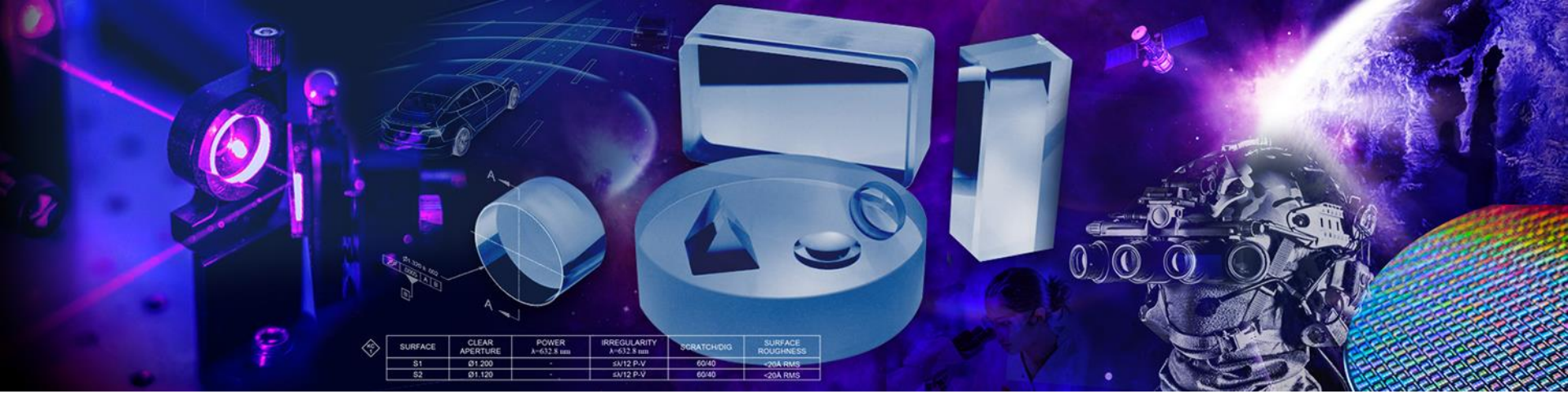
APOMA

AMERICAN
PRECISION OPTICS
MANUFACTURERS
ASSOCIATION

GENERAL MEETING

Jan 31st 2024



APOMA is the focal point of American precision optics manufacturing collaboration, facilitating the ongoing exchange of ideas and expertise amongst our diverse membership base. By advancing workforce development, defining industry standards, and sharing process improvements and innovations, APOMA bolsters operational excellence throughout all aspects of optics manufacturing. Membership consists of fabricators, coaters, material scientists, engineers, designers, and educators; who share in the unified goal to **make light work** in the United States.

APOMA

AGENDA

- Introduction
- Board Election
- Membership
- Financial Report
- 2024 Tech Workshop
  - TRAVIS GREEN
  - DR. LYNN COMINSKY
- Guest Speakers
  - Fusion Ignition Update & Freeform Optics
    - DR. TAYYAB SURATWALA
  - Workforce Development
    - DR. ALEXIS VOGT
    - ROSALIE CLEMENS

APOMA

BOARD MEMBERS 2024

Lee Steneken
President

ESCO OPTICS

Travis Green
President-Elect

ALPINE RESEARCH OPTICS

Mike Mandina
Past-President

OPTIMAX SYSTEMS

Dave Mohring
Treasurer

OPTIPRO

Zach Hobbs
Secretary

SYDOR OPTICS

Dr. Alexis Vogt
Academic Member

MONROE COMMUNITY COLLEGE

Michele Stolberg
Admin

Navid Entezarian
At-Large Member

THORLABS

Justin Mahanna
At-Large Member

UNIVERSAL PHOTONICS

Shai Shafrir
At-Large Member

CORNING

CANDIDATES

Gary Andreski

NGL AMERICA INC.

