

# LIGO Science Education Center: Building an Informal Education Center on Collaborations

Amber L. Stuver

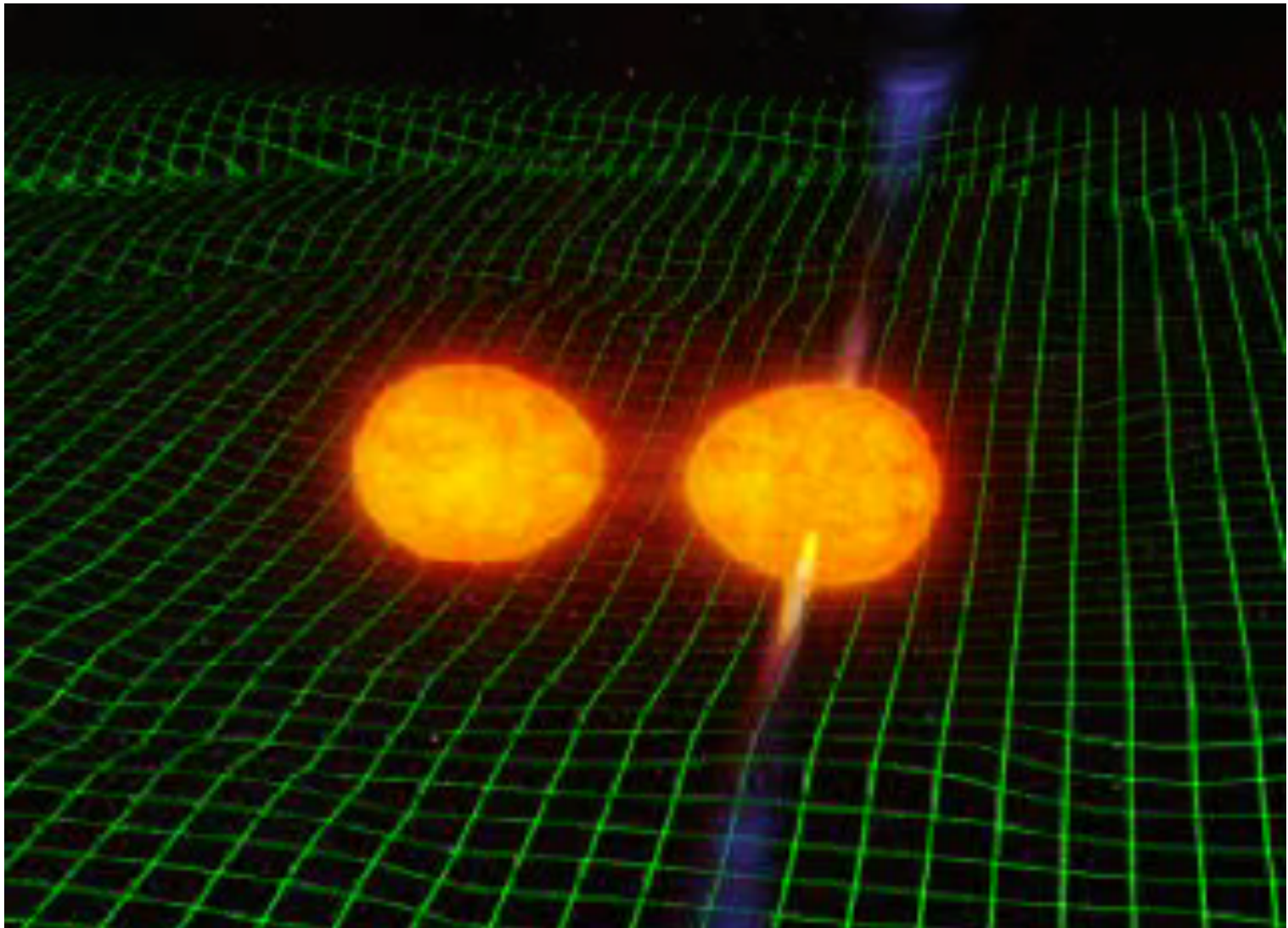
LIGO Livingston Observatory



# What are Gravitational Waves?



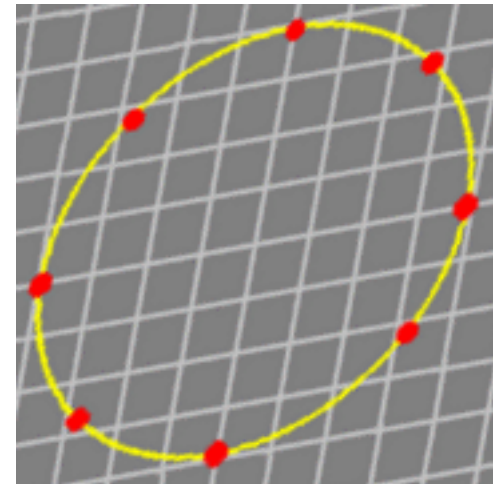
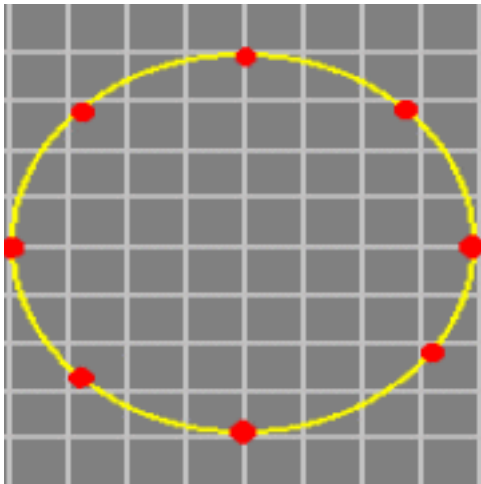
Later..



# The Effects of Gravitational Waves

- A gravitational wave will alternately compress and expand a ring of freely falling masses in orthogonal directions

2 polarizations:



# The LIGO Observatories



← Livingston, Louisiana



Hanford, Washington →

# LIGO Science Education Center: Funding

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- NSF:

- » General operation (incl. staff salaries) is funded through the general LIGO operations grant.
- » Grant awarded to LIGO Lab
  - Caltech/MIT/LIGO Observatories



- BRAF:

- » Funding partner for educational research support, including long-term longitudinal studies of both visiting students and teachers receiving PD. Grants are obtained through the NSF.

*Baton Rouge  
Area Foundation*

A decorative blue wavy line is positioned below the text of the Baton Rouge Area Foundation logo.

# SEC Objectives

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- Communicating LIGO-related science concepts to the public
- Strengthening pre-service and in-service science teaching
- Reaching a broad audience of students in Louisiana and the surrounding region
- Create a national model for ways in which scientists and educators can work together to support inquiry-based teaching and learning

# The Southeastern Louisiana Community

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## ● For Louisiana:

- » Nearly **20%** of residents live in **poverty**.
- » **36.5%** of residents are members of a **racial minority**, the majority (32.4%) identifying as black or African-American.
- » Lower percentage of high school graduates by age 25 than the national average.
  - The difference is even more pronounced for bachelors(+) degree.

## ● For Southeastern Louisiana Parishes:

- » Most parishes have a nearly 50/50 split between white and black populations (several parishes have **>50% black residents**).
- » The **poverty rate approaches 30%** in parishes with larger proportions of minority residents.
- » College graduation rates as low as half that of Louisiana average.



## SEC Programs

- Student (field trip and school visit) programs

