

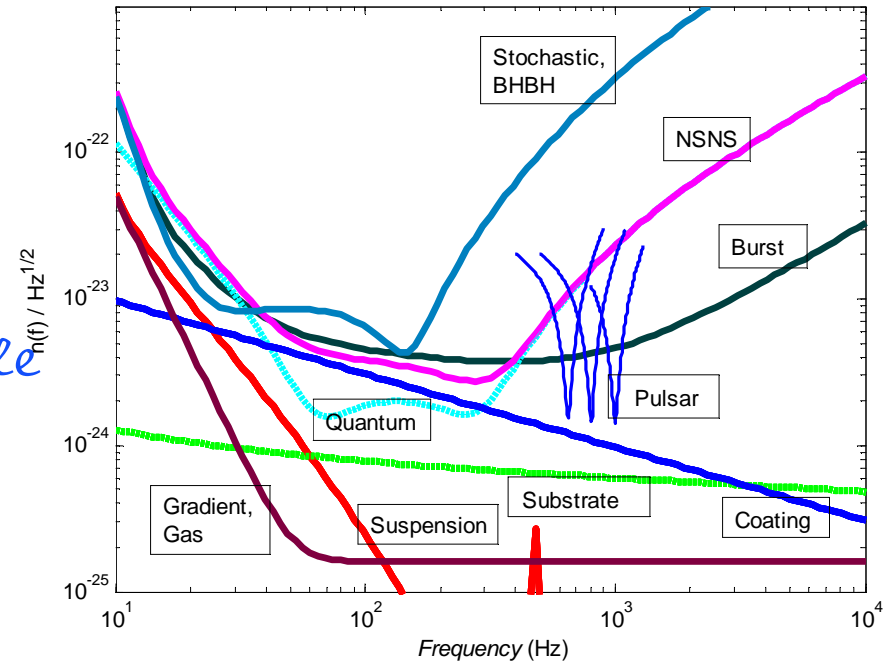


Advanced LIGO Update

David Shoemaker

LSC/Virgo MIT July 2007

- Significant step forward: Review in June, 2007
- 'Update baseline review'
- Confirmation of cost, schedule
- Technical progress recounted
- Review committee content



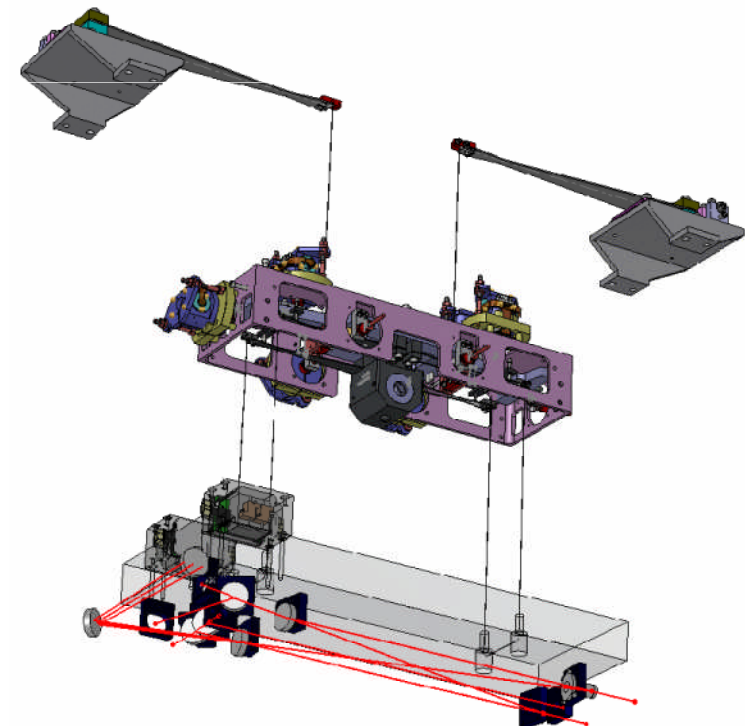
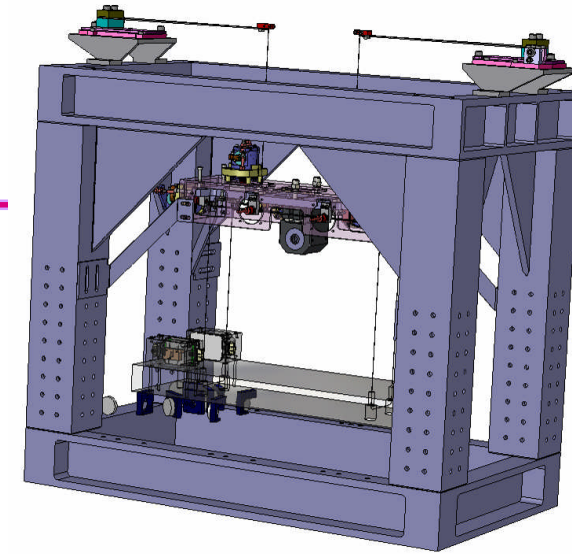
- "Overall the committee was confident that AdvLIGO was prepared to move into the construction phase"
- ...and now: a quick run through of progress highlights and active questions

