



Outreach at LIGO Livingston Observatory

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Presentation overview

- As part of an overall LIGO plan for educational outreach, we are implementing site specific outreach activities to address local needs and utilize local resources
- Presentation will briefly describe:
 - » local needs and opportunities
 - » LIGO's outreach activities and accomplishments
 - » LLO specific plans for the future

Regional overview

- LLO location
 - » Rural, relatively economically disadvantaged
 - » 30 miles from Baton Rouge (+400,000 population)
 - » 70 miles from New Orleans (+1 million population)
 - » >120,000 public school students in this region
- LIGO is one of very few regional scientific facilities providing opportunities to students, teachers, and families for educational enrichment
- Lots of negatives associated with education in Louisiana
 - » There is a statewide perception of need
- LIGO can make a positive contribution to the educational environment

Needs assessment

- Some sample statistics:
 - » Louisiana usually ranks near the bottom in national standardized testing
 - Louisiana ranks near the bottom in state wide average scores on Iowa Test of Basic Skills – only Washington, DC and the US Virgin Islands performed at a lower level.
 - » Only 5% of New Orleans first grade students likely to enter college
 - » Science teachers, especially K-8, have little training in science
 - » Low parental educational attainment is common – up to 70% of students are Title I at some local schools

Some positive factors

- NSF funded Rural Systemic Initiative brings science education resources to the area
- Tighter accountability standards starting in 2001, including astronomy on 8th grade statewide testing
- State science benchmarks are tied to NAS benchmarks
- LSU now requires completion of HS physics for admission
- Louisiana is an EPSCOR state

There is a profound need for efforts that improve the teaching of physical science in this region

Serving K –12 students

- Goals
 - » Become a regional enrichment resource for formal science education for K-12 teachers
 - » Inspire young people to achieve in science and engineering
- Accomplishments
 - » Developed tours, visual displays, science lessons, hands on science exhibits, and fun activities for students visiting LIGO
 - » Sponsored activities involving youth groups at LLO – Boy and Girl scouts, science clubs, etc.
 - » Engaging teachers at regional science teacher meetings, making contact with school district science curriculum coordinators
 - » Partnered with already established organizations (Audubon Foundation, Stennis Space Center, LSU, SLU, etc.) to speak and present at regional activities aimed at K-12
 - » Built a network of contacts with individuals and organizations with similar interests – LSU, Southeastern Louisiana Univ., Southern University, Louisiana Public Broadcasting, Delta Rural Systemic Initiative.

Making site visits meaningful

- We want students to see more than just a building and equipment when they visit, so we have devised various activities and lessons to engage children (and adults) on many levels:



K-12 Results

- More than 2000 students visit LLO each of the last three years on field trips with their classes for tours, lectures, hands-on activities
- Schools have come from more than 200 miles away
- Three students have won state-wide science fairs with LIGO related projects
- LSU Physics Department reports some high school students now contacting them to find out about majoring in physics and citing LIGO as a reason for their interest

Teacher Programs

- **Goals**

- » Strengthen science education proficiency
- » Show teachers that LIGO is exciting science!
- » Utilize that excitement to stimulate student interest in science
- » Where practical, we want to develop opportunities to promote student and teacher participation in research (program at LHO is a great example)

Teacher programs...

- Accomplishments

- » Create RET (Research Experiences for Teachers) program
 - Teachers participate in research activities at LIGO during 8 weeks in summer.
 - 2 teachers in 2001, 3 in 2002 (from Baton Rouge, New Orleans, and in-between)
- » Host regional teacher workshops and meetings
 - Opportunity to showcase LIGO, invite back for tours
- » Partner with Livingston Parish “Intech” (Eisenhower Grant) in-service program for about 150 Middle and High School teachers to tour and learn about LIGO

Teacher programs...

- Results

- » Development of standards based classroom enrichment activities to share and take back to their classes. Activities on LLO website with cross references to state benchmarks
- » Invitations to reach wider audience through Louisiana Science Teachers Association
- » Two high schools in Louisiana now working with LLO to involve students in research – correlation of microseismic environment at LLO with NOAA buoy wave height data
- » Participated in national NSF/RET conference in 2002. LIGO teachers presented and shared experiences with a national audience of science teachers

College Outreach

- Goals
 - » Create a vibrant and intellectually stimulating research environment in which undergraduate students can participate
 - » Welcome participation by regional universities in LIGO research program
- Accomplishments
 - » “SURF” – Caltech’s REU program - implemented at LLO
 - » Summer lecture series on LIGO related topics established for SURFers
 - » Partnered with Southeastern Louisiana University in Hammond to arrange low cost on-campus dorm housing
 - » In addition to strong participation of LSU, Louisiana Tech University, Loyola University of New Orleans, Southeastern Louisiana University, Southern University have joined and become active members of LSC

College outreach...

- Results

- » Undergraduate RET program has grown to include students from MIT's REU program and from other LSC institutions
- » 1 student four years ago - 17 students last summer, ranging from entering college to entering graduate school.
- » 20 part lecture series + student reports at end of summer.
 - Staff and RET teachers also attend.
 - Lecture notes on web
 - We even attracted students and members of the general public by posting this series on the internet
- » Southeastern Univ undergraduates now using end-to-end model to study input optics performance

Informal outreach

- Goals
 - » Provide opportunities to inform adults and families about LIGO – reach “life long learners”
- Accomplishments
 - » Fulfilled lots of speaking invitations to community groups
 - » Many adult group tours have resulted as a consequence of these tours (~1000 visitors per year)
 - » Open house in late 1999 resulted in 750 members of the general public touring LIGO during a single Saturday afternoon
 - » We have set up the multipurpose entry of LLO with informative posters, brochures and hand outs, and hands-on demos. There is a small but constant stream of drop-ins who tour this area
 - » We also arrange periodic tours for the public

Minority outreach

- Unique opportunity for outreach to the African-American community in Louisiana
- Strong LIGO connection with Southern University – nation’s largest HBCU system – through LSC and adjunct appointment to SU Physics Dept.
- This has provided opportunities to partner with SU’s own science outreach programs to African-American community:
 - » community groups, churches, Boy and Girl Scouts, as well as SU students
- We have used this connection to involve Southern students in the REU program, and to reach minority teachers through recommendations from Southern



Future Plans

- Want to continue to support the programs we have and grow them appropriately as our on-site staff grows.
 - » Jill Andrews, Assistant to the Provost for Educational Outreach at Caltech, is assisting with coordination of project strategy and development of future initiatives
- Want to develop an educational outreach and interpretive center based around LIGO to enhance
 - » K-12 education
 - » Provide resources to pre-service and in-service physical science teachers
 - » Become a regional resource for informal science education

Future plans...

- LIGO plans to submit an IPSE (internships in public science education) proposal next February as a vehicle for establishing an education center and developing associated program content.
 - » NSF has encouraged us to look at Arecibo Observatory visitors center as a model for successful outreach program at an observatory.
 - » Barry, Fred, and I visited to learn about their operation
 - » Follow-up meeting at NSF next month to discuss details of this approach