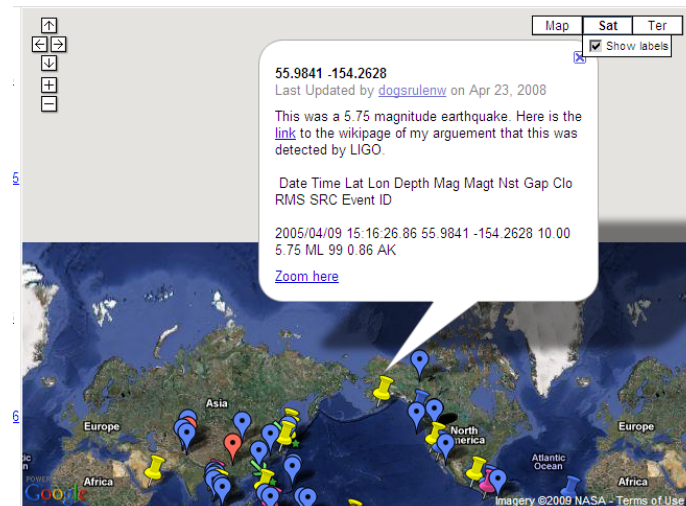


I2U2: Sharing Large-Project Science Data with Students via the Web

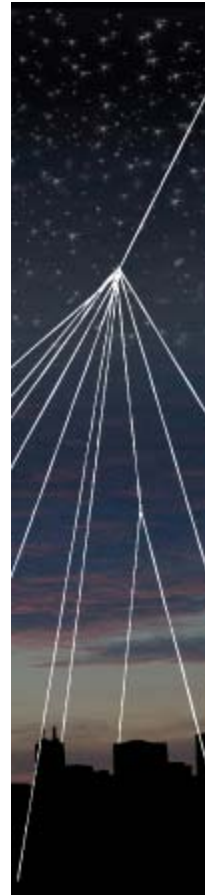
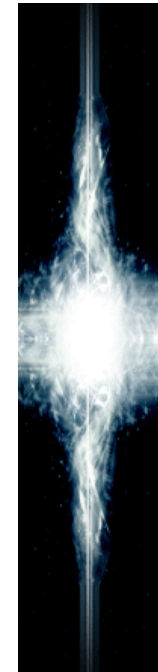


- Dale Ingram (LHO EPO) on behalf of the I2U2 Collaboration
- LIGO Hanford Observatory, Richland, WA
- www.ligo.caltech.edu
- outreach@ligo-wa.caltech.edu
- 509-372-8248 (*Dale Ingram*)



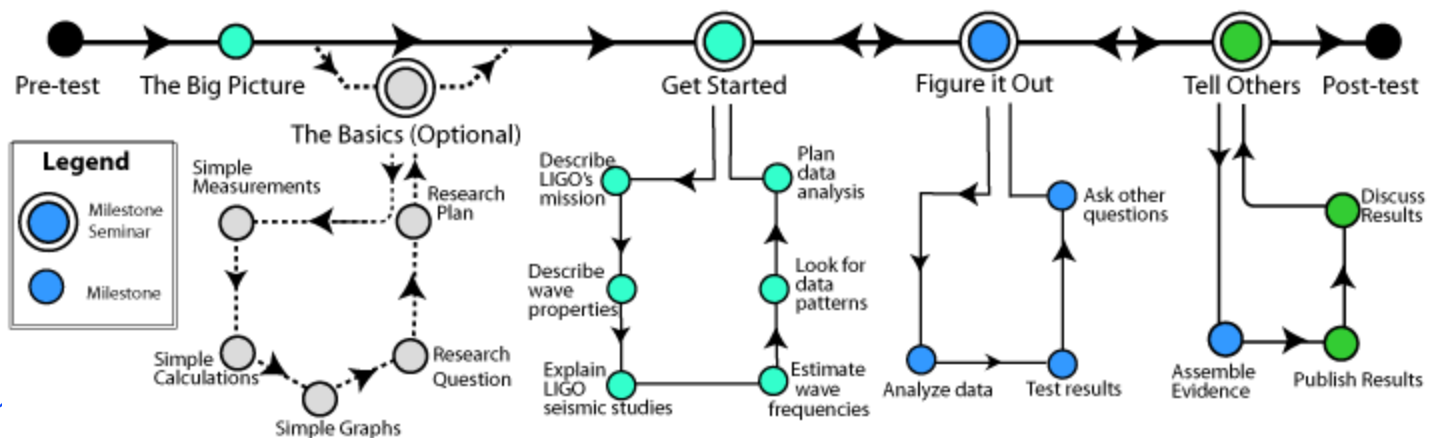
The Platform: NSF's *Interactions in Understanding the Universe (I2U2)* Program

- www.i2u2.org
- Also supported by the Office of High Energy Physics in the Office of Science , U.S. Department of Energy.
- Students use I2U2 e-Labs (virtual laboratories) to conduct science research using data sets from large projects.
- Museum-based i-Labs provide opportunities for the general public to interact with data.
- I2U2 partners include Fermilab (QuarkNet), U. of Chicago (grid computing), LIGO, Notre Dame (CMS) and the Adler Planetarium.



