

Report of the 40 m TAC 8th June 2006. LIGO-T070032-00-R

K.A. Strain for the 40m TAC

February 16, 2007

Feb 8th 2007 40m TAC telecon minutes

Attending

Rana Adhikari, Bob Taylor, Osamu Miyakawa, Kirk McKenzie, Rob Ward, Keisuke Goda, Hartmut Grote, Ken Strain, Valera Frolov, David Shoemaker, David Tanner, Peter Fritschel, Nergis Mavalvala, David Ottaway.

Minutes

Rana led a presentation covering the main topics of DC readout, locking strategy and squeezing. There was considerable progress in all three areas, indeed the overall program is proceeding close to the schedule given at the previous TAC. The presentation G070016-00-R, which speaks for itself, is currently at

http://lhocds.ligo-wa.caltech.edu:8000/40m/TAC_Meeting-Feb_07

We note that the parallel development of squeezing with the rest of the 40m work has not been a cause of any significant delays.

Several issues were raised in general questions, mostly after the presentation.

There was a short discussion about the various acquisition strategies that were being investigated (SMOOTH, BANG in the talk). Some work is being done that may have application to Enhanced LIGO, as although the Initial LIGO scheme is clearly adequate for the purpose, there is scope to find a method that is more deterministic in its initial stages, and perhaps requires less hand tuning of parameters.

In this context the higher loss (ca. 100 ppm) of the 40 m optics, and consequent tendency for the high finesse arm cavities to be undercoupled, in contrast to the Initial, Enhanced, and possibly Advanced LIGO cavities. This raised again the tricky question of which parameters of the 40 m should match the longer instrument during controls development. The possibility of cleaning mirrors and even replacing ITMs was raised.

Still on the subject of controls, it was agreed that the 40 m team, with assistance from expert(s) within the LSC, should prepare a proposed layout for a test of the newly baselined 9/45MHz RF sensing scheme. A report would, ideally, be prepared on the timescale of a few months, and an extra TAC meeting may be called to consider it when it is ready. The questions of cavity finesse and coupling and of the stability of recycling cavities are likely to play a significant role in this development.

Progress on DC readout was good, with an encouraging noise spectrum shown, where most of the noise was understood, and relatively easy to improve (whitening before ADCs, changing servo filters). There is therefore promise of reaching down to the low 10^{-18} m/ $\sqrt{\text{Hz}}$ range in the not too distant future. The 40 m team is to be congratulated on this excellent progress.

Anticipating the completion of the first phase of squeezing experiments in the next few months, the question of what to do next naturally arises. A moderately high priority would be to integrate the squeezing system with OMC and DC readout. As the squeezer does not take up too much space, or otherwise disrupt the work of the 40 m, it seems most reasonable to plan to leave the squeezer *in situ* while a more definite plan evolves.

In summary progress continues to be very good, and the 40 m program is meeting its goals in a timely fashion.