

LIGO Hanford Observatory (LHO) Status

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Hanford Summary

- Infrastructure largely completed
- Approximately 1/2 the Operating Staff on board
- First Physics Meetings held (PAC & LSC)
- First Experimental Tests Performed (HAM 1st Article)
- First Student Projects (4 REU students)
- First Beam-Tube Module Baked out
- First 10-Watt Laser Installation Underway
- First HAM Seismic Installation Underway
- Building relationships with local universities, colleges, school districts & professional societies

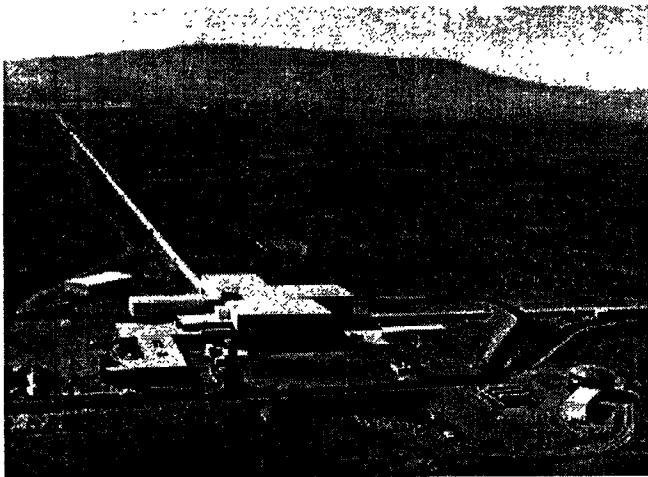
Observatory Staffing

- Available manpower currently comprised of:
 - ›› Resident Staff (~13 in operations; 2 in bakeout)
 - ›› LIGO Laboratory Visitors (avg ~10 during installation & commissioning)
 - ›› LIGO Science Collaboration (~2 members from UFI for input optics; ~ 4 members from JILA, LSU, PSU for HAM testing)
 - ›› Contractors for ongoing non-technical services (e.g., maintenance, grounds, janitorial)
 - ›› Temporary services for special jobs that do not carry over into steady-state operations (materials receiving/handling during installation; beam-tube bakeout; vacuum prep)
 - ›› Special “installation” contractors for trades (electricians, grouters, etc.)
- Typically 30-40 people working on site

Resident Staff at Hanford by Task

- Management/Administration: Berry, Matherny, Raab
- Scientific Staff: Rong, Savage, Sigg
- Vacuum Systems: Ryan, Worden
- Electrical & Electronics Systems: McCarthy, TBD
- Software & Systems Administration: Barker, Patton
- Optics & Lasers: Cook
- Seismic Systems: Gray, Radkins
- Beam -Tube Bakeout: Guenther, Lubinski

Status of Facilities



- Corner Station, Mid-Stations, End-Stations complete
- OSB (main laboratories & office space) complete
- Maintenance, grounds, janitorial services are established
- Water system mods underway
- Additional space under construction to provide laboratory/ staging space, fabrication shop, additional office and storage space and space for outreach programs

Status of Vacuum Equipment



- PSI installation completed
- System tests completed
- Vacuum chamber bakeout completed
- Valve problems were discovered and rework program was established
- All valve internals inspected and reworked as necessary
- Soft closure test completed

