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# LIGO Hanford Observatory Outreach Program

Frederick J. Raab, LIGO Hanford Observatory



# Main Components of LHO Educational Outreach 1997-2001

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- Informal Education
- K-12 programs in collaboration with Pacific Northwest National Laboratory (PNNL) and Educational Service District (ESD) 123 in southeast Washington.
- University-level programs



# LHO Informal Education Activities

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- Observatory tours draw approx. 800-1000 visitors/yr
  - » Einstein, interferometers and the work that we do.
  - » Audience comes from professional groups, boy scouts, families, bicycle club, etc.
- Public talks and LIGO Public Lectures
  - » Wheeler/Thorne lecture drew > 350 people; Kamionkoski in 01
  - » Rotary/Kiwanis clubs & professional societies
  - » Adler Planetarium lecture
- Cooperative “happenings” w/ other outreach groups
  - » Wheeler book signing at CREHST
  - » B-Reactor reunion



# LHO K-12 Outreach

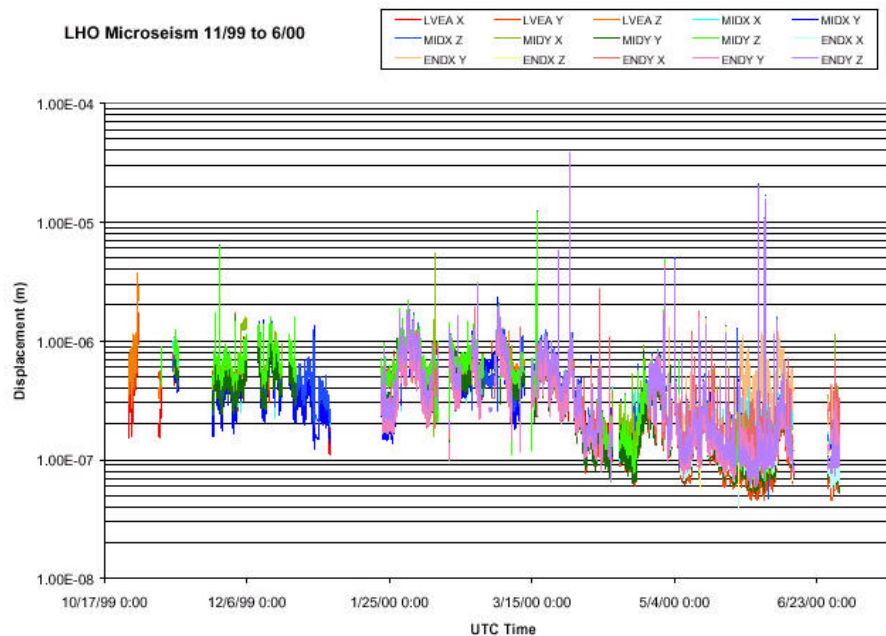
Kamiakin High School interns investigate seismic effects of gravel mining near Yakima River in Richland, WA



- LIGO-SST involves 2 HS teachers, 6 students in summer w/ ~30 students during academic year
- “The Scientific Method on the Job” video developed as Middle/High School science resource
- Distance learning initiative with ESD 123 to develop interactive science programming for WA K-20 teleconferencing network



# Gladstone High School (~30 students/yr participating)



First long-term record of  
microseism near Hanford site,  
developed by Gladstone HS

Research Project Presenters at  
Community Science Night, May  
2000

<http://www.gladstone.k12.or.us/ghs/users/ingramd/Physics/>



# LHO University-Based Activities

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- REU program involves 3-4 undergrad research interns/yr
  - » Betsy Weaver developed/commissioned vac-prep facility
  - » Eric Morganson wrote earth-tides prediction software
- Typically 2-4 grad students doing research
  - » U.Rochester, U. Oregon, U. Michigan, Caltech, MIT, Penn.St.
- Visitors program
  - » U. Michigan, U. Oregon on long-term appts.



# Main Components of LHO Educational Outreach 2002-2006

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Proposed to NSF

- Expand SST participation to more schools and more sites throughout nation via LSC.
  - » Budgeted funding for program
  - » Extension to Livingston Observatory
  - » Also applying for RET funding to expand scope
- Expand “distance learning” initiative through K20
  - » More interactive programming
  - » More teacher involvement through summer internships (IPSE)
- University-level programs
  - » Continue current scope through REU program
  - » Goal to increase “breadth” of graduate-level students from other fields



# LHO Educational Outreach 2002-2006, continued

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Proposed to NSF

- Improve informal educational program within current envelope
  - » More exhibits with “hands-on/minds-on” content
  - » Teacher-developed “use” plans and classroom materials (IPSE)
- Work toward development of a regional science center for the inland Northwest
  - » Develop exhibition plan with input from STC professionals and teachers
  - » Develop 503-c group to govern and begin fund raising
  - » Deal with special nature of DOE-NSF-private enterprise
  - » Develop regional science consortium





# Regional Science Center

Proposed to NSF

## ● Partners/Resources

- » Columbia River Exhibition of History, Science & Technology
  - Access to non-classified Hanford DOE artifacts
  - Active K-6, summer & “latchkey” programs in science & environment
  - Museum at ‘gateway’ to Hanford Works & Nat’l Monument
- » Alliance for Science Teaching Through Astronomy
  - Robot 0.8-m observatory atop Rattlesnake Mountain for internet use in classrooms
- » B-Reactor Museum Society
  - World’s 1<sup>st</sup> production nuclear reactor
- » Economic, Community and Tourism Development Agencies
  - Hungry to develop economic independence from D.O.E.



