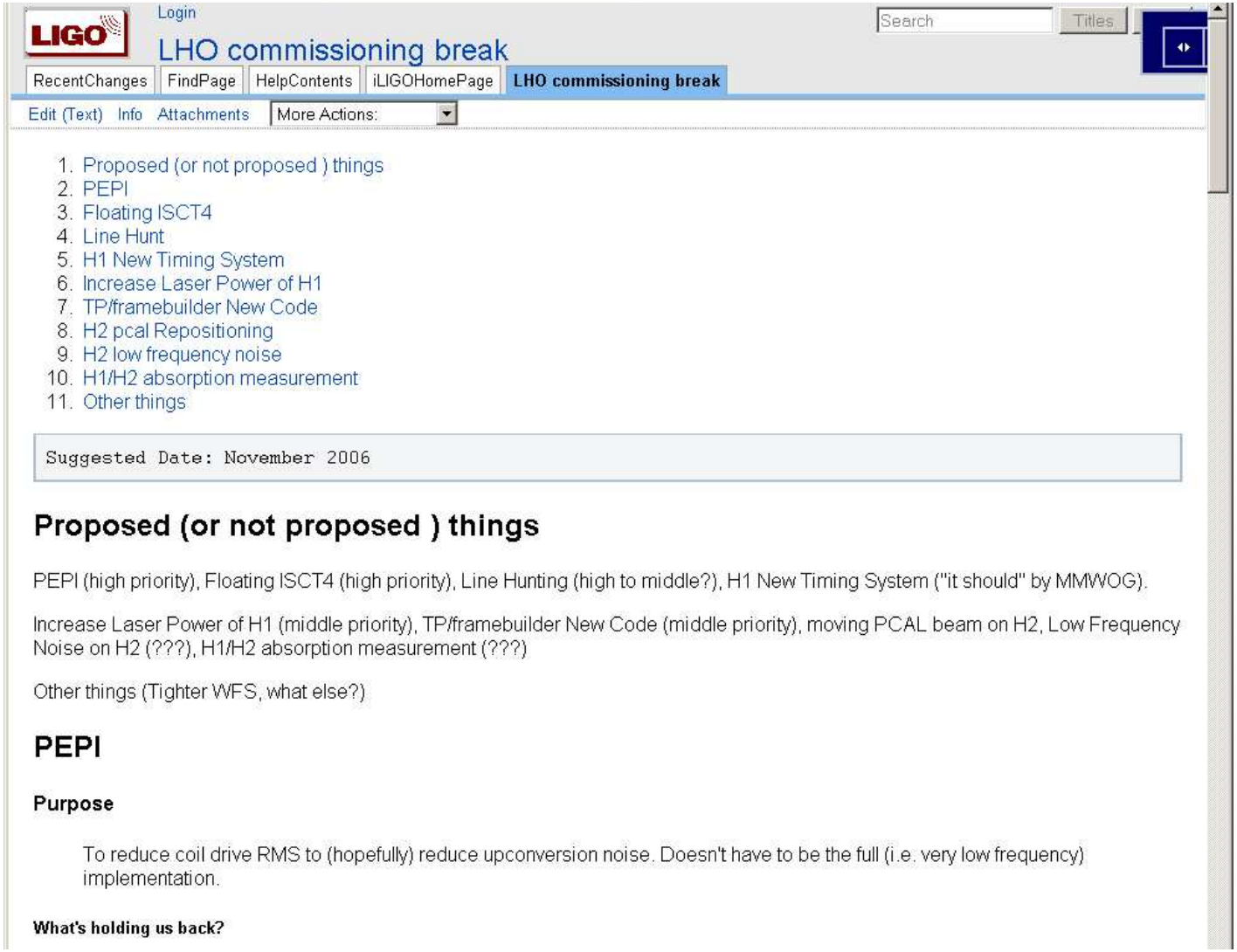
A maximum of 25h (figure subject to review) can be used on these tasks for commissioning/IFO maintainance. Seems like the budget for calibration is kind of different, but anyway the sum of calibration and commissioning and IFO maintainance is given here (see individual pages for details).

Note 2

Apart from these, we have to use time to fix things when IFO is suffering and performing worse than usual (e.g. if the laser is glitching). From September 2006, I (current Hanford local run coordinator Keita KAWABE) also try to count these, but wouldn't include these into our budget. If you want to see the numbers just follow the links.

Monthly breakdown of tasks

Jun 06	June **usage was: ?h for L1, 24h 17m for H1, 15h 13m for H2**
Jul 06	July **usage was: ?h for L1, 25h 25m for H1, 11h 25m for H2**
Aug 06	August **usage was: unknown h for L1, 10h25m for H1, 3h10m for H2**
Aug06 LSC	Week of commissioning after the LSC meeting
Sep 06	**?h for L1, 4.25h for H1, 0.5h for H2 (commissioning). 8+h L1, 10.2h H1, 0h H2, 8+h H1+H2 (calibration).** Apart from these, roughly 12.5h was used to fix things for H1, 4h for roofing H1+H2, 4+ hours for bootfest for both.
Oct 06	**? for L1, 0 for H1, 0 for H2 (commissioning). ? for L1, 30 min for H1, 0 for H2 (calibration).** Apart from these, roughly 3h was used to fix things for H1 and 1.6h for H2.