Nicholas Bilis

OPTIMAX SYSTEMS

Mitzi Brennan

PUREON

Navid Entezarian

THORLABS

Incumbent

Timothy Kennedy

EDMUND OPTICS

Chris Russell

UNIVERSAL PHOTONICS

Shai Shafrir

CORNING

Incumbent

Barry Tyler

SALVO TECHNOLOGIES

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At-Large Member

THORLABS

Chris Russell
At-Large Member

UNIVERSAL PHOTONICS

Timothy Kennedy
At-Large Member

EDMUND OPTICS

NEW AT-LARGE MEMBERS

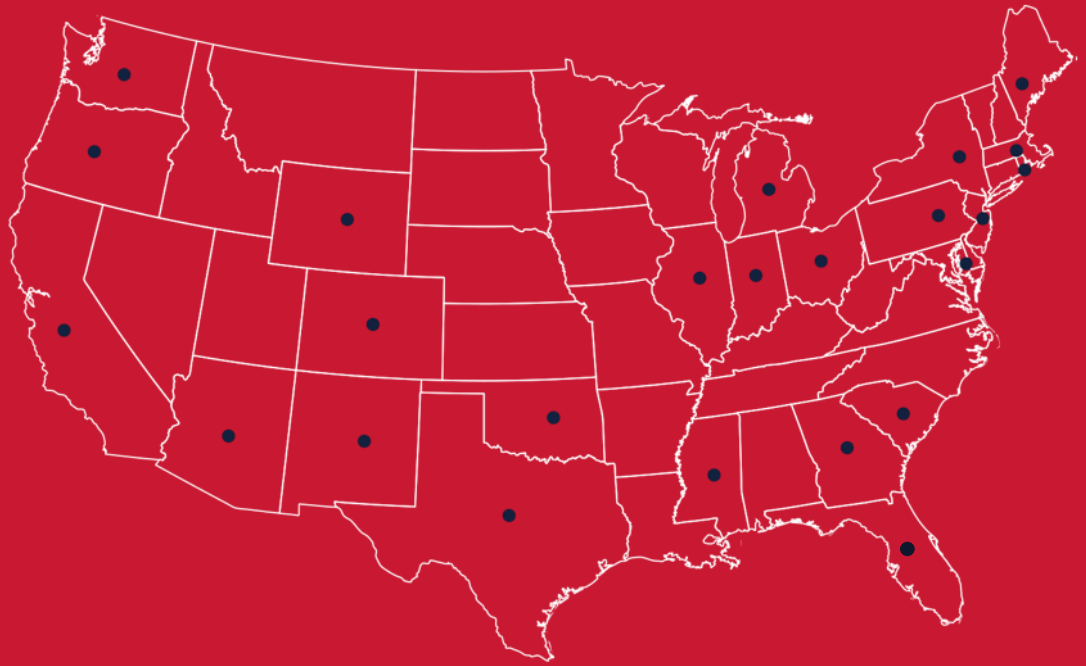
Chris Russell
UNIVERSAL PHOTONICS

Chris is an experienced Field Application Engineer with a demonstrated history of working in the precision optics industry and has worked for Universal Photonics for almost 20 Years in various roless. He has worked all over the world with small to very large optical, IR, crystal, plastic, and many other polishing industries. He's developed strong relationships with many of manufacturers and APOMA members.

Timothy Kennedy
EDMUND OPTICS

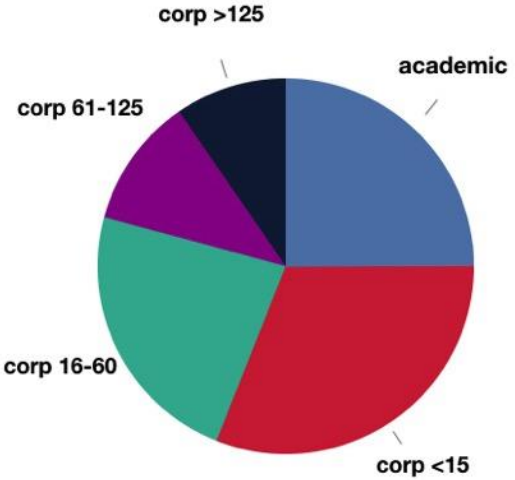
Tim Kennedy is the Sr. VP of Global Sales & Marketing for Edmund Optics. He has a global mindset and cultural awareness developed from spending nearly 20 years living and developing operations in various countries across Asia. One of his key strengths is his ability to communicate on a more personal level with native speakers in Japanese, Mandarin and Thai. He is hard working, always available for his team, and committed to the stakeholders of the organization.

MEMBERSHIP



119 members

Academic……	30
Corporate <15……	35
Corporate 16–60……	28
Corporate 61–125……	13
Corporate >125……	13