- *Horizontal wedge chosen for Beamsplitter*
 - » *Reduces coupling to vertical motion (seismic, or more importantly thermal noise)*
 - » *Allows use of steel fibers: simpler to design, assemble, install*
- *Recycling Cavity Geometries (power & signal, stable vs marginally stable): on-going study*
 - » *Simulations team completed development of the coupled cavity FFT code and is using it to examine sensitivity of the stable geometry to radius of curvature tolerance, etc.*
 - » *Plan to have a decision by late August*

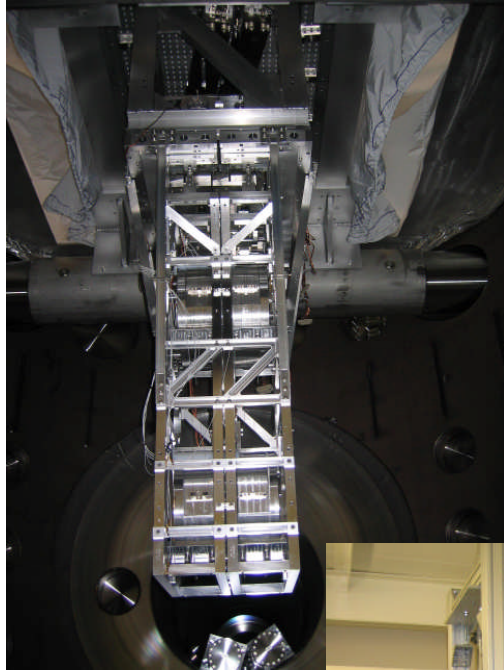


HAM chamber Suspensions

- *Output mode cleaner suspension*
 - » *One assembled, in test*
 - » *Modes, damping ok*
- *Recycling mirror suspension*
 - » *Detailed design underway*
- *Confirm using simple initial-LIGO style SOS for auxiliary optics*
- *Interferometry using AdL suspensions*
 - » *A mode-cleaner triple facing a test mass quad suspensions set up as 10m cavity*
 - » *Improved matching, better locking*
- » *Trying out electrostatic*