Login

LHO commissioning break

Search Titles

RecentChanges FindPage HelpContents iLIGOHomePage LHO commissioning break

Edit (Text) Info Attachments More Actions:

1. Proposed (or not proposed) things
2. PEPI
3. Floating ISCT4
4. Line Hunt
5. H1 New Timing System
6. Increase Laser Power of H1
7. TP/framebuilder New Code
8. H2 pcal Repositioning
9. H2 low frequency noise
10. H1/H2 absorption measurement
11. Other things

```
Suggested Date: November 2006
```

Proposed (or not proposed) things

PEPI (high priority), Floating ISCT4 (high priority), Line Hunting (high to middle?), H1 New Timing System ("it should" by MMWOG).

Increase Laser Power of H1 (middle priority), TP/framebuilder New Code (middle priority), moving PCAL beam on H2, Low Frequency Noise on H2 (???), H1/H2 absorption measurement (???)

Other things (Tighter WFS, what else?)

PEPI

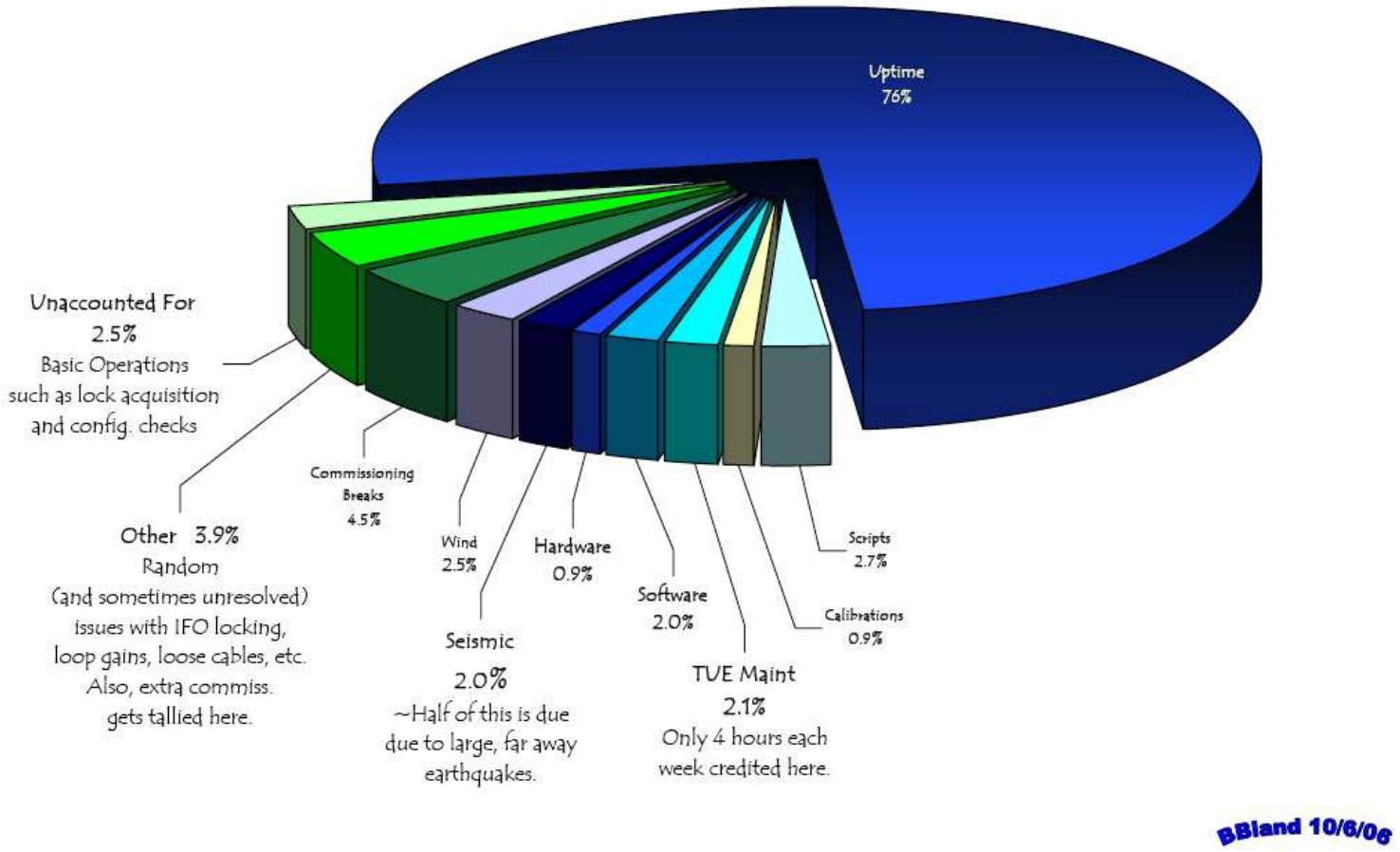
Purpose

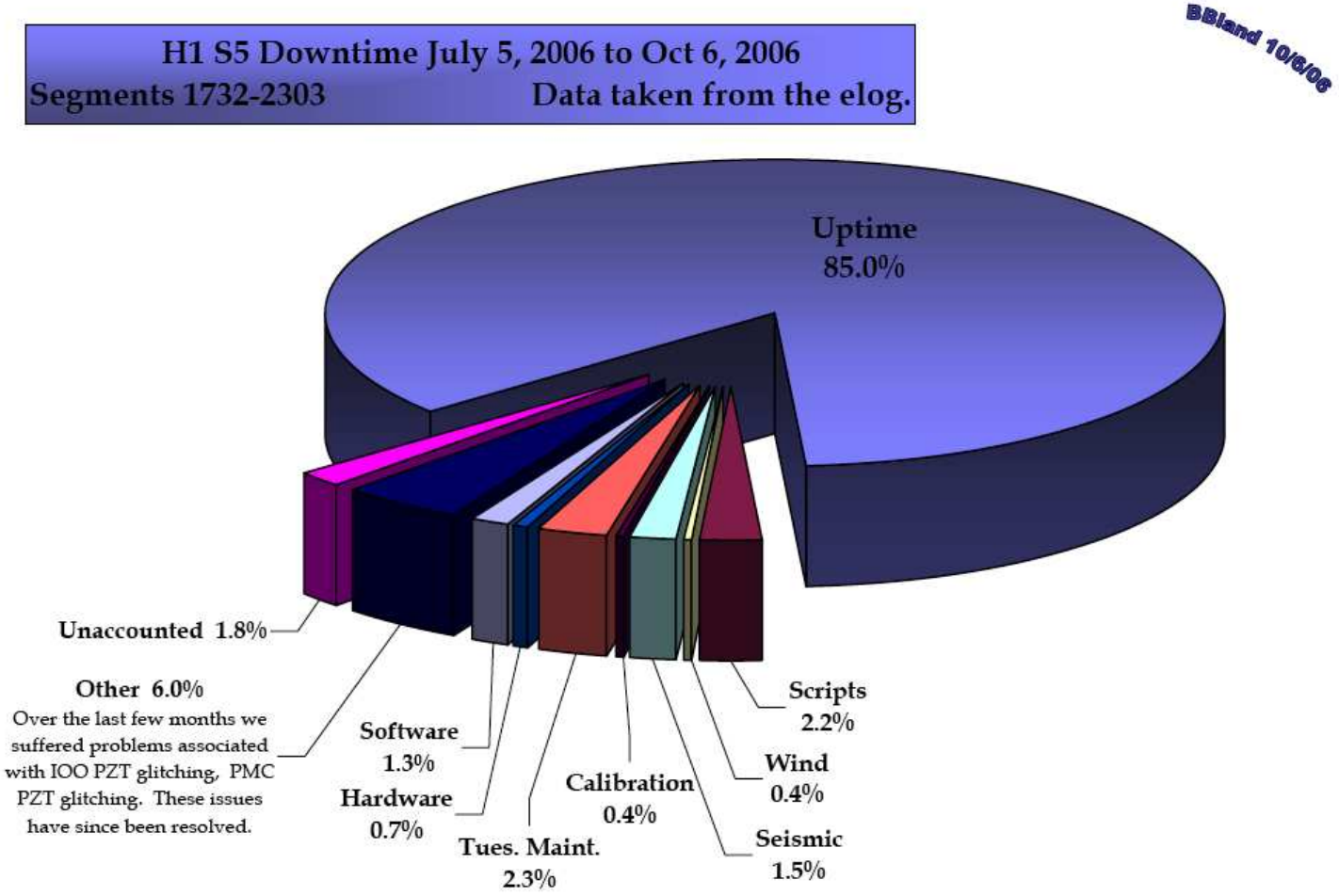
To reduce coil drive RMS to (hopefully) reduce upconversion noise. Doesn't have to be the full (i.e. very low frequency) implementation.

What's holding us back?

