



LIGO Hanford Observatory



Outreach Summary
2007-2008

LIGO Hanford Observatory Outreach Mission

LIGO Hanford Observatory seeks to impact the development of the Tri-Cities and the surrounding region by providing opportunities for lifelong learning, by promoting and developing science literacy and by building relationships with educational and community development organizations that will advance mutual interests.

LHO Local Educator Network

LIGO Hanford Observatory receives advice on public outreach from our Local Educator Network (LEN). The LEN meets annually in October to review LIGO's outreach progress and to offer guidance for the focus of future outreach efforts.

Warren Buck
Professor, Arts and Sciences
University of Washington
Bothell, WA

Roy Gephart
Scientist
PNNL
Richland, WA

Mary Moore
Teacher
Lewis & Clark Elementary School
Richland, WA

Rebecca Chitkowski
Science Teacher
Gladstone High School
Gladstone, OR

Stacia Gunderson
Education Coordinator
CREHST Museum
Richland, WA

Judy Morrison
Faculty, Education, Teaching & Learning
WSU Tri-Cities
Richland, WA

Rod Coler
Community Member
Kennewick, WA

Trisha Herron
Economic Development
City of Richland
Richland, WA

Tim Olson
Faculty, Computer Sci. & Engineering
Salish-Kootenai College
Pablo, MO

George Garlick
President
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Laura Cook
Interim Director
Yakima Valley/Tri-Cities MESA
Richland, WA

Keith Plewman
Teacher, 6th grade
McLoughlin Middle School
Pasco, WA

Bruce Hawkins
Superintendent
ESD 123
Pasco, WA

Marisela Mendoza
Recruitment/Retention
Columbia Basin College
Pasco, WA

Brock Wells
Science Teacher
Connell High School
Connell, WA

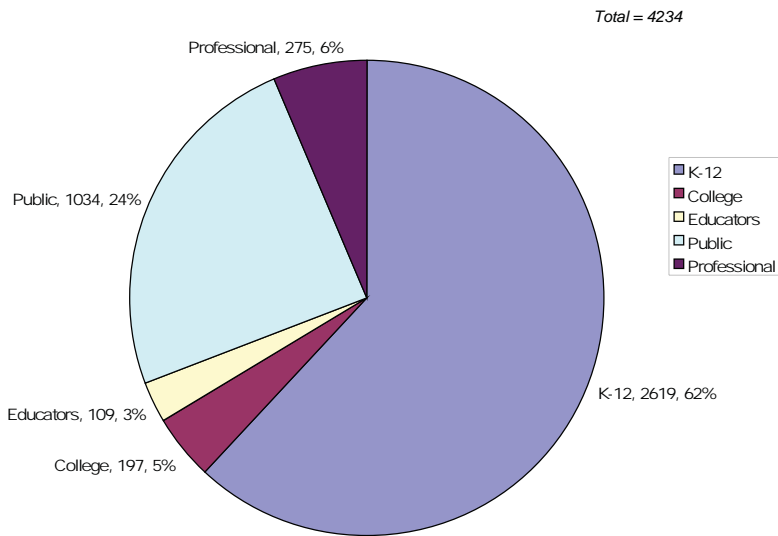
2007-08 in Review

LIGO Hanford's outreach program underwent significant growth between September 2007 and August 2008. The number of visitors to the Observatory increased by more than 20% over the previous year. The number of off-site outreach contacts increased by nearly 40%. Stronger partnerships in LIGO's outreach to k-12 students and families more than doubled the number of students who participated in field trips and public events. Partnerships also facilitated more strength and higher volume in the area of teacher professional development. The LIGO Laboratory's Diversity Committee, chaired by LHO Head Fred Raab, undertook the task of increasing the awareness of LIGO among university students and young professionals from underrepresented populations. To capitalize on the growth of the outreach program and to create a top-tier science resource in southeastern Washington, LIGO is preparing a proposal to the National Science Foundation to seek funds for the construction of a science center at the Hanford Observatory. The LIGO Exploration Center would mirror the LIGO Science Education Center (SEC) at the Livingston, Louisiana site. The SEC has brought transformational science experiences to students, teachers and families across the Baton Rouge region. All indications suggest that Hanford's LExC would have a similarly powerful effect in the Columbia Basin and beyond.