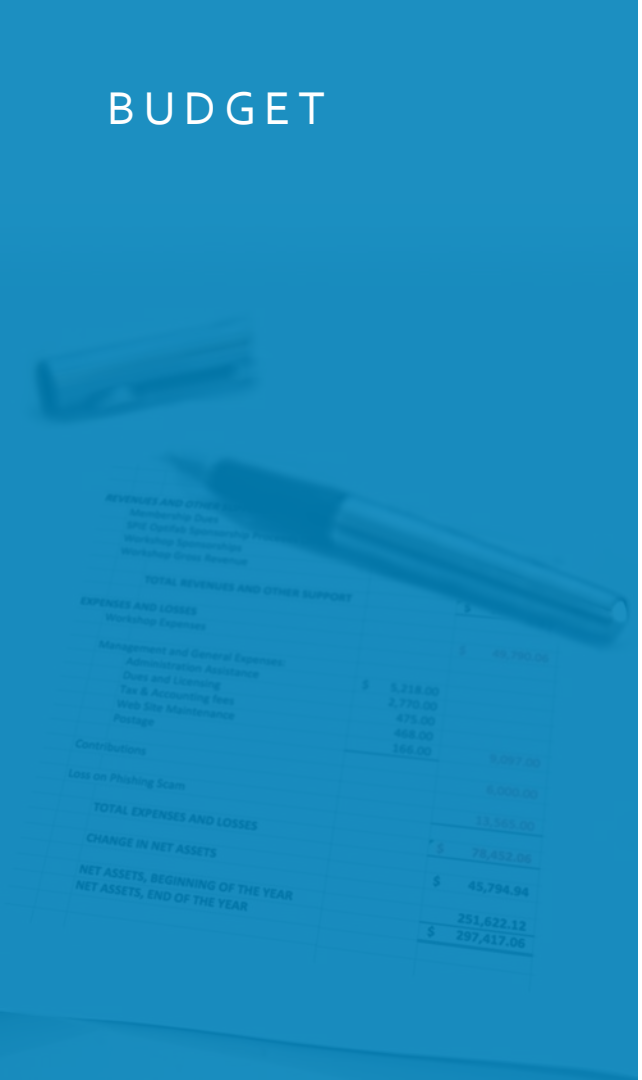


FINANCE REPORT

Statement of Activities
For The Year Ended
December 31, 2023

REVENUES AND OTHER SUPPORT		
Membership Dues ($20K Outstanding)		$ 35,550.00
SPIE Optifab 2023 Sponsorship Proceeds ($ 10K Expected)		$ -
Workshop Sponsorships		$ -
Workshop Gross Revenue		$ -
Bank Sweep Interest		$ 9,485.67
TOTAL REVENUES AND OTHER SUPPORT		**$ 45,035.67**
EXPENSES AND LOSSES		
Workshop Expenses		$ -
Management and General Expenses:		
Administration Assistance	$3,825.00	
Dues and Licensing	$2,770.00	
Tax & Accounting fees	$765.00	
Bank Service Charge / Fees	$2,497.00	
PW General Mtg. 2023	$968.66	
Intuit Qbook Fee	$275.40	
Intuit Tran Fee	$1,056.51	
Web Site Maintenance	$479.00	
Postage & Supplies	$234.90	$ 12,871.47
Contributions		$ 6,000.00
TOTAL EXPENSES AND LOSSES		**$ 18,871.47**
CHANGE IN NET ASSETS		**$ 26,164.20**
NET ASSETS, BEGINNING OF THE YEAR		**$ 297,417.06**
NET ASSETS, END OF THE YEAR		**$ 323,581.26**

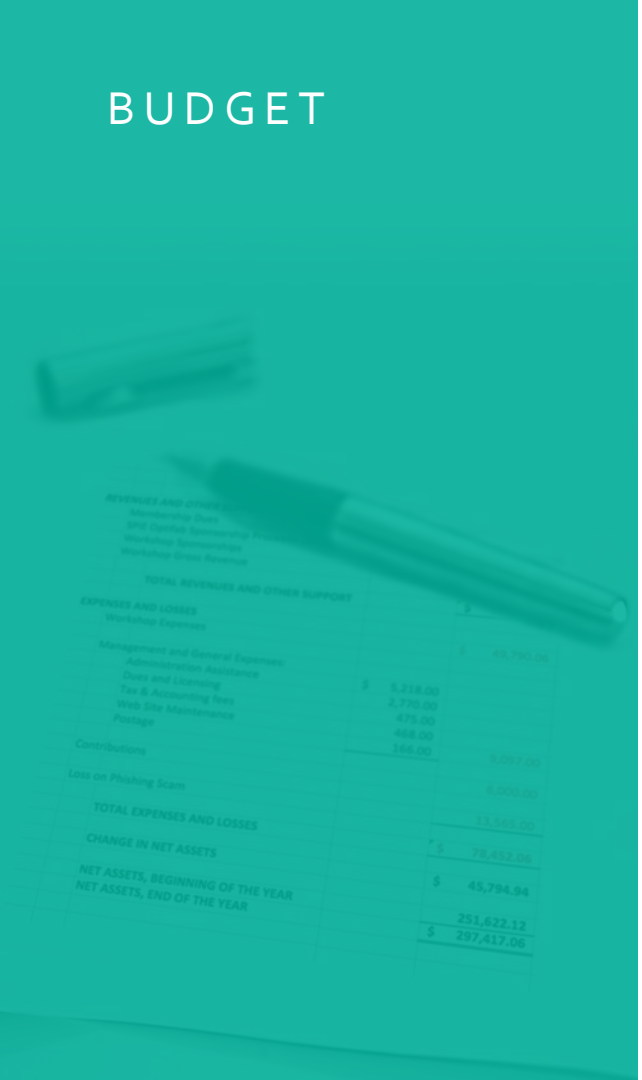
BUDGET



2023 Proposed Budget vs. Actual

Item	Proposed	Actual
Postage, Supplies	$ 170.00	$ 235.00
Dues & Licensing	$ 6,500.00	$ 2,770.00
Tax & Accounting Fees	$ 900.00	$ 765.00
Web Site Maintenance	$ 2,500.00	$ 479.00
Administrative Assistance	$ 7,500.00	$ 3,825.00
Marketing & Advertising	$ 3,500.00	$ -
Conventions (OptiFab)	$ 4,000.00	$ -
Contributions	$ 5,000.00	$ 6,000.00
Intuit Qbooks and Fees	$ -	$ 1,332.00
Total Proposed vs Actual	**$ 30,070.00**	**$ 15,406.00**

