

X-Mailer: QUALCOMM Windows Eudora Version 6.2.1.2  
Date: Fri, 14 Mar 2008 13:33:07 -0800  
To: Tom Carruthers <tcarruth@nsf.gov>, Beverly Berger <bberger@nsf.gov>  
From: Phil Lindquist <lindquist\_p@ligo.caltech.edu>  
Subject: Large Facilities Projects Monthly Report (End of February 2008)  
Cc: "Phil Lindquist" <lindquist\_p@ligo.caltech.edu>,  
Jay Marx <marx\_j@ligo.caltech.edu>,  
"Stan Whitcomb \ (E-mail\)" <whitcomb\_s@ligo.caltech.edu>,  
Linda Turner <turner@ligo.caltech.edu>,  
"Thomas B. Lucatorto" <toml@nist.gov>, dcc@ligo.caltech.edu,  
Albert Lazzarini <lazz@ligo.caltech.edu>,  
Dave Beckett <beckett@ligo.caltech.edu>,  
Dave Reitze <reitze@phys.ufl.edu>,  
John Thacker <jthacker@ligo-la.caltech.edu>  
X-Spam-Score: undef - License key expired  
X-Canit-Stats-ID: 8496006 - 3a8ae0b04abf  
X-Scanned-By: CanIt (www . roaringpenguin . com) on 131.215.115.14

Tom, Ye of little faith!  
P.  
=====

Subject: **LIGO End of Febuary 2008 Highlights**

Reference: **LIGO-M080032-00-P**

**LIGO Scientific Collaboration (LSC)**

The LSC Remote participation committee conducted a survey for the LSC and Virgo Collaborations to assess the needs and desires of the collaborations for effective long-distance participation in collaboration and face-to-face meetings. Approximately 133 LSC and Virgo members participated. The results will be discussed at the LIGO-Virgo meeting in March. In addition, EVO, a collaboration tool developed for high-energy collaborations will be tested during the March meeting.

The initial meeting of the LSC Education and Public Outreach (EPO) working group was held in February. The meeting focused on overall priorities and major objectives of the group (developing public, K-12, undergraduate, graduate outreach) as well as short term goals such as surveying LSC outreach activities and EPO best practices, and web site development for the new ligo.org website under development. As a follow up, the group submitted a proposal for a half day workshop on LSC outreach activities at the May American Astronomical Society of the Pacific meeting (held in conjunction with the American Astronomical Society meeting) in St. Louis in preparation for the upcoming International Year of Astronomy in 2009.

**Publications**

No publications to report this month.

**Education and Outreach**

The LIGO Laboratory hosted a booth at the 2008 Joint Annual Conference of the National Society of

Black Physicists and The Society of Hispanic Physicists in Washington, DC, February 20 through 22. There were a large number of inquiries from undergraduates attending the summit, who were interested in our REU/SURF/UROP programs and also in applying to graduate school at both LIGO Laboratory institutions.

### Livingston Observatory

#### Student Learning

The LIGO Science Education Center (SEC) hosted 10 school visits this month with a total student attendance of 385 (245-High School students, 65-Middle School students, 75-Elementary students).

In addition, three off-site visits were made to local elementary schools (102 total students for the three schools).

An SEC staff member participated as a science fair judge for a New Orleans charter school. All available SEC school field trip days for the year (except six dates reserved for low-performing schools) were reserved by mid-January. We have placed schools on a "cancellation standby list" and urged them to consider requesting a Fall field trip date next year to avoid our crowded Spring calendar.

#### Teacher Programs

- We conducted one off-site teacher Professional Development (PD) program. This was for the Baton Rouge Area Teachers of Mathematics. We explored pendulum motion using web cams and computer software. Eighteen teachers attended.
- We conducted two on-site teacher PD programs for the Math Science Partnership (MSP) projects in the Baton Rouge area. Forty-one teachers and administrators attended.
- We saw increasing pre-service teacher Docents participation during our school visits.

#### Education Research

- Tulane University's research in student interactions during exhibit play continued this month at the SEC with video data collection during most of the school visits.

### Hanford Observatory

For the second consecutive year, the Hanford Outreach Group conducted February visits to GEAR UP schools in the Okanogan Valley of north-central Washington State. LIGO Outreach visited six schools in two trips of three schools each. These six sites are affiliated with a GEAR UP grant that is administered from Central Washington University in Ellensburg. Students at Manson, Brewster, Bridgeport, Omak, Tonasket and Oroville middle schools participated in LIGO's set of portable hands-on wave activities or, if their school hosted the wave activities last year, a large-group presentation on force, pressure, air pressure and the behavior of vacuums. Roughly 1100 students participated in these activities.

### **Enhanced LIGO**

We achieved several major milestones this period in the enhanced LIGO installation effort.

The Hanford four-kilometer interferometer vertex input and output optics modifications were declared to be complete when, after several weeks for degassing, the beam tubes were opened to check final alignment.

As was true earlier in Livingston, the four-kilometer arms were aligned within specified tolerances, clearing the way to proceed with laser and seismic system installation. This is also good news for the two-kilometer interferometer as it is now operating at good sensitivity and duty factor in AstroWatch mode and should not need to be disturbed further.

Meanwhile at Livingston, we installed the first Advanced LIGO active internal seismic isolation (ISI) platform in HAM6 (the horizontal-access module which is the final output chamber), after a near-textbook verification of open-loop dynamics on the external test stand. A special clean room bridge crane system developed for the purpose delivered the fully assembled ISI (nearly 3 tons) horizontally into the chamber and set it onto its mount points in perfect alignment. Instrument signatures and clearances are being verified in situ to clear the way for installation of the output mode cleaner

We successfully locked the Livingston four-kilometer interferometer output mode cleaner (OMC) to a test laser and completed a transmission-test in the optics lab, verifying readiness. It will next be mated with its suspension system, already tested, and the assembly installed atop the completed ISI in HAM6.

### **Advanced LIGO**

Please refer to the to the work reported above in the context of the enhancements to initial LIGO for work on the "HAM" seismic isolator, some laser work, and Output Mode Cleaner work.

We took a significant step forward with the decision to adopt optically stable cavities for the input and output recycling cavities. This will provide a number of advantages, most specifically a greater tolerance for imperfections in those optics. We are now propagating that decision into the other subsystems. This allowed us to conduct a Preliminary Design Review of the Core Optics Components, which was drawing to a close at the end of the month.

Our Albert Einstein Institut (AEI) colleagues, with LIGO lab participation, successfully tested a closed servo-loop for frequency control around the front end of the Advanced LIGO laser (which also serves as the enhanced LIGO laser).

In suspension work, we completed the mechanical characterization of the Quad suspension with the seismic isolation system, with satisfactory results. The beam splitter prototype has been sent out for fabrication by our UK colleagues. They have also completed, with Lab participation, the installation of the ribbon pulling machine at the MIT LASTI facility in preparation for the fabrication of the monolithic suspension stage later this year.