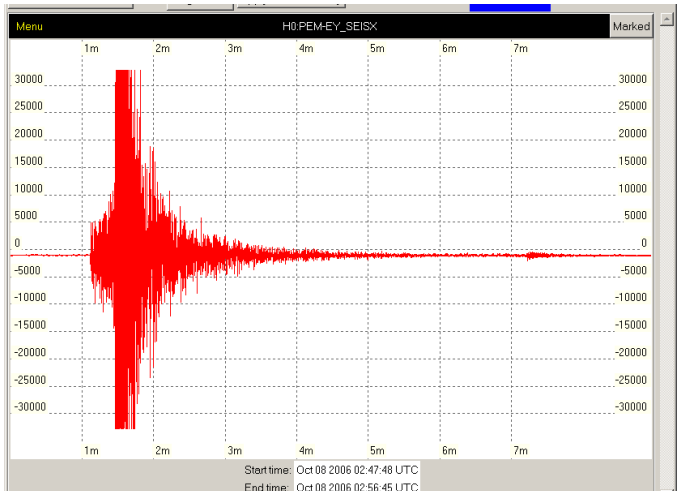
Major Events in the S5 Run

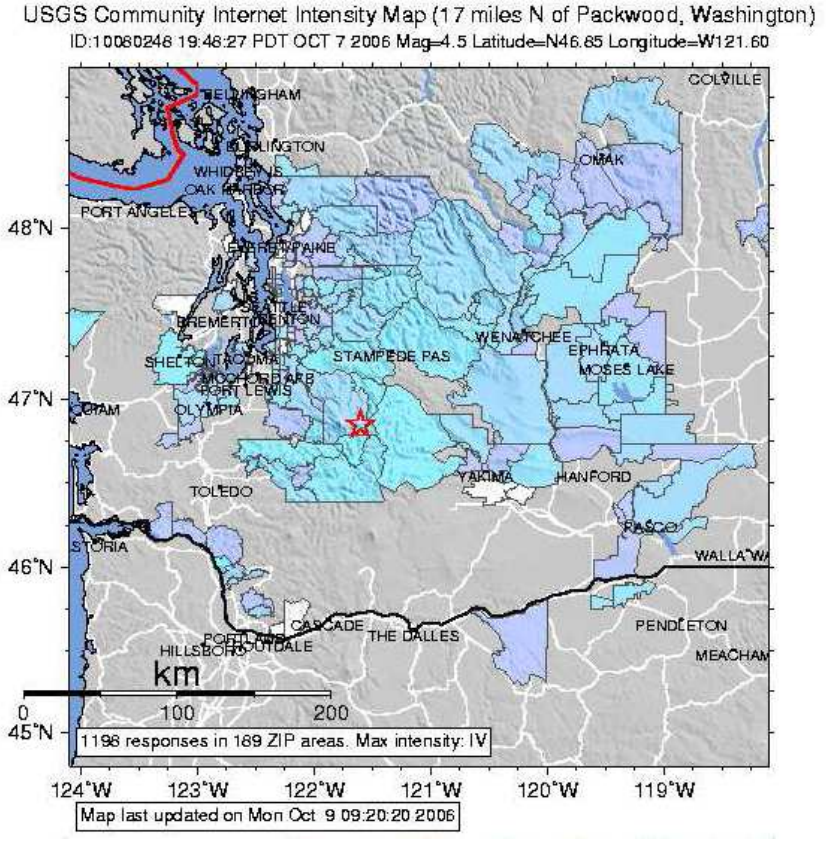
2005 November 4	S5 Science Run begins with LHO
2005 November 14	LLO joins
2006 February 6 – 17	LHO Intra-S5 Commissioning
2006 April 3 – 15	LLO Intra-S5 Commissioning
2006 May 2 – 5	LLO ITMY “Stuck Optic”
2006 October 7	Mt. Ranier Earthquake


S5 H1 Downtime
Data taken from elog and conlog and covers H1-100-871, COMM1, 1041-1160, COMM 2, 1263-2303
(Covers most of late Nov, 05 thru Oct 5, 06)
Uptime
76%
Unaccounted For
2.5%
Basic Operations
such as lock acquisition
and config. checks
Other 3.9%
Random
(and sometimes unresolved)
issues with IFO locking,
loop gains, loose cables, etc.
Also, extra commiss.
gets tallied here.
Commissioning
Breaks
4.5%
Wind
2.5%
Seismic
2.0%
~Half of this is due
due to large, far away
earthquakes.
Hardware
0.9%
Software
2.0%
TUE Maint
2.1%
Only 4 hours each
week credited here.
Calibrations
0.9%
Scripts
2.7%
BBland 10/6/06