BUDGET



2024 Proposed Budget

Item	Amount
Postage, Supplies	$ 300.00
Dues & Licensing	$ 3,500.00
Tax & Accounting Fees	$ 950.00
Web Site Maintenance	$ 2,000.00
Administrative Assistance	$ 7,500.00
Marketing & Advertising	$ 3,500.00
Workshop & PW General Mtg	$ 4,500.00
Contributions	$ 6,000.00
Intuit Qbooks	$ 2,000.00
Budgeted Expenses	**$ 30,250.00**

2024 GOALS

- Support workforce development and apprenticeship program directed by AmeriCOM
- Continue to save capital in an effort to bring on full time assistance
- Execute 2024 tech workshop
- Monthly member activation

UPCOMING EVENTS

April 21-25

SPIE. DEFENSE+ COMMERCIAL SENSING

Gaylord National Resort and Convention Center

National Harbor, MD

July 2024

WNY OPTICS GOLF TOURNAMENT

Rochester, NY

October 2024

NEW ORLEANS TECH WORKSHOP OCT 2024

Tour LIGO

Livingston, LA

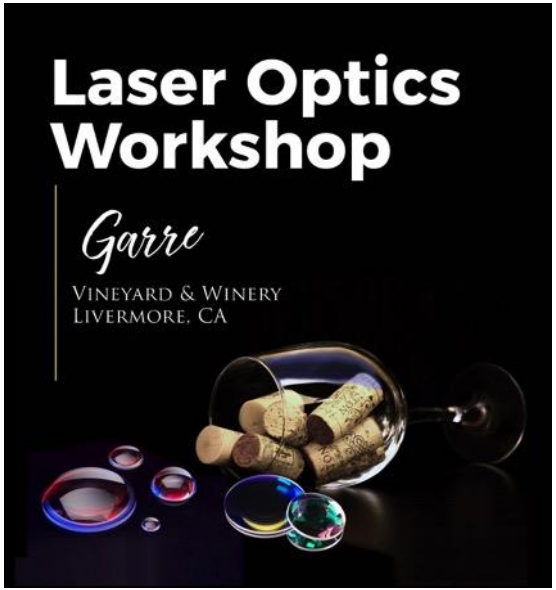
TECH WORKSHOP

Travis Green | President-Elect

TECH WORKSHOPS

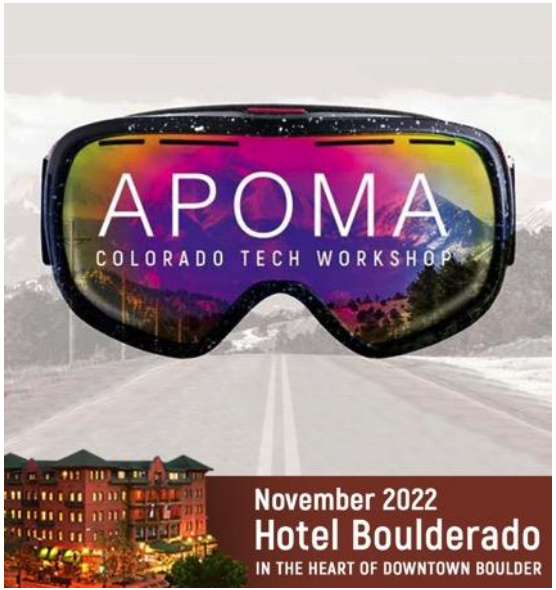
WORKSHOP TOUR

UA SCIENCE
RICHARD F. CARIS
MIRROR LAB
Steward Observatory



WORKSHOP TOUR

Lawrence Livermore
National Laboratory

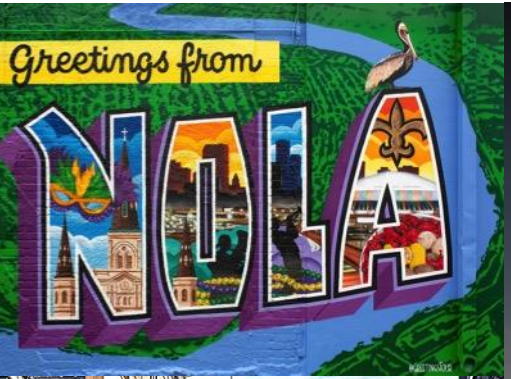


WORKSHOP TOUR

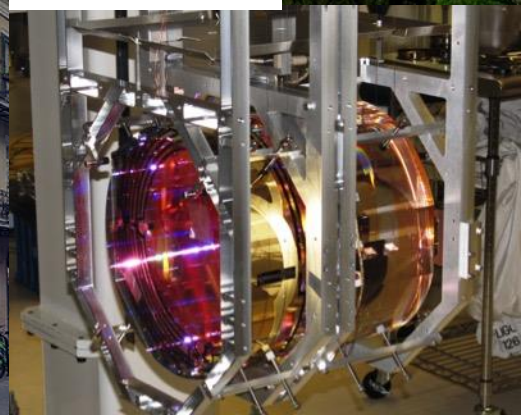
NIST

CONNECT | COLLABORATE | INNOVATE