Site-based Outreach Activities

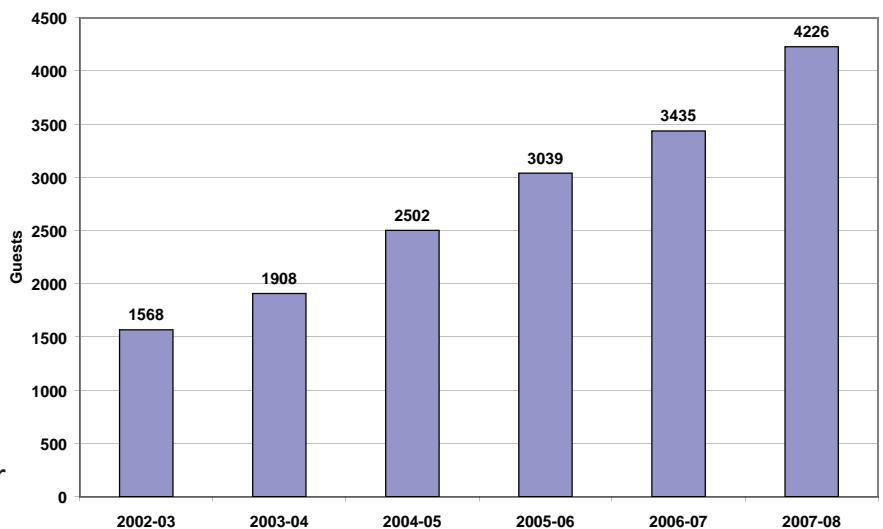
9/07 - 8/08 LHO Visitor Count



LHO now regularly attracts school visits from a region roughly bounded by Walla Walla, Moses Lake and Yakima. Nearly 35% of k-12 visitors during the year were affiliated with the Pasco School District. The Observatory’s customary slate of astronomy-related public events continued in 2008, although the weather was largely uncooperative. Monthly drop-in tour attendance increased to an average of 50 guests. The August monthly tour welcomed over 100 visitors from the IEEE chapter in Portland, OR.

In the near term, LHO facilities will support continued growth in visitor attendance but staffing for outreach activities must increase to sustain the pattern that appears on the adjacent graph. The Observatory will develop a team of volunteers that can assist with direct public interactions and behind-the-scenes support of the outreach program. ESD 123 continues to grow in importance as a partner in furthering LIGO’s outreach to schools. The addition of middle school outreach capability at YVTC MESA has added another dimension to the long-standing MESA-LIGO collaboration. WSU Early Outreach continues to increase the involvement of regional students in LIGO activities, primarily through GEAR UP grants. GEAR UP sites in northern WA and in the Yakima area also utilized LIGO during 2007-2008

