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# Outreach Status at LIGO Livingston Observatory

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LLO

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# 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

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- NSF funded Rural Systemic Initiative brings science education resources to the area
- Tighter accountability standards starting in 2001, including astronomy on 8<sup>th</sup> 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

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- 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

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- 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 micro-seismic 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 learn optics and 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

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- 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...

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- 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



# Outreach Center

- Want to establish a visitor center to communicate LIGO science and technology to:
  - » General public – through exhibits and tours
  - » Teachers – through in-service and pre-service programs, specialized enrichment resources
  - » Students – through tours, activities, science classes on site
- Want to use IPSE as a vehicle to
  - » Construct the building
  - » Develop exhibits and programs
- Want to partner with regional educators so that there is broad support and commitment to utilize these resources
- Want to leverage relationship with Southern University to reach and serve African-American community

## Not to be shown at meeting

- What is the nature of the partnering needed for a successful proposal?
  - » Who to involve and how:
    - Potential partners are school districts, prominent outreach leaders at LSU and Southern, Kerry Davidson of La Bd of Regents, Delta Rural Systemic Initiative, but
    - Blount's previous comments from 2001 RET proposal seemed to place us in the role of an educational institution rather than a science center and demand involvement in education activities at a depth more appropriate to an organization with a school of education.
  - » How should scope for construction be presented?
  - » Include exhibit and program development in proposal? Some of these activities may be better developed through a planning grant. Note that places like Exploratorium and Adler have expressed interest in helping with this and bring credibility to the effort.