TECH WORKSHOP | NEW ORLEANS 2024



LIGO



TECH WORKSHOP | ENGAGEMENT

TECH WORKSHOP | ENGAGEMENT

LIGO: the experiment that won the 2017 Nobel Prize in Physics

Dr. Lynn Cominsky

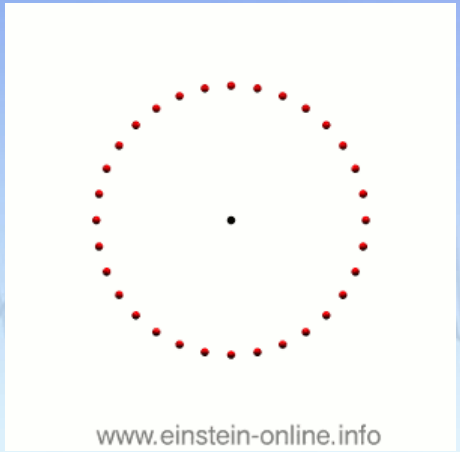
Professor of Physics and Astronomy

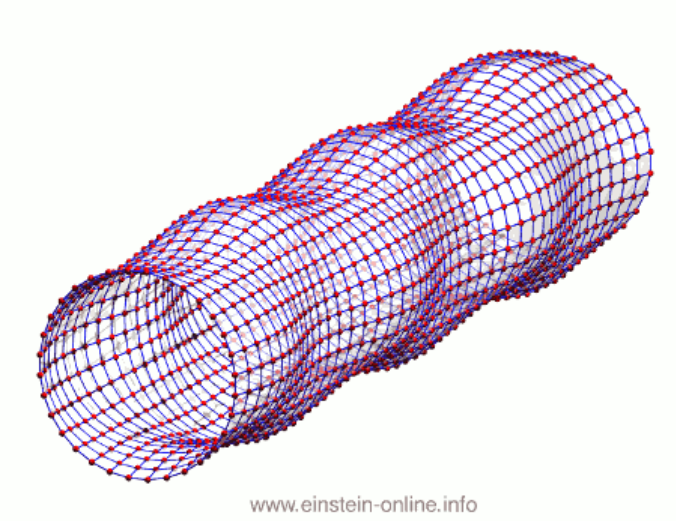
Director, EdEon STEM Learning

Sonoma State University

What are Gravitational Waves?

- “Ripples in the fabric of spacetime”
- Predicted by Einstein in 1915
- Stretch and squeeze spacetime as they travel at the speed of light



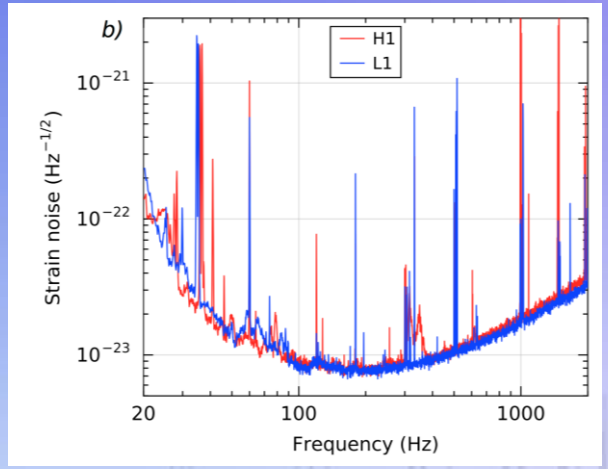


Background information

- Gravitational waves were predicted by Einstein's 1916 General Theory of Relativity
- GWs travel at the speed of light
- Colliding massive bodies will produce the strongest gravitational waves
  - Unique wave patterns specify masses of objects
  - Observed wave amplitudes can be compared to predicted amplitudes to determine distances
  - Time delays between detectors provide crude positional information

LIGO Sensitivity and Strain

- Strain (h) = $\Delta L/L$
- L for LIGO = 4 km
- Max strain $h = 10^{-21}$
- $\Delta L = 4 \times 10^{-18}$ m
- This is 4×10^{-3} * size of a proton (~ 1 fm)



It's like measuring a hair over the distance to the nearest star!