# Proposed Outreach Budget Strategy

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Proposed to NSF

- Modestly extrapolate from our successes into a “legitimate” baseline program that DOES NOT COMPETE with science goals
- Expand the program as we build on successes and learn lessons
  - » Identify targets of opportunity
  - » pursue additional funding
  - » pursue additional partnerships
- Our goal is to be bold & effective, but NOT to “reinvent the wheel”



# WBS 2.10 Baseline Outreach Components in NSF Request

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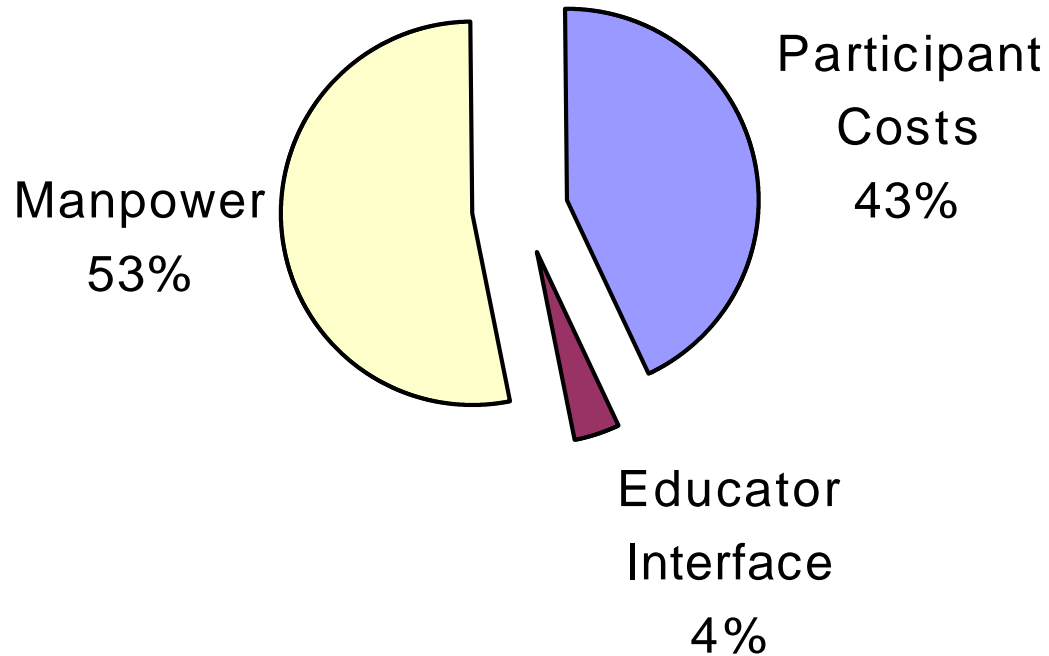
Proposed to NSF

- Manpower: 0.5 FTE engineering / 0.5 FTE admin. to avoid competition with science objectives
- K-12 Participant costs
  - » SST Program – Teacher & Curriculum Enhancements
  - » Teacher internships for resource development associated with informal ed., classroom resource & distance-learning programs
- REU targeted toward under-represented groups
  - » Recruitment of Native American and Hispanic students in NW
- Educator “interface”
  - » consulting, evaluation and dissemination