- » Seeing scientists at work
- » Inquiry based classroom activities
- » Free exploration of hands-on exhibits

- Public Open Houses

- » Different theme every month with standard facility tours and exhibit hall exploration.



## SEC Programs

- Teacher professional development
  - » Inquiry focused – how to teach through inquiry
  - » “Snack” focused – provide teachers the knowledge and skills to make inexpensive classroom demonstrations.
    - Please see Kathy Holt’s talk on SWIMs (Science With Inexpensive Materials) later in this session.
  - » Many have been supported by LA Board of Regents



# Exploratorium

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- ~50 hands-on exhibits comprising the SEC exhibit hall.
- Provides training to SEC staff through Institute for Inquiry.
- Provides teacher PD on-site at the SEC
- Several teachers from surrounding area are sponsored by the SEC to participate in the summer Teacher Institute at the Exploratorium.
- Provides on-site training to docents in a model similar to Exploratorium docent training.

# SEC Exhibit Hall



# Southern University



- Only HBCU system in nation
- Docents: “exhibit explainer”
  - » Exploratorium and SEC trained
  - » Docents are in STEM and education majors
  - » Role models on the pathway to becoming a STEM professional
  - » Almost all complete their bachelor degree, several have gone on to graduate study, and one has even been hired by LIGO as an operator.
- 3 science education research dissertations have been defended with 4<sup>th</sup> expected in May 2015.



# Educational Research at the SEC

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- **Tulane** – (complete) Graduate research on student attitudes after visiting the LIGO.
- **Univ. of S. Florida** – (complete) Postdoctoral research in attitude changes and concept gains after visiting LIGO
- **Univ. of N. Texas** – (ongoing) Postdoctoral research on docent effects on visitor responses to exhibits, and how the public starts seeing themselves as scientists at open houses.

# Collaborations

- Knowing who we serve and seeking collaborations in the community and from national experts have helped LIGO successfully develop an informal education center.



**LIGO**

# Collaborators: Past and Present

*Baton Rouge  
Area Foundation*



**expl**  **atorium**<sup>®</sup>  
the museum of science,  
art and human perception