LIGO
Laser Interferometer
Gravitational-Wave Observatory
Supported by the National Science Foundation
Operated by Caltech and MIT

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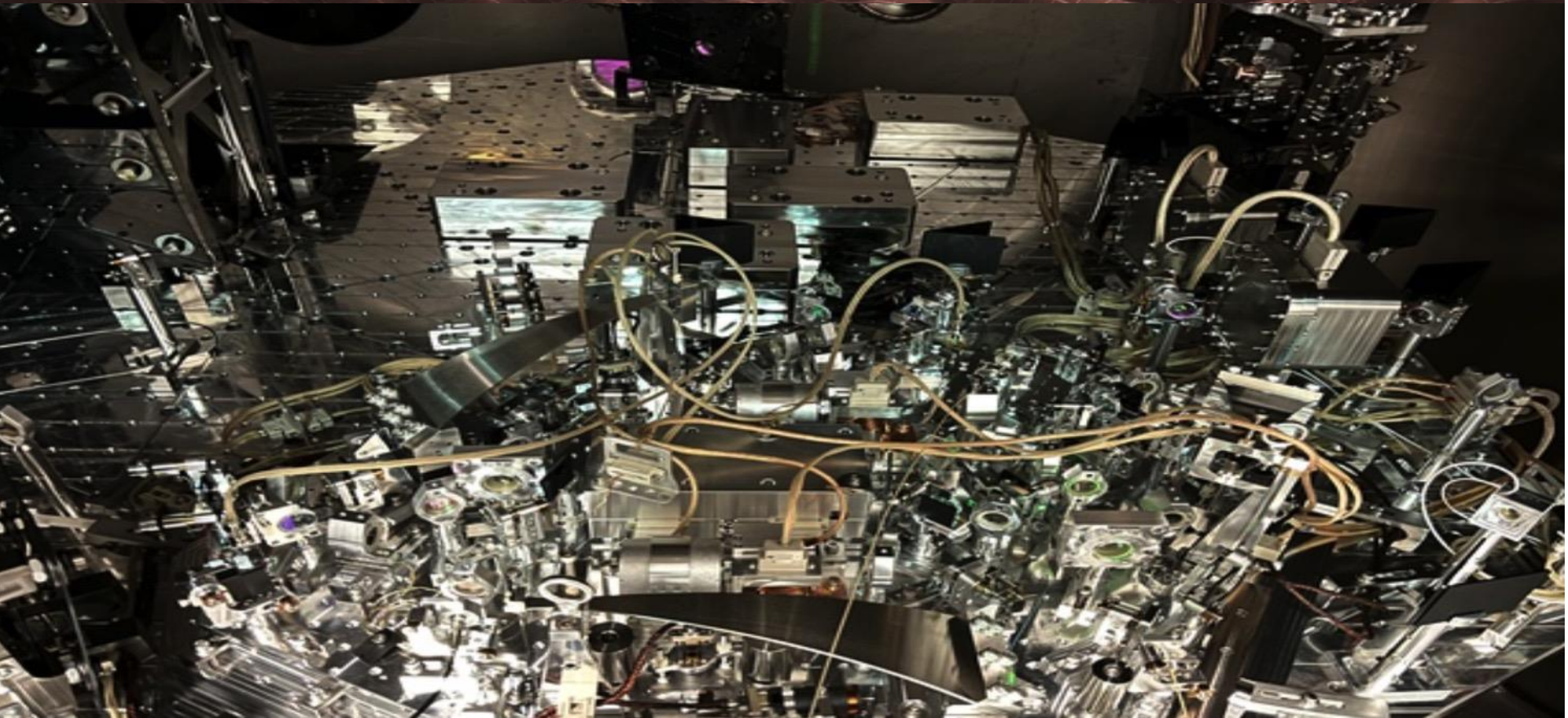

