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Date: Thu, 09 Mar 2006 15:08:54 -0800  
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Subject: Large Facilities Projects Monthly Report for February 2006  
(LIGO)  
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Reference: LIGO-M060037-00-P

## LIGO February 2006 Highlights

### Publications

The S2 binary black hole paper has been accepted by Physical Review D.

### S5 Science Run

We began the first long LIGO Science Run (S5) in November at sensitivities over most frequencies equal to our target in the science requirements document (SRD). Our goal is to accumulate one full-integrated year of data at the design sensitivity. S5 is expected to last 18 months with minor interruptions for maintenance and improvements.

We interrupted Operations for two weeks beginning February 6, 2006 for interim commissioning activities. Operations (data recording) continued at night.

We resumed Operations February 20, 2006. As a result of improvements we have achieved new sensitivity records. The best measured "reach" of the interferometers as measured by the distance at which a neutron star binary coalescence would be detected is over 14 megaparsecs for the Hanford four-kilometer interferometer (H1), over seven megaparsecs for the Hanford two-kilometer interferometer (H2), and better than 12 megaparsecs for the Livingston four-kilometer interferometer (L1).

We continue to address the duty factor. At Hanford the cumulative duty cycle since the beginning of S5 for the four-kilometer interferometer (H1) is 62 percent. For the two-kilometer interferometer (H2), the cumulative duty cycle is 72 percent. At Livingston the four-kilometer interferometer (L1) the cumulative duty cycle is 55 percent.

The duty cycles have been limited primarily by anthropocentric noise (construction noise, convoys of trucks, etc.) and record high micro-seismic noise (high winds, etc.), and hardware issues. **Several lines of investigation are in progress that the commissioning team is confident will improve the reliability of the hardware and make the system more robust to environmental disturbances.**

### Advanced LIGO

Advanced LIGO is preparing for a preliminary Baseline Review, to be held at MIT on May 29-June 2. The objective

of this baseline is to affirm the cost and schedule, risk and contingency planning, plans for project execution, and to cover the technical approach and associated R&D. This review is in advance of the normal schedule for a project baseline review, and LIGO looks forward to an update review in a year's time to mesh with the planned start of the project in FY 2008.

On the R&D front, the first prototype quadruple pendulum suspension for the Advanced LIGO test masses has been shipped from Caltech, where it was engineered and fabricated, to MIT, for installation in our large-scale integration test bed. It has now been installed in a mock-up of the isolation system, and is being aligned and 'shaken down'. Shortly it will be installed in the full-scale LIGO vacuum chamber at MIT as an installation exercise and to allow testing of the control and mode damping electronics.

#### Science Education Center at Livingston

Construction of the Livingston Science Education Center (SEC) is on schedule. The steel structure has been completed. A Request for Proposal was issued on February 22 for the design of the kinetic facade. Proposals are due on Friday, March 3. The Center should be operational by November 2006.

The Exploratorium is on schedule to deliver the second group of exhibits for the SEC on April 18. This will leave only one more group to complete the contract deliveries