Report of the LASTI Technical Advisory Committee (TAC)
Based on its meeting held at the LSC meeting at LSU on August 16th 2006

Members of the committee: Rich Abbott, Dennis Coyne, Riccardo DeSalvo, Brian Lantz, Fred Raab, Norna Robertson (chair) and Alan Weinstein

LIGO – T060218-00-R

1. Introduction

The LASTI TAC held a meeting on 16th August 2006 with Dave Ottaway during the recent LSC meeting at LSU. Prior to the meeting, Dave prepared an update for the TAC (LIGO-T060183-00-R). His report summarised the status of work at LASTI on 6 fronts, all of which have seen progress in the last 6 months. These areas are

1) Quadruple pendulum suspension control prototype: installation into BSC chamber, sys-id and damping tests
2) Two stage internal seismic isolation (ISI) prototype: assembly of structure in high bay
3) Triple suspension prototype controls testing: testing of modal controller and locking of optical cavity between two triple pendulums
4) HAM SAS: infrastructure preparation and model development
5) QND experiments: suspension of 1 gram mirror as part of cavity and further investigations of optical spring effect
6) Commercial optical amplifier tests: verification of laser modelling code and birefringence compensation technique

The first five areas are ongoing at LASTI. The laser amplifier work has been transferred to LLO for manpower reasons.

Since the last update a couple of key changes have been made to the LASTI plan. Firstly the ISI is taking longer to assemble than anticipated. The revised schedule has the clean installation into LASTI at 1 March 2007 (following completion of 'dirty' tests, disassembly and cleaning). This revised timing has led to a revision of the plans for joint testing with SUS. The first joint testing of ISI with a quad suspension will now be with the noise prototype suspension, due for delivery to LASTI in March 2007. The initial tests will be done with aluminium penultimate and test masses and steel wire suspension in the quad to gain experience while minimising risk before the all silica suspension is installed.

2. Schedule plans

Dave noted that the overall LASTI schedule is sensitive to slips in either of the two areas, ISI and SUS which, as mentioned above, are currently scheduled to come together in March 2007. Dave is in regular communication with RAL re the SUS delivery schedule. Two other areas could also cause potential scheduling issues. Firstly there is a planned significant upgrade to the QND experiment in the autumn. It is anticipated that the downtime needed for the upgrade can be kept to two weeks. The other major installation will be of the HAM-SAS, currently due for delivery in November 2006. Results of the HAM-SAS are needed by March 2007, and so the timescale is tight. Dave noted that if the QND installation slips it could be done at the

same time as HAM SAS. Clearly the scheduling of downtime needs to be monitored regularly.

After SAS testing the next test in that HAM tank might be of the output modecleaner (OMC) on its suspension. See section 4.1.

3. Update on issues raised at the LASTI review meeting in March 2006

See previous report T060069-00-R.

3.1 Manpower issues

Dave described the current manpower situation in his update. Overall he feels that the staffing in the near term is adequate, given the continuing strong support from the various external groups. Laurent Ruet is due to graduate shortly. However a new postdoc from INSA is expected soon. He could work on lock acquisition issues with the noise prototype quad suspension and also continue Laurent's modal damping work applied to the quad. It was however noted that it is important that LIGO personnel also need to be involved to insure continuity. The UK Adv LIGO SUS group has confirmed that they will have a significant presence during the quad installation. The HAM-SAS work currently looks understaffed, but potential help from Caltech and Columbia is being pursued. It was confirmed that EE support is working well with CDS input from Caltech. Dave noted that longer visits are more valuable.

3.2 Temperature control

Dave noted that the temperature control was now better than reported in March. However he noted that we should ask the question again as winter approached as the climate control could be "seasonally specific".

4. Issues raised at this meeting.

4.1 Scheduling of venting and future installations.

Some discussion took place about the possibility of separating one of the HAM chambers from the rest of the LASTI installation with a fixed plate and window, as is intended to be done for HAM 6 as part of the Enhanced LIGO work at the detector sites (and for HAMs 1 and 6 for Advanced LIGO).. The cost of such a separation plate, and a separate vacuum pumping system for the HAM chamber, would be ~ $60K. The advantage of having one separate HAM chamber would be that tests such as of the OMC could be done without interfering with other ongoing work.

Action: Dave Ottaway is encouraged to explore the possibility of implementing the separated HAM vacuum solution at LASTI to ease scheduling difficulties.

4.2 Thermal testing

At present tests on the thermal compensation for Adv. LIGO is not due to be done until the noise prototype quad is up and running. A related test is underway. A set of resistors will be placed on the controls prototype assembly in vacuum and used to determine the temperature distribution and elongation (using the OSEMS). Should we be considering any other earlier testing using the controls prototype, such as deploying a suspended ring heater to measure the radiative coupling to the structure?

Action: AOS and SUS teams should consider this and make a proposal considering the merits of earlier action and what might be feasible to do.

4.3 Longer term planning.

The work due to be carried out in the next ~ 12 months is fairly clear. However the "Big Picture" is less clear. The intention had been to set up a PSL and an Advanced LIGO-like input modecleaner (3 triple pendulums) followed by a cavity between a further triple and a quad. Is this still the right approach? What are the outstanding research issues that can be addressed at the LASTI facility?

Action: Norna Robertson as chair of the LASTI TAC should organise a LASTI "summit" telecon (or face-to-face) to discuss the longer term research program and produce a revised LASTI plan

5. Conclusion

The committee was impressed with the continuing progress on many fronts at LASTI under Dave Ottaway's leadership, and commend all the team's work.

NAR for the LASTI TAC.
11th September 2006