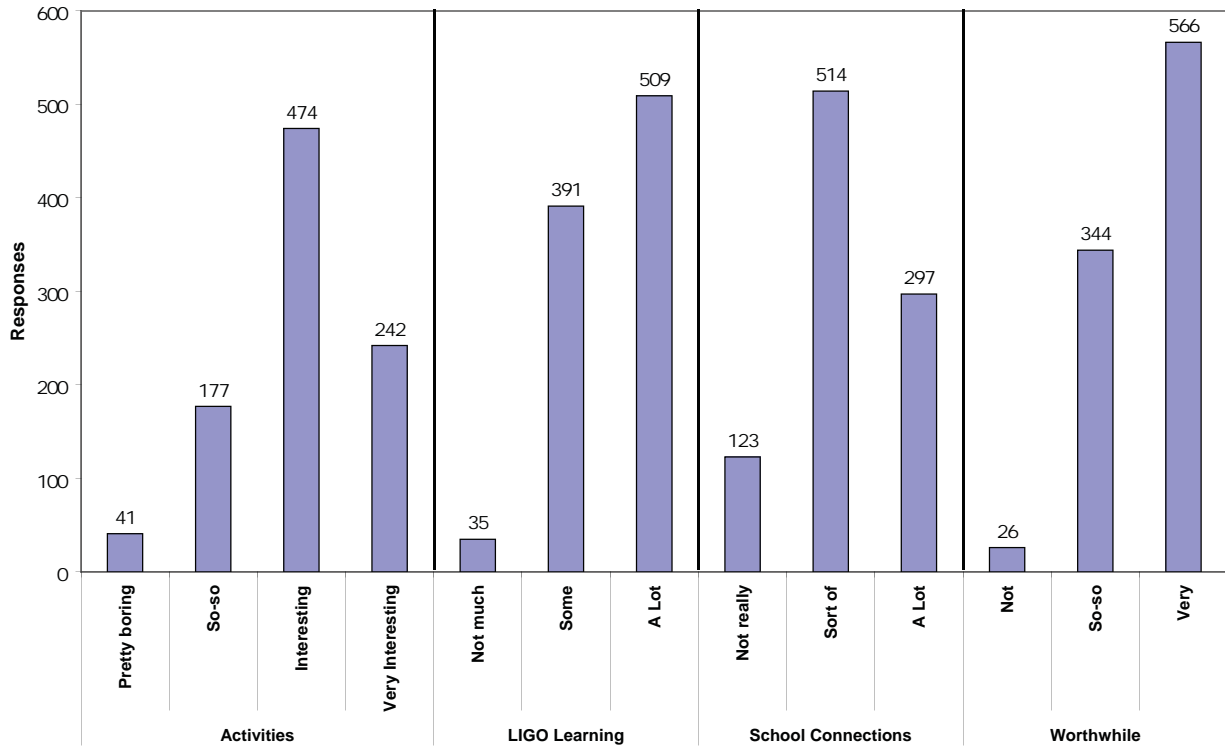
LHO Annual On-site Outreach Attendance, 2002-08



LIGO’s membership in the Tri-City Visitor and Convention Bureau enabled visits from five Portland area tour groups, bringing 140 visitors from a sector that LHO hopes to penetrate more deeply in the coming years.

Field Trip Feedback

LHO School Visit Survey Results, 2007-08



How interesting were the (hands-on) activities?

How much did you learn about LIGO?

Did you see any connections between the science you learned today and what you have worked on at school?

How worthwhile was the trip to LIGO for you?



Teacher Professional Development

The Southeastern Washington Math Science Partnership, headed by ESD 123, continued as LIGO Hanford's flagship teacher training activity. Approximately 30 Pasco and Othello teachers from grades 3 through 8 participated in the two-week summer graduate course that has become a fixture at the Observatory. The efforts of course instructors from LIGO, WSU Tri-Cities and Columbia Basin College were augmented in summer of 2008 by the participation of six mentor teachers who had completed the summer course and follow-up workshops during the 2007-08 MSP cycle.

RGI Corporation of Sunnyside, WA completed an evaluation of the first year of the MSP teacher professional development program. Before the start of the two-week summer academy, participating teachers completed a RGI survey that assessed their level of understanding and confidence in the nature of science and inquiry-based instruction concepts, State academic standards and content knowledge. Eleven months later, at the close of the MSP activities for the cohort, the teachers were surveyed again. The average percentage of gain on the eleven survey questions was 31%, with a high gain of 60% and a low of 8%. These results support the institutional partners' contention that the immersion of teachers in the inquiry-rich LIGO environment, combined with high-quality instruction in the nature of science and techniques for inquiry-based instruction, can empower teachers to undertake science instruction that is richer, more meaningful and more effective for students.