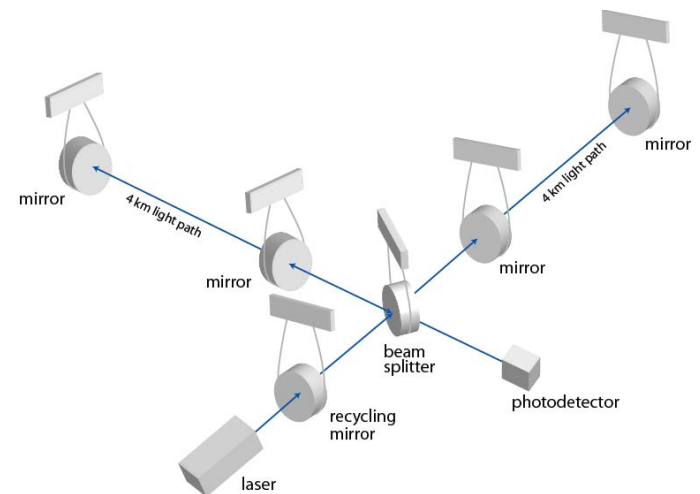
I2U2 e-Labs Provide Data and Additional Resources to Support Student Inquiry

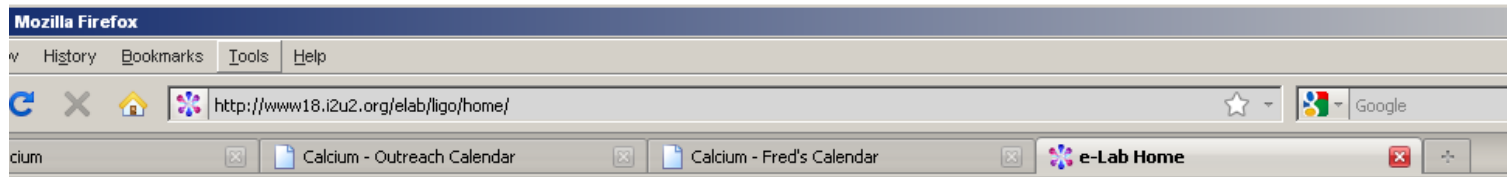
- Current e-Labs: Cosmic Rays, LIGO, CMS (beta testing).
- Usage: High school physics classrooms. LIGO's e-Lab has been used in physics, physical science, integrated science and earth science classrooms down to grades 7-8.
- Selling points: e-Labs are entirely Web-based. No software downloads are necessary at the school. e-Labs share a common structure.
- Features: A paperless environment that provides online pre- and post-tests, a milestone-based road map, a teacher-viewable e-logbook and online posters.
- Teacher features: Learner objectives/outcomes, correlations to standards, assessment rubrics, sample lessons and discussion forums.
- One of the goals of I2U2 is to provide reliable customer-friendly software tools for students. A student's capacity for challenge should be exercised in the doing of inquiry rather than in the mastery of idiosyncratic tools.



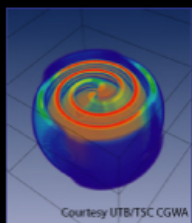
The LIGO e-Lab

- LIGO: Laser Interferometer Gravitational-wave Observatory. 4-km interferometers in WA and LA, designed to make direct detections of gravitational waves from astrophysical sources.
- Exquisitely sensitive instrumentation capable of resolving test mass displacements of 10^{-19} m.
- LIGO operates a network of seismometers at each facility to monitor the effects of seismicity on detector operations.
- Seismometer data forms the central focus of the LIGO e-Lab. The e-Lab data pool also includes magnetometers and weather stations.





LIGO **LIGO e-Lab** Logged in as group: guest **Logout**
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- LIGO Big Picture
- LIGO Maps
- LIGO Sensors
- Related Data
- LIGO Glossary
- Bluestone Tutorial