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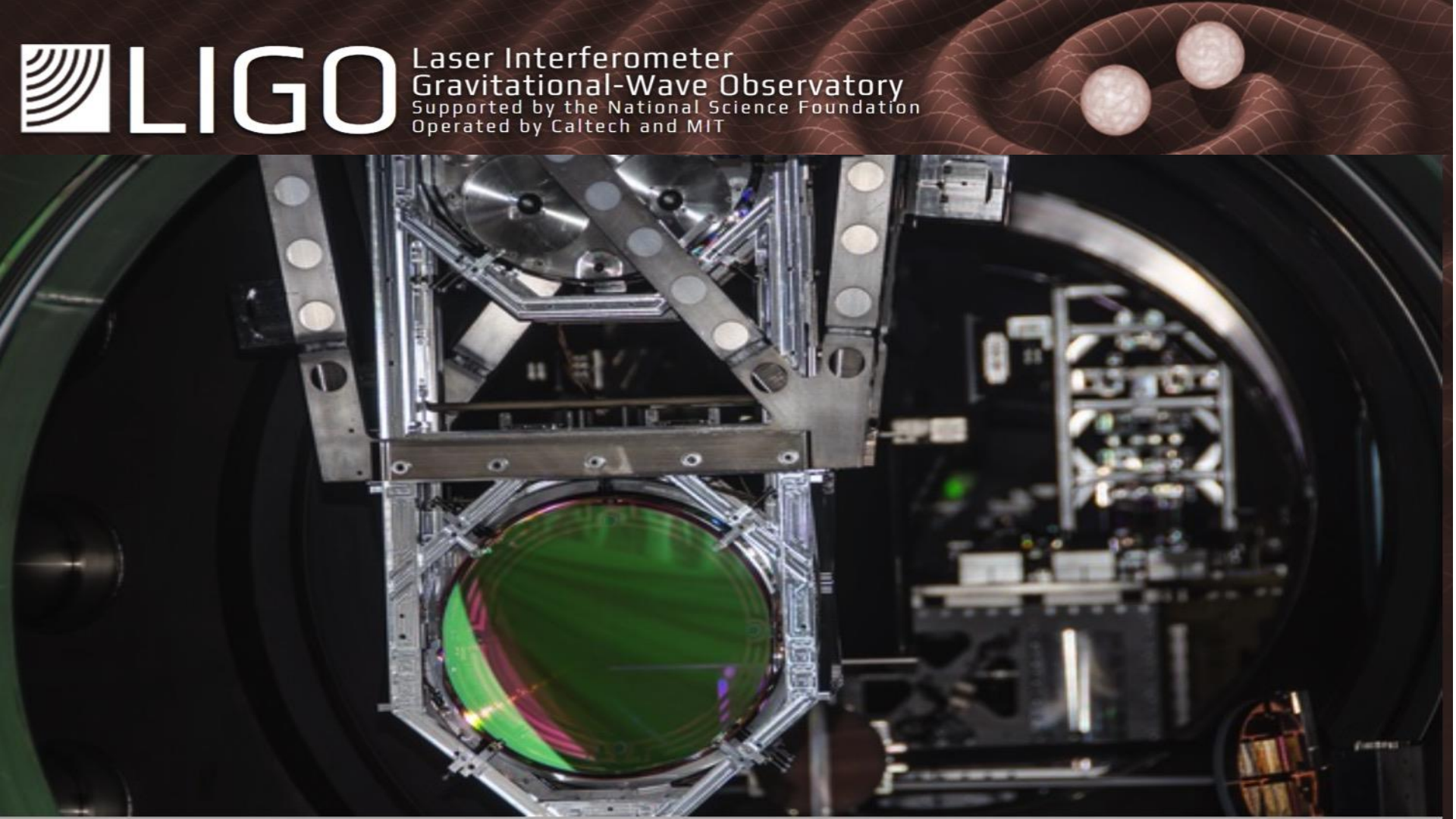
Laser Interferometer
Gravitational-Wave Observatory
Supported by the National Science Foundation
Operated by Caltech and MIT