Test Mass Suspensions

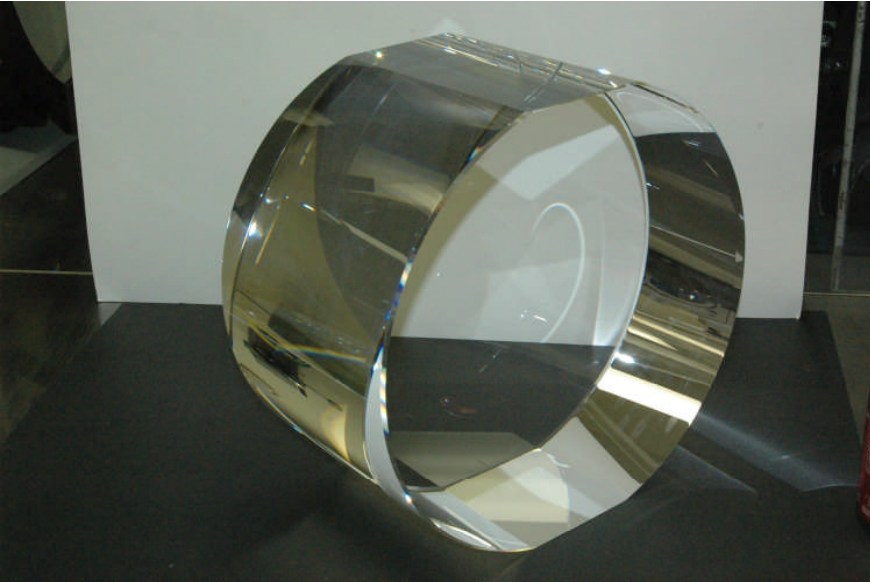


- Controls quad suspension in detailed characterization
 - » Looks good for basic design
- UK has delivered 'Noise' quad
 - » Suspension assembly started
 - » Maybe mounted to isolation system this week as 'dead weight' (masses locked) as a first testing step
- Creation of installation 'lab' - welding, bonding, etc. - at LASTI

- *Test Mass (BSC) isolation system in clean assembly, ~50% complete*
 - » *Several layers complete, to be integrated*
 - » *Sensors in pods*
 - » *Electronics/controls together*
 - » *Race to meet SUS Quad schedule*

- *Design for baseline 'stiff' HAM isolation deep into fabrication*
 - » *Prototype test of low-natural-resonant-frequency system carried out*
 - » *Confirmed use of high gain servo, high natural frequency system for Advanced LIGO*
 - » *Race to meet both ELI and AdL schedules*
 - » *Start first assembly in September (at Vendor)*



- Full sized Optic for integration testing
 - » Coated by LMA; now being characterized
 - » Looks like a good, low-loss coating
 - To be joined to the UK soon to the quad suspension, installed at LASTI on the BSC Seismic Isolation
- 
- CSIRO developing metrology to support pathfinder polishing
 - » Final polish of the pathfinder substrate will commence within the month
 - At CIT, improving metrology
 - » can now be fairly certain that the roughness of the LIG01 ETM03 is less than or equal to .15 nm rms over the spatial frequency range $\sim .5$ to 21/mm - better than thought
 - Charging - meeting here after the L-V meeting
 - Optimized-thickness coating made at LMA for Thermal Noise Ifo test
 - Both Coaters - CSIRO and LMA Lyon - eager and available to play continuing



Auxiliary Optics

- *Designs of suspended baffles*
 - » *Needed to reduce motion*
 - » *Simple damping system*
 - » *Plans for a full-scale prototype, installation at LASTI*
- *Lots of other Stray Light Control design work going on*
- *Rai pulling together observations of scatter from end covers of 4km arms*
 - » *May need an additional baffle*