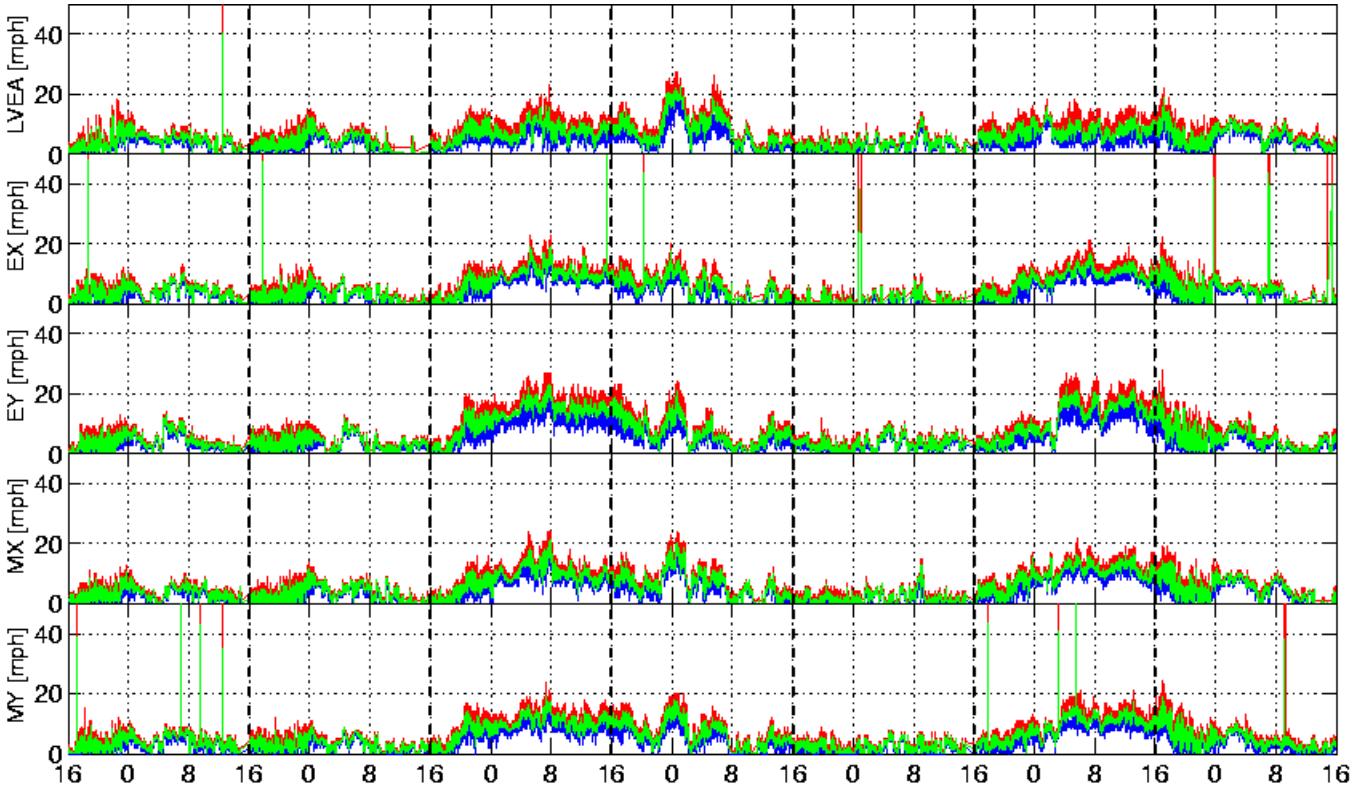

H1 S5 Downtime July 5, 2006 to Oct 6, 2006
Segments 1732-2303 Data taken from the elog.
BBland 10/6/06
Uptime
85.0%
Unaccounted 1.8%
Other 6.0%
Over the last few months we suffered problems associated with IOO PZT glitching, PMC PZT glitching. These issues have since been resolved.
Software
1.3%
Hardware
0.7%
Tues. Maint.
2.3%
Calibration
0.4%
Seismic
1.5%
Wind
0.4%
Scripts
2.2%