# Proposed FY2002 Outreach Budget by Category

Proposed to NSF





# Effect of NSF Proposal Downsizing on Observatories

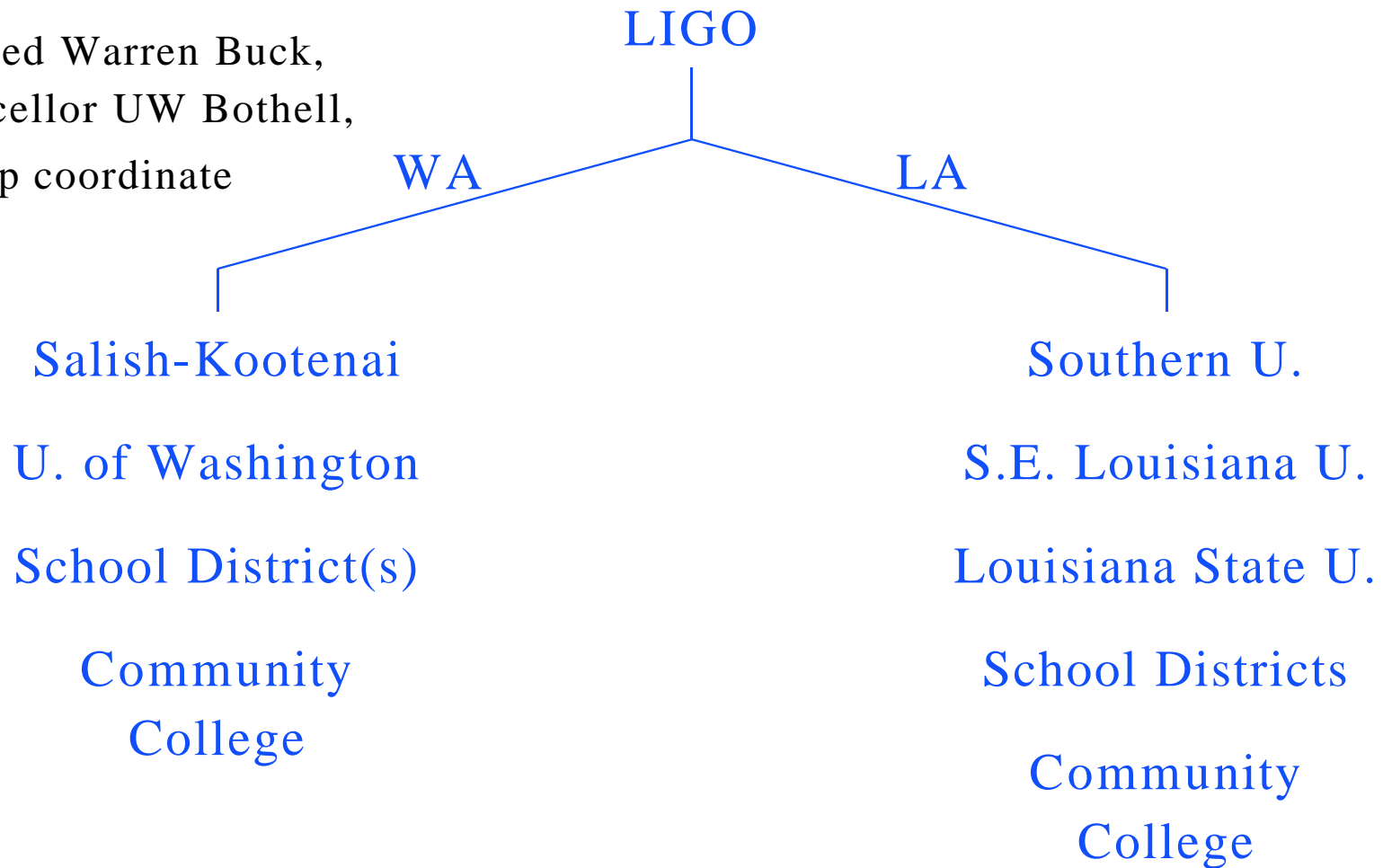
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- FY2002 request of \$10.7M → \$8.9M
- Staffing of 60 pared to 56, staffing increases deferred in FY2002
- No explicit outreach funding
- No LSC support
- Deferred LDAS maintenance



# LIGO Partnership to Create Doorway into Science for Native- & African-Americans

Enlisted Warren Buck,  
Chancellor UW Bothell,  
to help coordinate





# Summarizing...

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- What works at LIGO:

- » Our track record during early operations got rave reviews by NSF visiting committee and regularly features in NSF reporting
- » Extremely successful REU program ~20 students/year
- » Popular informal education tours of facilities (1000's visitors)
- » Successful pilot project to embed LIGO research into high school science curriculum: ~30+ students/yr in 9<sup>th</sup>-12<sup>th</sup> grade at Gladstone High School, OR
- » In-service teacher training and internships
- » Good coupling with local school districts, other science outreach efforts
- » Public Lecture Series a hit
- » Ground work to develop resources for science centers associated with observatories



# Outreach Concerns & Recent Developments

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- Despite outreach successes in practice, we have not gotten outreach and science off a collision course
  - » Available outreach funds come from reserve - uncertain year to year
  - » Significant manpower drain preparing proposal materials (>1/2 doz ) distracts manpower from significant science issues
- Sep 17 meeting with NSF EH&R program officers to coordinate funding request for multifaceted African- & Native-American outreach programs with Southern U., Salish-Kootenai College
  - » No progress
- Proposal for LIGO Public Science Education Internships finished last in “peer” review; we do not review well with EH&R
- Strategy: concentrate on science until LIGO-I works; try to keep current outreach activity alive; eventually figure out some new approach to legitimize outreach with its own funding so we can expand activity.