Status of Beam-Tube Bakeout

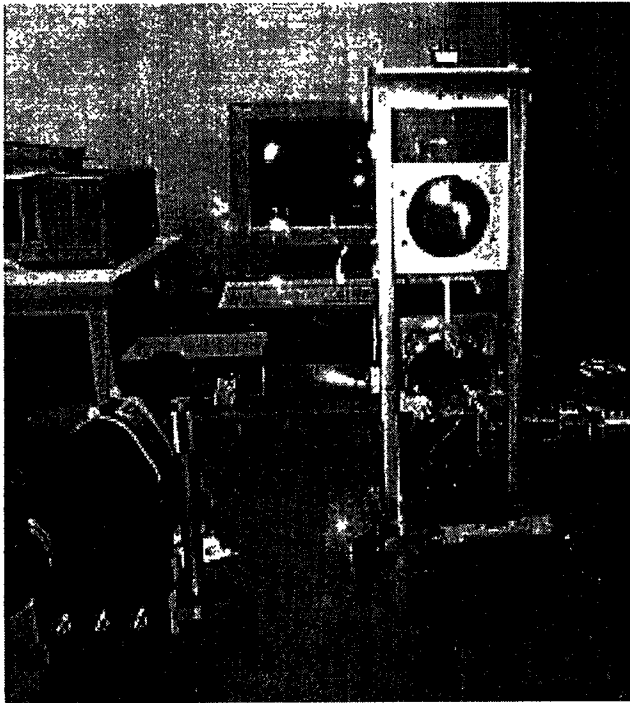
- Design, Procurement & Staging completed June 98
- Bakeout started August 98 following valve repairs
- First beam-tube module (Y2) successfully baked out!
 - ›› $\text{H}_2\text{O} < 10^{-15}$ Torr-liter/s/cm²
 - ›› $\text{H}_2 = 10^{-13}$ Torr-liter/s/cm²
 - ›› $\text{CO}_2, \text{CO}, \text{CH}_4, \text{NO} < 10^{-15}$ Torr-liter/s/cm²
 - ›› Hydrocarbons $< 10^{-16}$ Torr-liter/s/cm²
 - ›› No Leaks $> 3 \times 10^{-9}$ Torr-liters/s
- Equipment moved to next module (Y1)
- Y1 Bakeout scheduled to start 2nd week in November

Water Behavior During Bakeout

Outgassing Before & After Bakeout

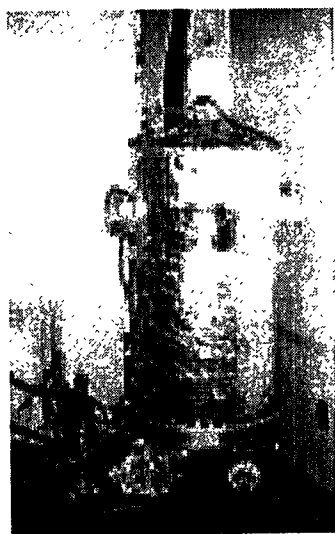
Laboratory Infrastructure

- Electronics lab in business
- Mechanical lab in business



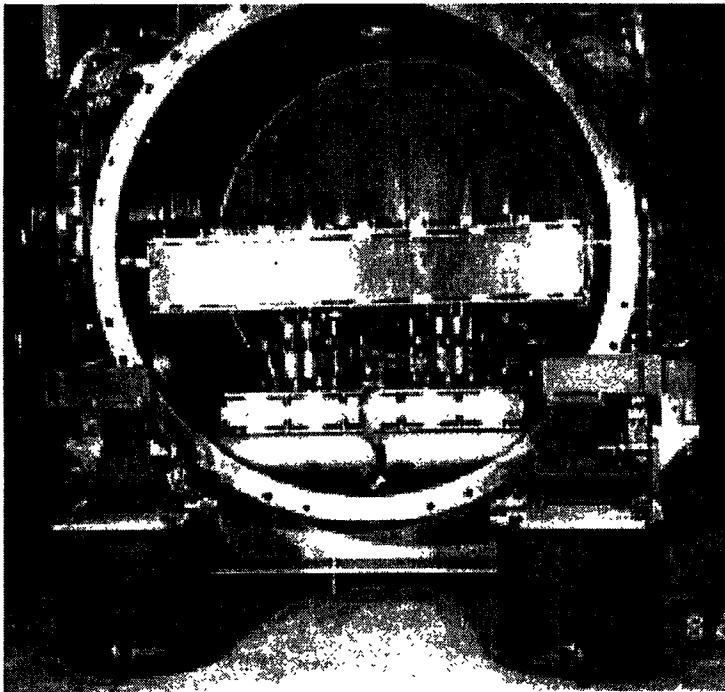
- Optics Lab in business; cleaning of input optics has begun
- Vacuum Assembly lab in business; suspension test stand used to check out 1st-article suspension assembly procedures using dummy mirror
- Clean-room practices in place in corner station labs and experimental halls