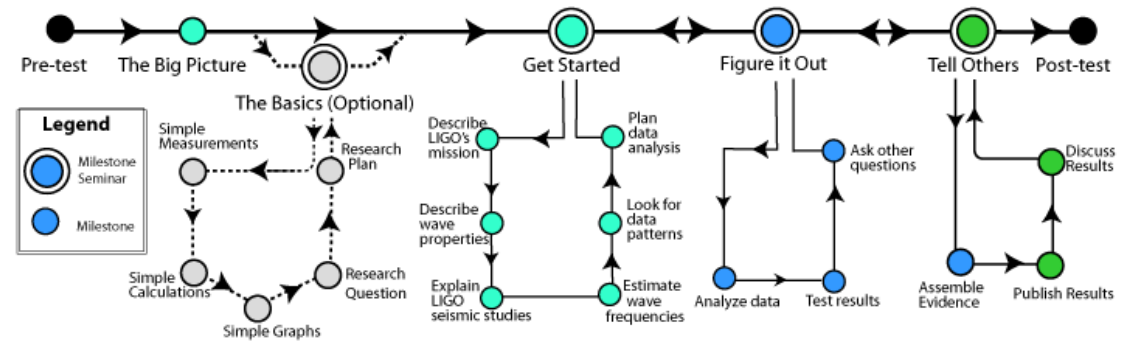


The LIGO e-Lab Web site

Join a national collaboration of students to study LIGO seismic data.



Project Map: Use the milestones below to guide you through the e-Lab. Make sure you know how to record your progress, keep your teacher apprised of your work and publish your results.

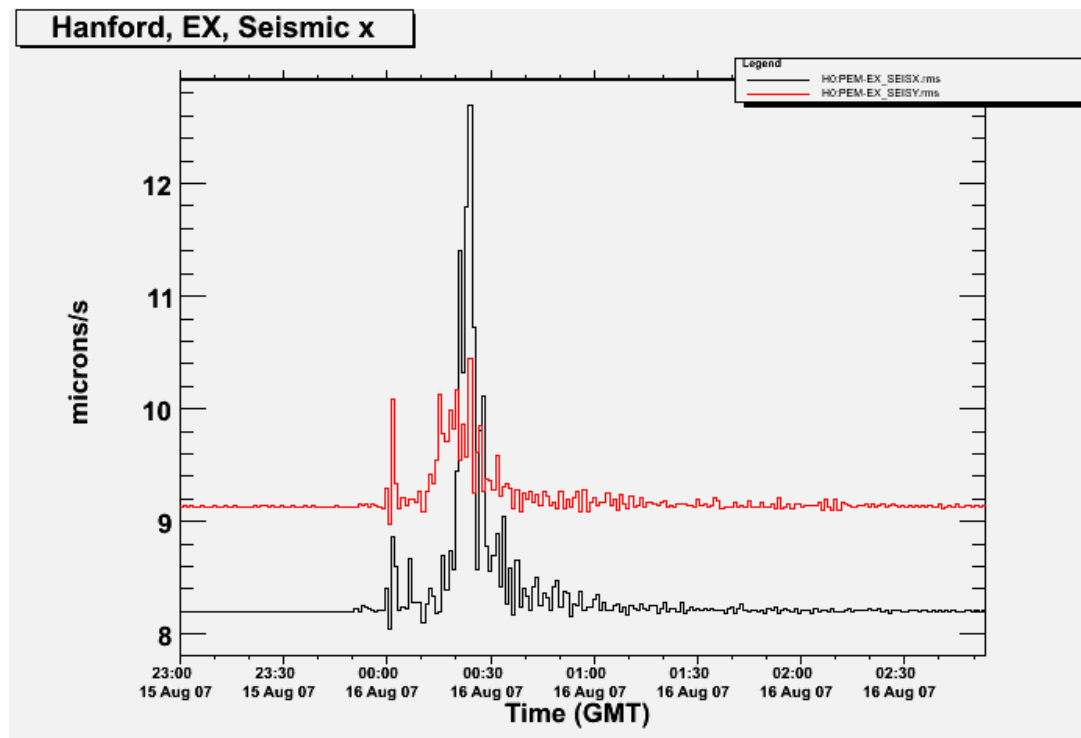


Milestones (text version)

Think of this map as a subway map with one main line and four branch lines. Along the main line are stops, milestone seminars, opportunities to check how the work is going. Off each main stop are branch lines where each stop is a project milestone. Hover over each milestone or milestone seminar to preview; click milestones to open.

Common Investigation Themes with the LIGO e-Lab

- Noise-hunting studies (“What caused that?”).
- Earthquake studies (Lots of possible research questions here).
- Correlation studies of natural seismic drivers (wind, rain, ocean waves).
- Correlation studies of human activity (traffic patterns, day-night patterns).
- Frequency-based studies using filtered channels.



Directionality of 8.0 Peru Earthquake at LIGO Hanford in 2007 (*Hanford High School student investigation*)

Avenues for Teacher Involvement

- Participate in the current round of pilot testing!
- Subscribe to the LIGO e-Lab newsletter (outreach@ligo-wa.caltech.edu).
- Find a group of like-minded colleagues and request an e-Lab workshop.
- Use outreach@ligo-wa.caltech.edu as the point of contact for any e-Lab questions or requests.

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