October 8, 2006 02:48 UTC Earthquake

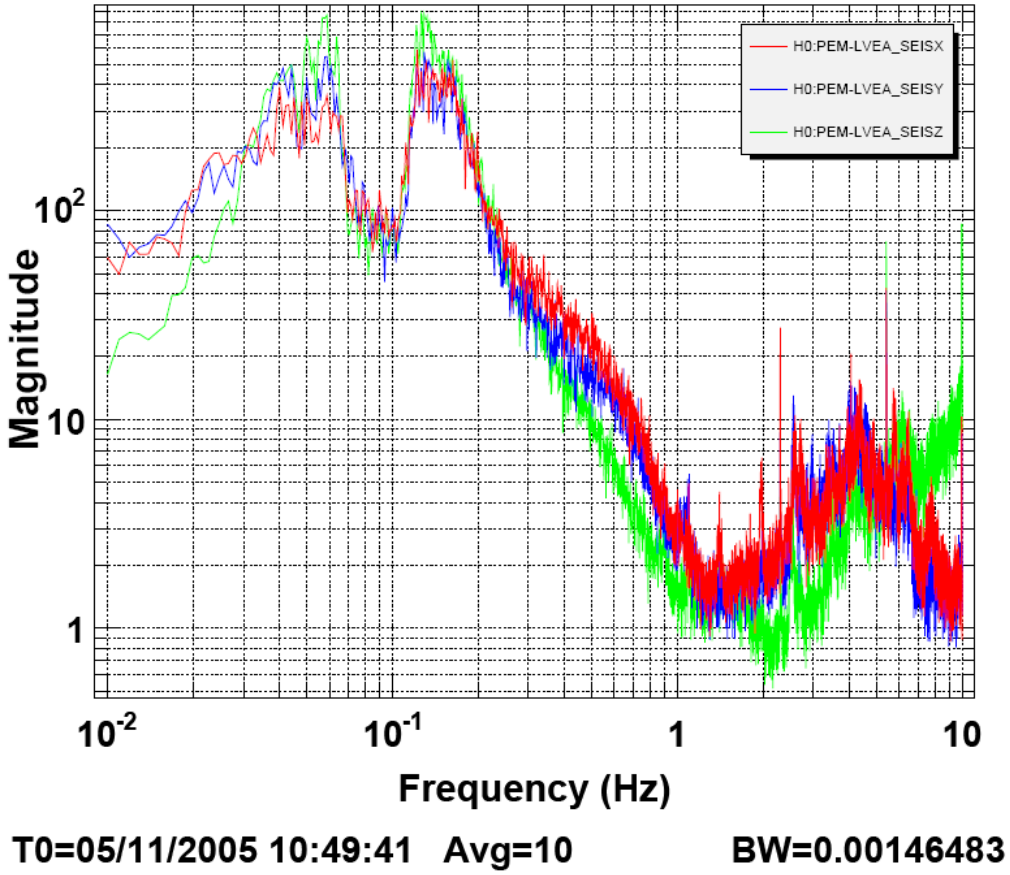




Hanford wind trends (red=max blue=min green=mean)

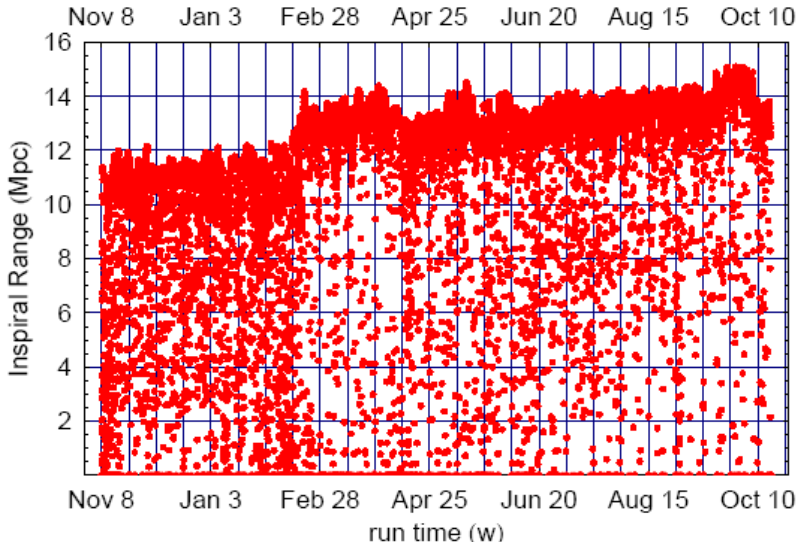


Micro-seismics

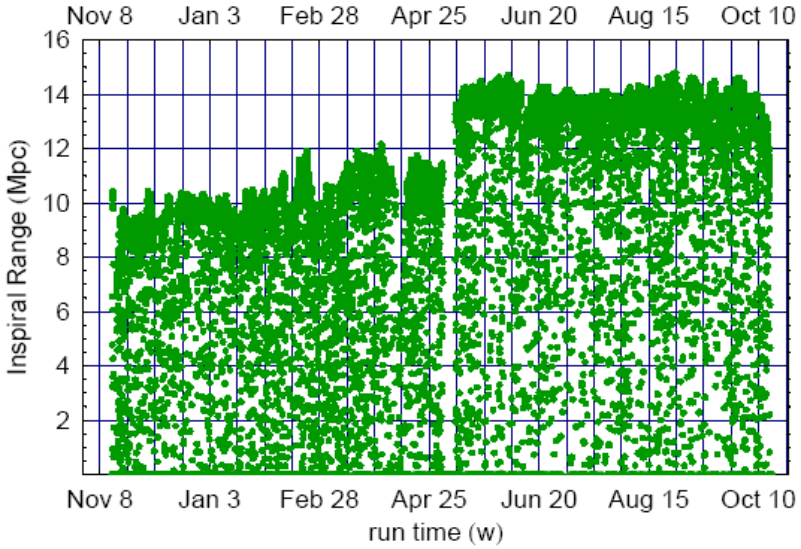


Range [Mpc]

