



Review of 40 Meter Progress, Scope, Budget, Staffing

- Recent progress: see *40m Laboratory Upgrade Progress Report - LSC Meeting, August 18, 2003, Hannover, Germany*
<http://www.ligo.caltech.edu/docs/G/G030405-00>
- Summary of commissioned systems: next slide.
- Plans for next 3-6 months: Fabry-Perot Michelson
- Plans for following 6-12...? Months: Dual-recycled IFO
- DC demodulation
- Beyond?
- Staffing
- Budget



Systems already installed, commissioned, in use

- Vacuum envelope, pumps/gauges, EPICS-based controls
- Conditioned power, racks, crates, cable trays
- Pre-stabilized laser (PSL): MOPA, frequency stability servo (FSS), pre-mode cleaner (PMC) servo, intensity stability servo (ISS)
- Ten LIGO-quality optics and suspensions: all but PRM and SRM installed in the vacuum envelope and aligned
- Digital suspension controls (DSC) for 10 suspended optics
- Suspended 13-m mode cleaner: length control, wavefront sensor (WFS) alignment control
- Input optics (IOO): Faraday isolator (FI), mode-matching telescope (MMT)
- Optical levers for 7 core suspended optics
- RF distribution system for three pairs of sidebands
- STACIS active seismic isolation for 4 test masses
- EPICS control system
- Data acquisition system (DAQS) -> 300 GB RAID array
- Global Diagnostics System (needs work!)



Next 3-6 months

- Complete fabrication and commissioning of Length Control System for main IFO
- Repair / recommission STACIS
- Align and commission all optical sensing trains (AP, SP, POX, POY, POB, TRX, TRY)
- Learn to lock x-arm, y-arm, Michelson, full Fabry-Perot-Michelson
- Common-mode servo
- Measure noise, calibrate response. Optimize.
- Vent, install and align power- and signal-recycling mirrors (PRM, SRM)
- Continue work on simulation with Finesse and E2E (with Hiro?). Siesta (VIRGO)?.



Then the real work begins

- Lock power-recycled F-P-Michelson
- In conjunction with detailed simulations, learn to lock and control dual-recycled IFO, and extrapolate to AdvLIGO (4km arms)
- Measure noise, calibrate response. Optimize.
- We don't yet know how to do this.
Will this take 6 months? 12?
How many iterations of control electronics? \$\$
- Work towards DC detection: short output mode cleaner and controls, offset lock arms, DC photodetector, homodyne detection.
Measure noise & response.
No budget for this in FY04. FY05?
- We presumably need to amend the construction WBS, and flesh out the "experiment" WBS.



Beyond?

- Wavefront sensing at 180 MHz
- Continually improving CDS architecture
- Detection at one FSR (3.8 MHz) (Melisinos)?
- Multiple pendula?
- Thermal noise measurements?
- QND measurements?
- VIRGO DR prototyping?
- TAMA DR prototyping?



Staffing

- A. Weinstein – project lead
- O. Miyakawa – postdoc
- S. Vass – Master tech, lab manager
- B. Taylor – Master tech, bake ovens, wiring, OSEMs
- B. Abbott – CDS engineer
- L. Goggin - Caltech grad student
- LIGO engineers: Smith, Heefner, Bork, CDS techs
- S. Kawamura & 2 students – visitors for 03-04
- M. Eichenfield – Undergrad visitor, 6 months starting 1-04
- B. Barr, visitor from Glasgow, starting summer 04
- Potential visitor from Orsay/VIRGO

Miyakawa and Kawamura are the lead physicists for commissioning. We probably have sufficient technical support, but not if any of the above are re-directed. More physicist support would be very valuable!

We rely heavily on long-term (≥ 6 months) visitors and encourage participation by LSC members.



Budget

- Salaries (Miyakawa, Vass, Abbott, Taylor, Goggin), etc
- Equipment and M&S: ~ \$370K for FY04:
 - » Complete length sensing and control electronics
 - » Complete length sensing optics/photodetectors trains
 - » Maintain/improve all existing controls & equipment: computers, crates/racks/power supplies, vacuum envelope, vacuum controls, PSL, IOO, DSC, DAQ, oplevs, optics and suspensions, sensing optics & photodetectors, etc
 - » Lab supplies
- Equipment, M&S in FY03: \$650K
- Hard to estimate, but it is likely that \$370K is insufficient for FY04. If so, expect requests for more funds, partway through year!
 - » Laser, expensive electronics, vacuum equipment, etc, may fail and require replacement
- Output mode cleaner (optics, controls) is not in the budget for FY04.