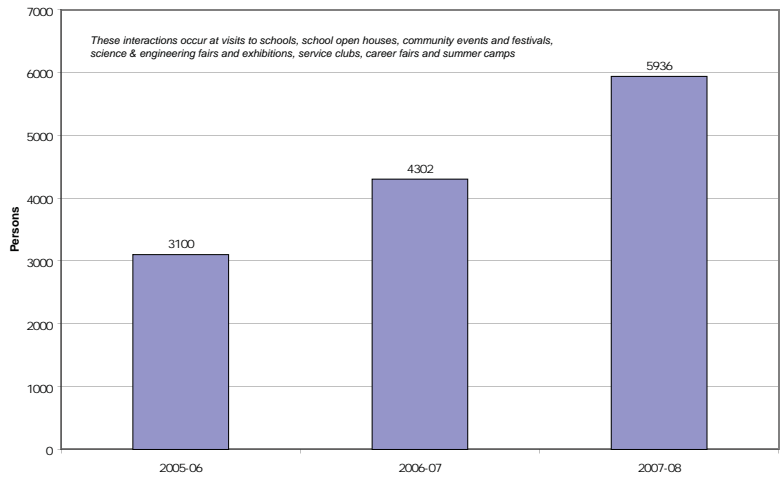
LHO again hosted an August teacher workshop to provide training on the LIGO I2U2 e-Lab. After the installation of a pre-test and post-test, the e-Lab Web site will be fully functional. LIGO will continue to provide e-Lab training to teachers across the region in 2008 as the I2U2 (Interactions in Understanding the Universe) program seeks to embed e-Labs into teachers' classroom practice and evaluate the effectiveness of the program as a tool for improving students' science literacy.

Off-Site Outreach Activities

75 visits to off-site venues were recorded by Observatory personnel during the course of the year. The greatest number of these occurred at schools. LHO now offers eight different in-school programs from which teachers can choose. The newest item, "Feel the Pressure," is an assembly-style presentation that involves exploding balloons, funny forces, plunger wars and liquid nitrogen phenomena. This show was well received by several schools in 2008.



LHO Off-site Outreach Contacts



Extended Activities

For the second year, LIGO partnered with WSU GEAR UP and Pioneer Middle School (Walla Walla) on "Space and Technology Boot Camp," a two-week summer day camp for students in which they developed independent projects in basic electronics, computer programming and LIGO data analysis using the I2U2 interface. This program was replicated with High School students from Moses Lake in partnership with WSU Upward Bound and Moses Lake SkillSource. At the close of both programs, students displayed the results of their projects to LIGO staff members during culminating field trips. In August 2008, GEAR UP students from Stevens Middle School in Pasco participated in a four-day summer camp that occurred completely at LIGO. Students undertook a variety of hands-on projects related to astronomy and simple optics. The highlight of the day camp was a two-hour job shadow with a LIGO staff member.



National-Level Outreach and Diversity Awareness

Fred Raab and LIGO Deputy Director Albert Lazzarini represented LIGO at the 2008 joint meeting of the National Association of Black Physicists and the National Association of Hispanic Physicists in Washington D.C. LHO operators Corey Gray and Gerardo Moreno staffed an exhibitor's booth at the 2008 conference of the Society for the Advancement of Chicano and Native American Scientists (SACNAS) in Salt Lake City.



A new working group in the LIGO Scientific Collaboration, Education and Public Outreach, seeks to coordinate national-scale outreach efforts among LSC institutions in concert with the LIGO Lab. LHO Outreach Coordinator Dale Ingram participates in the LSC EPO endeavor. A major focus of the group in 2008 was the preparation of a proposal to the NSF for the development of a LIGO exhibit and related public activities as part of the 2009 World Science Festival in New York City. If funded, the WSF activity will bring international attention to the search for gravitational waves during the 2009 International Year of Astronomy.



Outreach-focused Internships

LHO continues to host summer internships for science teachers through NSF's Research Experience for Teachers (RET) program. RET internships provide teachers with authentic research experiences in parallel with the development of activities and strategies for the improvement of classroom instruction. RET participant Keith Plewman of McLoughlin Middle School in Pasco has created a set of classroom activities that will provide Pasco 6th graders with hands-on encounters with wave behavior, a content area that is not well supported by existing curriculum materials.