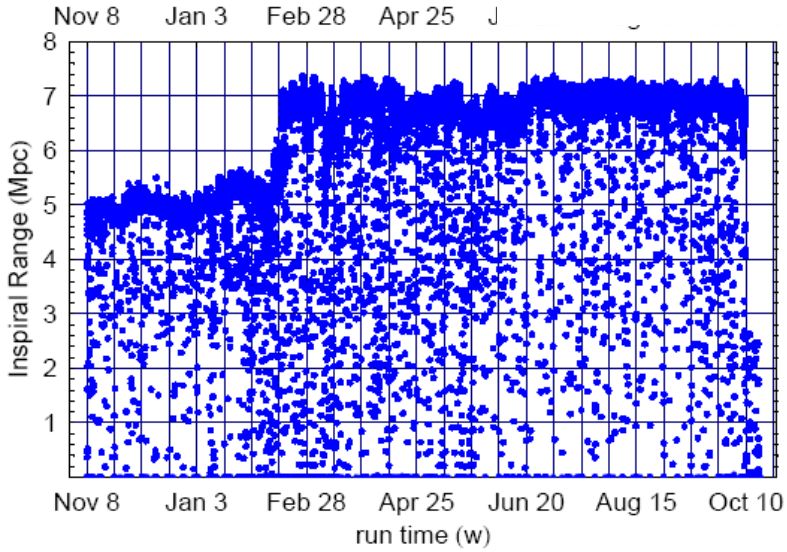
H1 4km

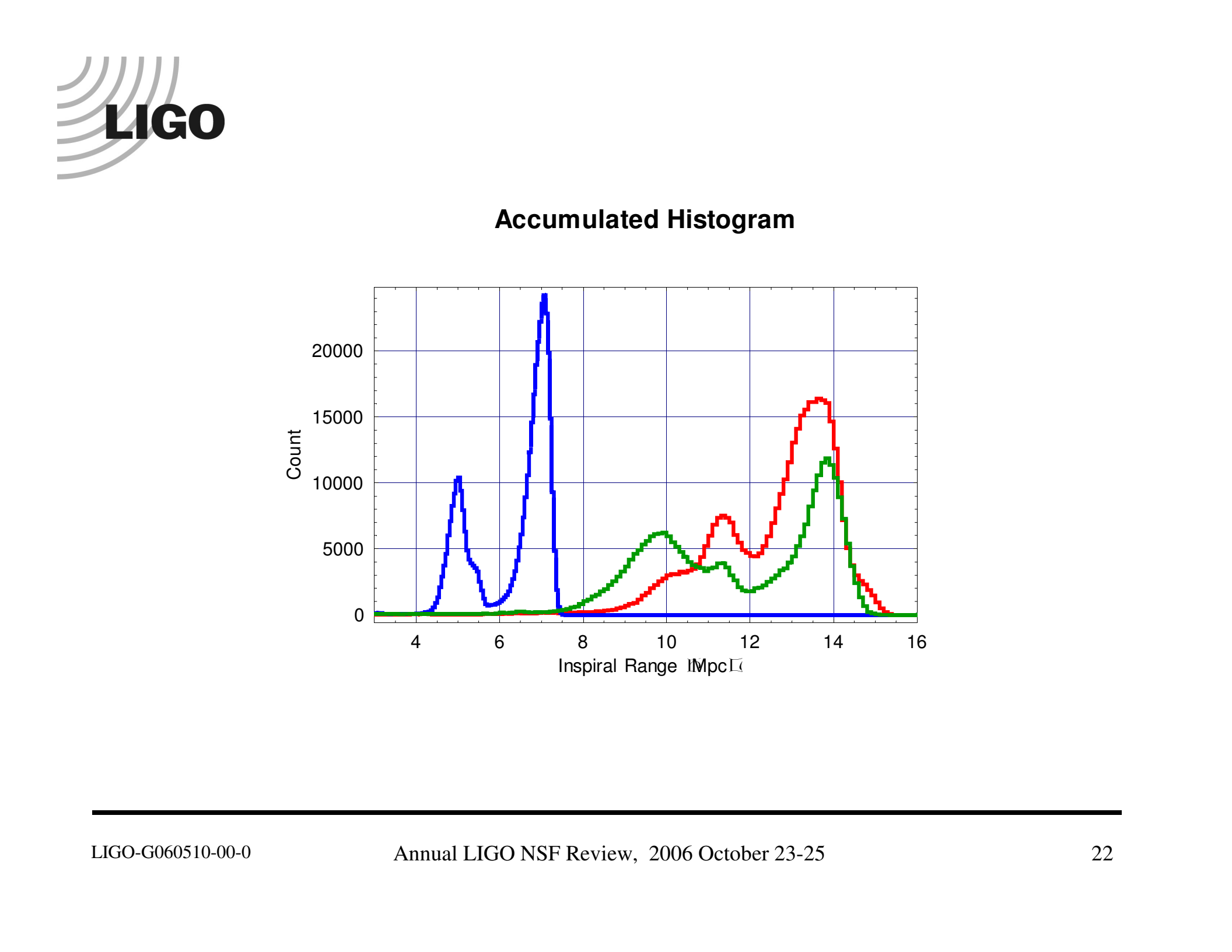


L1 4km

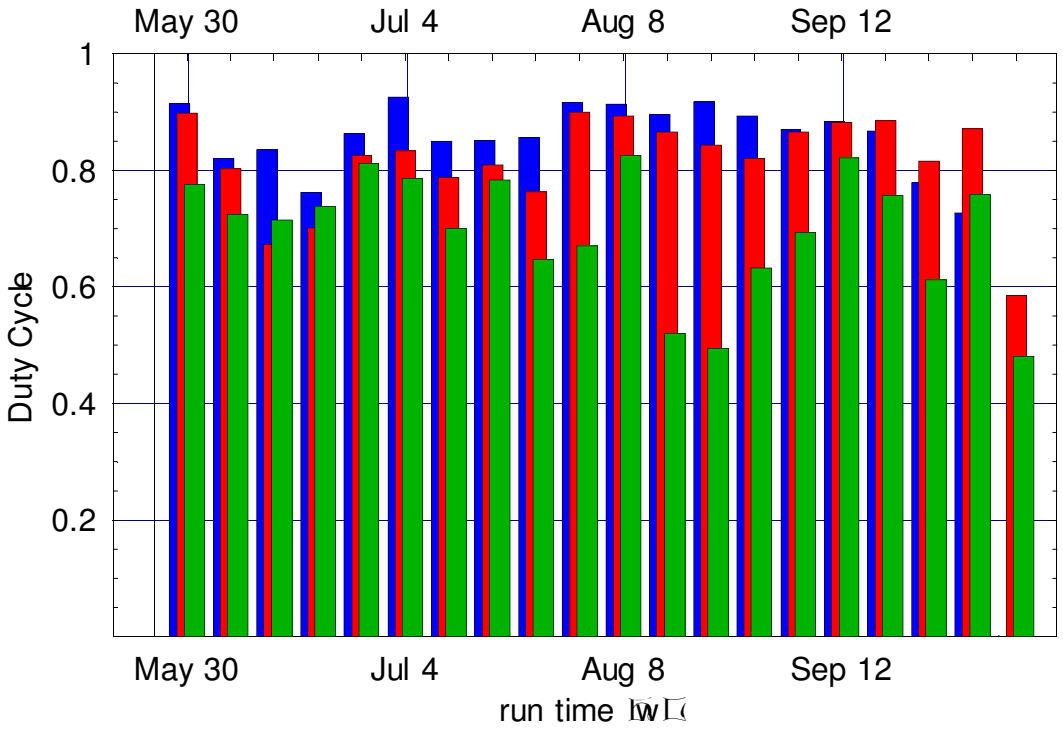


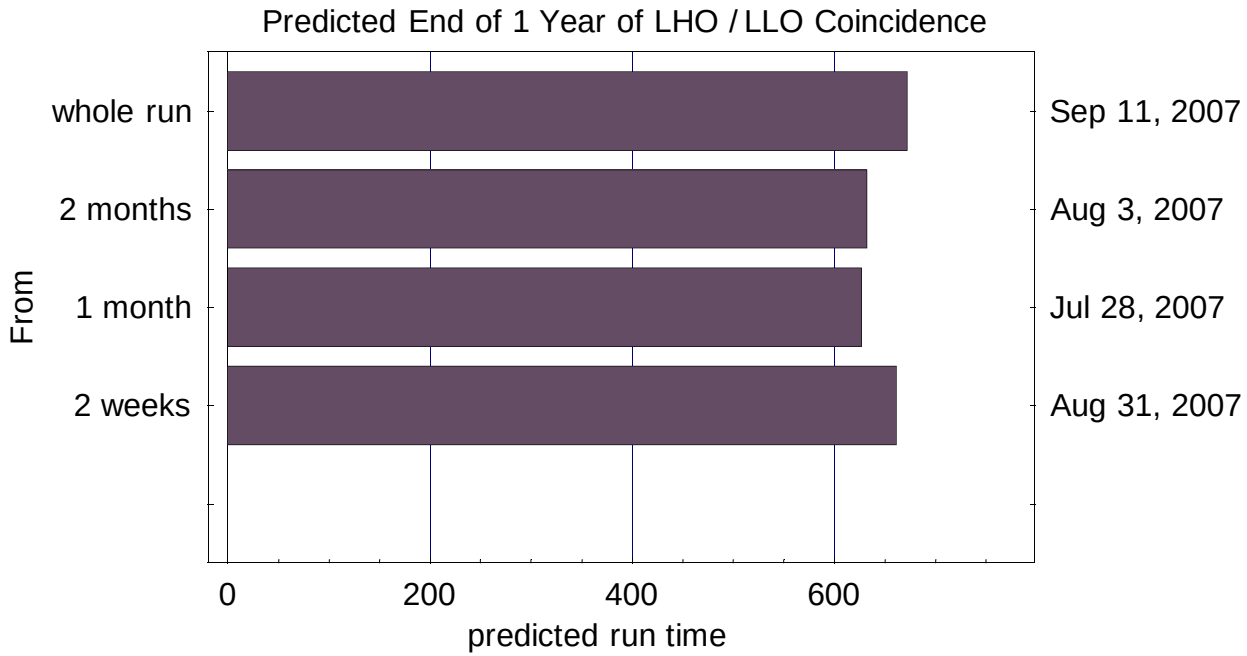
H2 2km




Accumulated Histogram
Count
20000
15000
10000
5000
0
4
6
8
10
12
14
16
Inspiral Range [Mpc]

Weekly Duty Cycle over Past 4 Months




Predicted End of 1 Year of LHO / LLO Coincidence
From
whole run
2 months
1 month
2 weeks
Sep 11, 2007
Aug 3, 2007
Jul 28, 2007
Aug 31, 2007
0
200
400
600
predicted run time