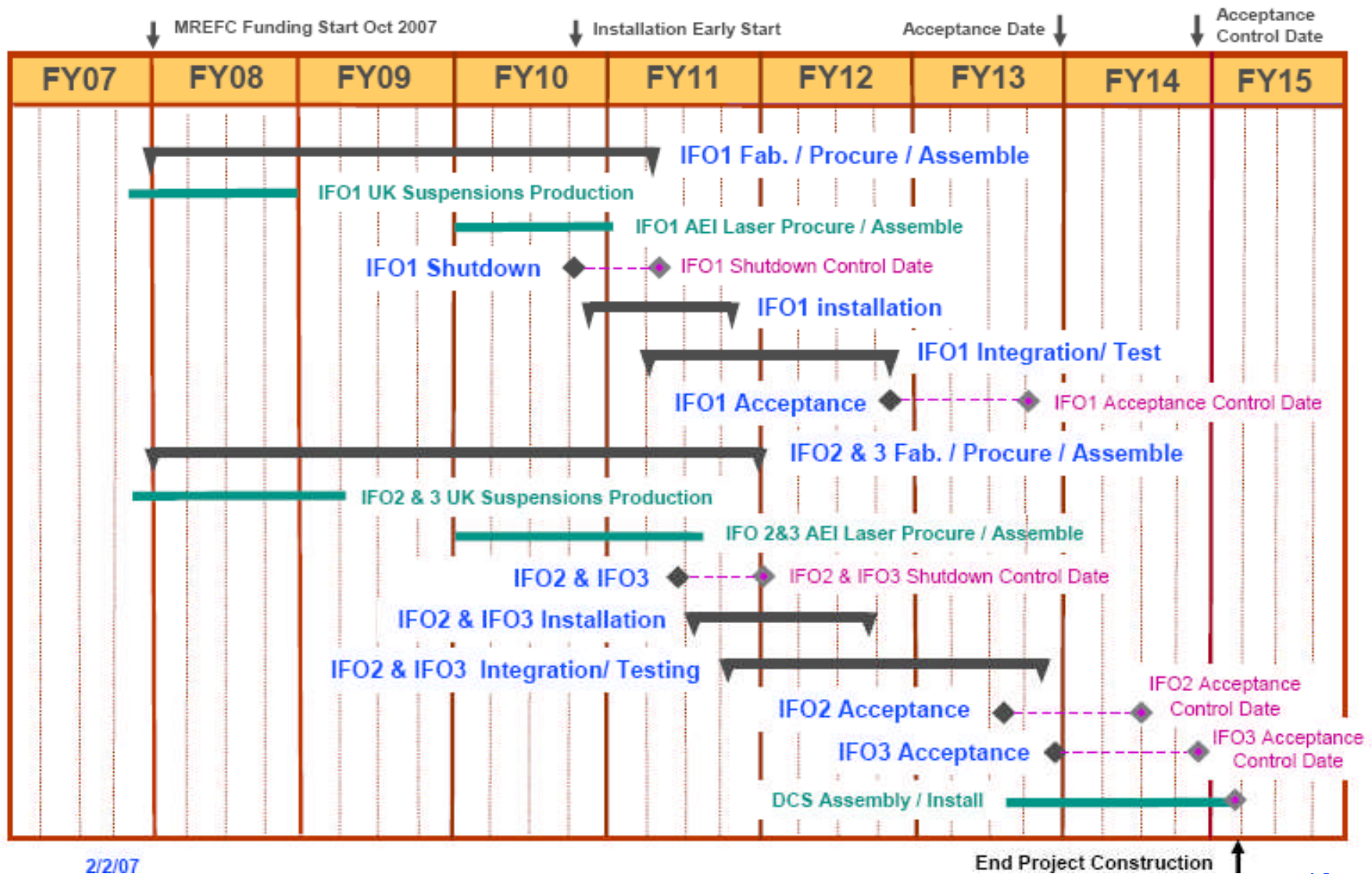
LIGO

Advanced LIGO Status, Trajectory

- *Appears as the one Major Facility 'start' in FY2008 in the Office of Management and Budget request, with the cost and schedule that we wanted*
- *Senate and House appropriation committees include Advanced LIGO; still a couple of steps to go...then...*
- *NSF Review in Fall after Congress allocates budget - one last check of situation (theirs and ours)*
- *...Funding in ~October 2007...*
- *Start turning off ELI in 2010, start turning on AdL in 2013*



Schedule





Advanced LIGO

- *Good progress on designs and prototype tests*
- *R&D program picking up, in some nice measure due to ELI's near-term deadlines*
- *Need to take our dates for completion of development seriously, because...*

- *Advanced LIGO has an ever-better chance of seeing FY 2007 funding!*