Columbia Basin College students Armando Merlin and Andres Ramirez are the second pair of STEM students to undertake mixed outreach and technical internships at LHO. These two individuals continue to provide key support to the outreach program while assisting with technical work at the Observatory.



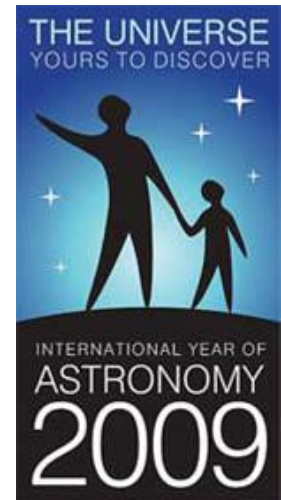
Tri-Cities STEM High School

LIGO Hanford has participated on the Program of Study team (Core Planning Team) for the STEM-focused high school that will open in the fall of 2009. LIGO will serve as a resource for teachers and students at this new institution, which is a partnership of Battelle, WSU Tri-Cities, Columbia Basin College, and the Pasco, Kennewick and Richland School Districts



2009 -- The International Year of Astronomy

The 2009 International Year of Astronomy will celebrate the 400-year anniversary of Galileo's first view through a telescope, the event that gave birth to modern astronomy. LHO will partner with local collaborators to offer a slate of IYA activities that will appeal to all ages.



Look Up, Tri-Cities!

Celebrate the 2009 International Year of Astronomy!
Join LIGO Hanford Observatory for any or all of these
International Year special events.

Saturday, March 21: Astronomy for the Young

Saturday, May 2: International Astronomy Day

Thursday, June 4: LIGO at LitFest --
Astronomy: More than Romance?

Saturday, June 20: Get Your Hands on Astronomy

Saturday, August 22: Searching the Deep Sky

Saturday, October 17: Einstein Film Festival

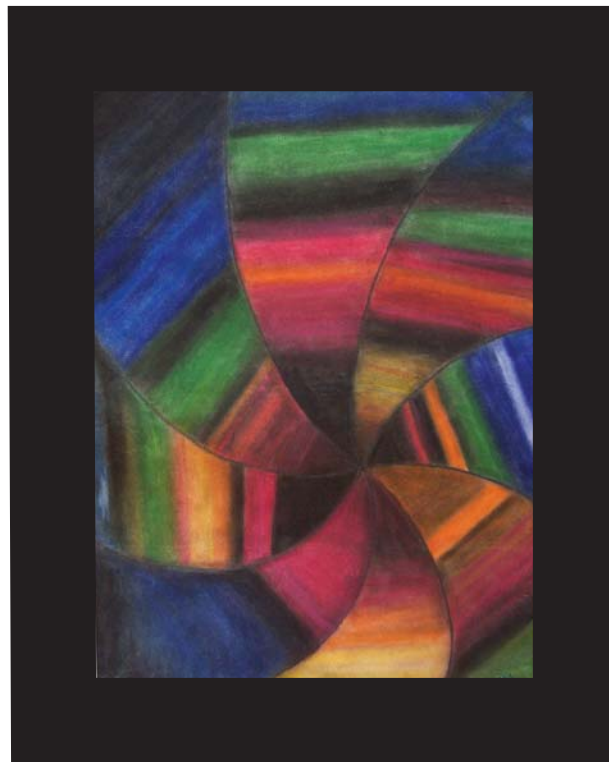
Saturday, December 5 Astronomy LIGO-Syle/
Astronomía la manera de LIGO

LIGO Hanford Science Center Proposal

LHO plans to submit a science center construction proposal to the NSF by November 2008. Construction of a center would open a new era of public outreach for LIGO and its partners, heightening the memorable nature of a visit to the Observatory and significantly increasing the site's capacity to host visitors. A center will provide a venue for hands-on science inquiry that will spark physics interest and understanding in students, teachers and the general public. The emphatically positive response to the opening of the LIGO Livingston Science Education Center in Louisiana demonstrates the great potential of combining a premier hands-on science experience with the interest and excitement of ground-breaking science research.



Student Art
Southridge High School
LIGO Display, 2008



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