Laboratory Infrastructure - 2



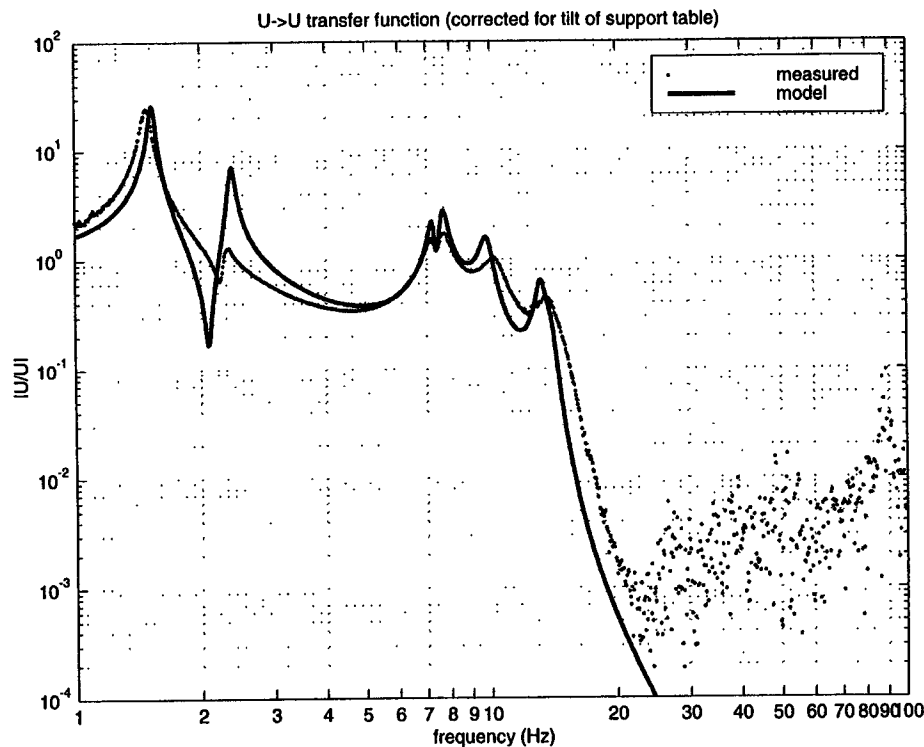
- Vacuum Bake/Qualification Facility in business
- 2 of 3 LANs in business (CDSnet, GCnet)
- T1 WAN service through ESnet tested; use agreement signed; installation in progress
- General Computing system ~1/2 built
- Control Room presence growing: vacuum controls, facility controls & laser screens currently available at consoles
- Data Acquisition system installation has begun; first data written into frames; GRASP installed

HAM Seismic First-Article Test Program



- form, fit & function tests were successfully completed
- a number of improvements were incorporated into assembly fixtures and production drawings
- enabled resident staff to master stack assembly process and to develop detailed assembly procedures

HAM Seismic First-Article Test Program (continued)



- performance testing of stack completed using LHO test systems
- stack performance well described by stack models
- drift rates generally within required range
- need for left-handed springs was confirmed by performance test

Interferometer Installation is in Progress

- Laser installed; pre-mode-cleaner locked
- Installation of seismic isolation into 1st Input HAM chamber in progress



Outreach Activities - Visitor's Area

- Visited heads of science/technology centers to learn museum business
 - ›› Adler Planetarium
 - ›› Lederman Institute
 - ›› Exploratorium
 - ›› Los Angeles Museum of Natural History
- Attended course on informal education & museum evaluation (needed for any NSF proposal)
- Prospects for NSF funding need to be worked out (currently a plan for long term financing is lacking), so emphasize low-budget activities as targets of opportunity arise

Outreach Activities in Local Area

- Met with superintendents of 6 local school districts to solicit advice on local educational needs & opportunities
- Held workshop with area teachers (supported by local school superintendents) to get advice on how LIGO can best interface to local needs and opportunities
- Discussions with PNNL to create internship opportunities for area high-school teachers and students for Summer 99
- Working with local high school teachers to establish science club and enrich content in current school programs
- Building bridges to local Universities: 4 REU undergrads from Caltech, Grinnel, Washington State U., & Whitman College interned at LHO during Summer 98

Summary

- Tremendous amount of work completed
- Upcoming events in 2K interferometer installation:
 - ››complete PSL & input HAM Seismic Systems in Nov98
 - ››install Input Optics in Dec98
 - ››begin BSC Seismic stack installation in Dec98
 - ››begin corner-station Core Optics installation in Jan99
 - ››complete Beam-Tube Bakeout by Jun99
 - ››complete mid-station installation work by Jul99
- Resident staff focused on installation