

Report of the LASTI Technical Advisory Committee

Based on its meeting held at the LSC meeting at LHO on March 22nd 2006.

T060069-00-R

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

Dave Ottaway gave the presentation on behalf of the LASTI team. In this presentation, he reminded us of the LASTI mission and then listed the personnel associated with LASTI work, both those in residence at MIT and recent and near-future visitors. He brought the TAC up-to-date on LASTI progress since March 2005 and gave a summary of the plans for the next year. Subsequent to the LSC, at the request of the committee, he provided a diagram of the LASTI optical layout annotated with details of the present and near-future activities in each of the vacuum chambers (3 HAM chambers and one BSC chamber). This diagram is included in his updated presentation posted on the DCC (G060183-00-Z).

There has been considerable progress at LASTI since the last review, and several experiments and investigations are underway. Various infrastructure activities have been completed, including installation of a new cleanroom, construction of a test stand for assembling SUS and SEI systems outside the vacuum tanks and installation of a granite table for SEI assembly. CDS infrastructure is under development. One item which was noted was the continuing problems with temperature control in the high bay, and we return to this in our conclusions.

Experimental activities currently underway include:

- i) Quadruple suspension controls prototype – initial characterisation of this system, mounted on the test stand, is underway.
- ii) Double triple experiment - to test sensor noise immunity in a local control system using predictive modal methods. This experiment makes use of the two modecleaner triple pendulum prototype suspensions, with a quiet cavity set up between the two suspended mirrors.
- iii) Radiation pressure experiments - parametric instabilities and unstable optical spring effects have already been demonstrated.
- iv) Seismic characterisation and control – the cause of noise amplification at the top of the piers in a HAM chamber has been identified and an adaptive feedforward technique to reduce this effect is being investigated.
- v) PSL power upgrade test – preparations are underway to test the feasibility of increasing the power of a Lightwave 10W laser using commercially available optical amplifiers.
- vi) BSC seismic isolation system - parts are arriving and assembly should start soon. Detailed scheduling has been carried out. (See also comments on scheduling below).
- vii) Preparations have started for the testing of the HAM SAS passive isolation system, Installation is planned for beginning Aug. 06.

A detailed schedule for the Advanced LIGO BSC SUS/SEI assembly and testing over the coming year was presented, showing an anticipated date for combining the two systems of Feb. 07 and cartridge installation into the BSC chamber in March 07.

Conclusions.

Overall the committee felt that the LASTI team under the leadership of Dave Ottaway is doing an excellent job, and we commend them for their efforts. Several different experiments are continuing in parallel within a common vacuum envelope, and coordination of timing of venting and pumping is clearly important. We are impressed that this coordination is working very well. The manpower issue was one of the points raised at the last LASTI review. We are encouraged to see that there is a good core of scientists, technical staff and students working at LASTI, and that two new postdocs (one from Lyons and another to be jointly appointed between MIT and LSU) will be joining the group. We also note that there have been (and continue to be) numerous visitors working at LASTI from the SUS, SEI, CDS/DAQ and PSL teams, both from within the Lab and from other LSC groups. We are reassured to hear that each activity has one (or more) named persons earmarked as the “responsible” person for that activity. We note that good communication exists with the SUS and SEI groups, with several MIT members taking part in the weekly telecons. Such communication should facilitate any changes to the detailed schedule necessitated by delays in deliveries or other unforeseen events.

We would like to flag two issues.

- 1) Dave reported that there are ongoing problems with the temperature control in the high bay, with 20 degree F fluctuations being experienced. We ask if the LIGO directorate could help our LASTI colleagues to impress on the appropriate MIT authorities the importance of having good working temperature control in the LASTI lab where several sensitive experiments are underway.
- 2) Dave raised the issue of more technical support. In particular he believes that LASTI could benefit from a full time electronics engineer. Additional technician support would also be valuable. We ask the LIGO directorate to consider if such can be provided.

NAR for the LASTI TAC, 14th April 2006