Filter Cavity Vacuum Tube

This picture shows the vacuum tube hosting LIGO's 300-meter filter cavity used to implement frequency-dependent quantum squeezing. Each LIGO facility, one in Hanford, Washington, and the other in Livingston, Louisiana, has its own 300-meter filter cavity. (Image credit: MJ Doherty)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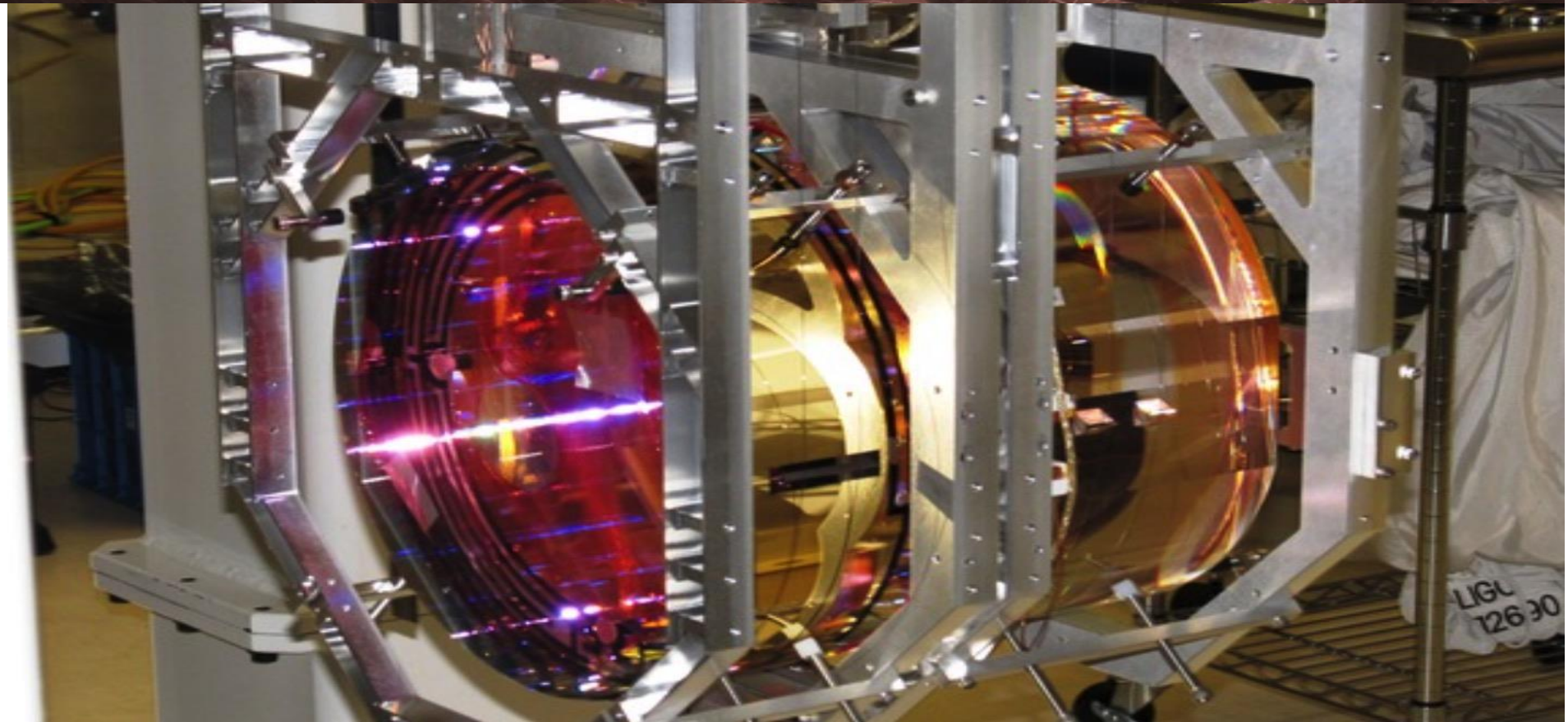
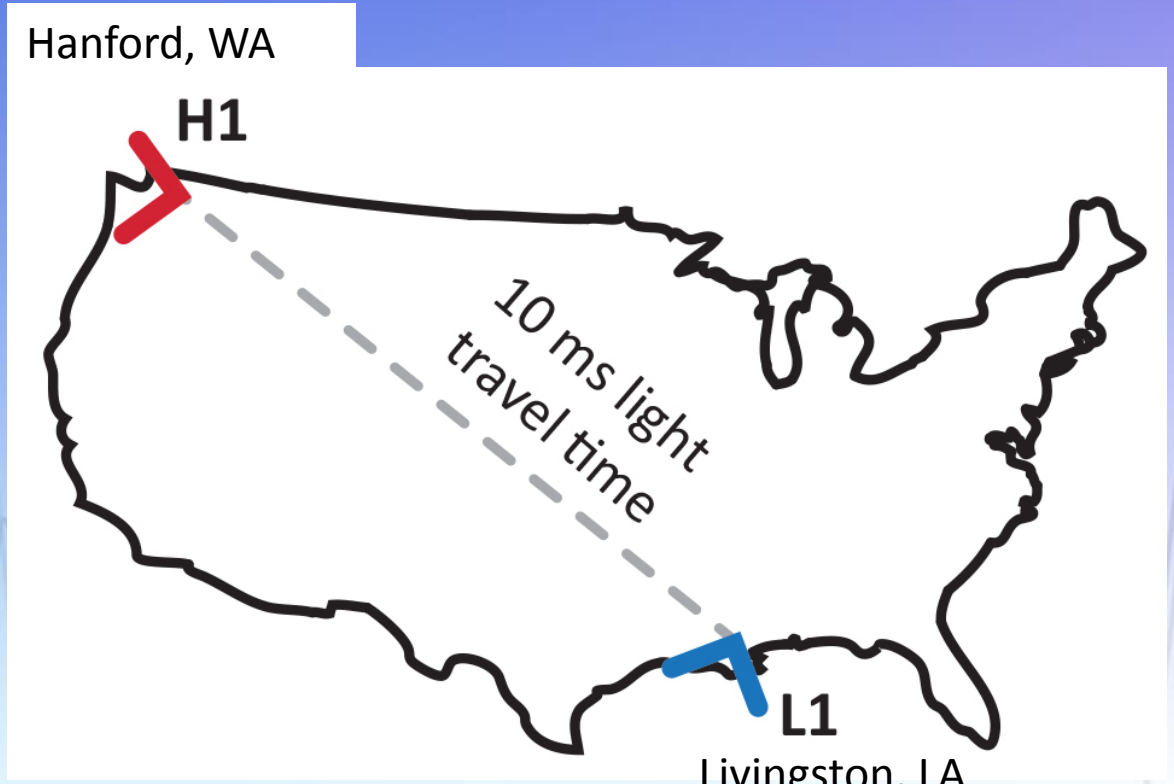


Twin Observatories

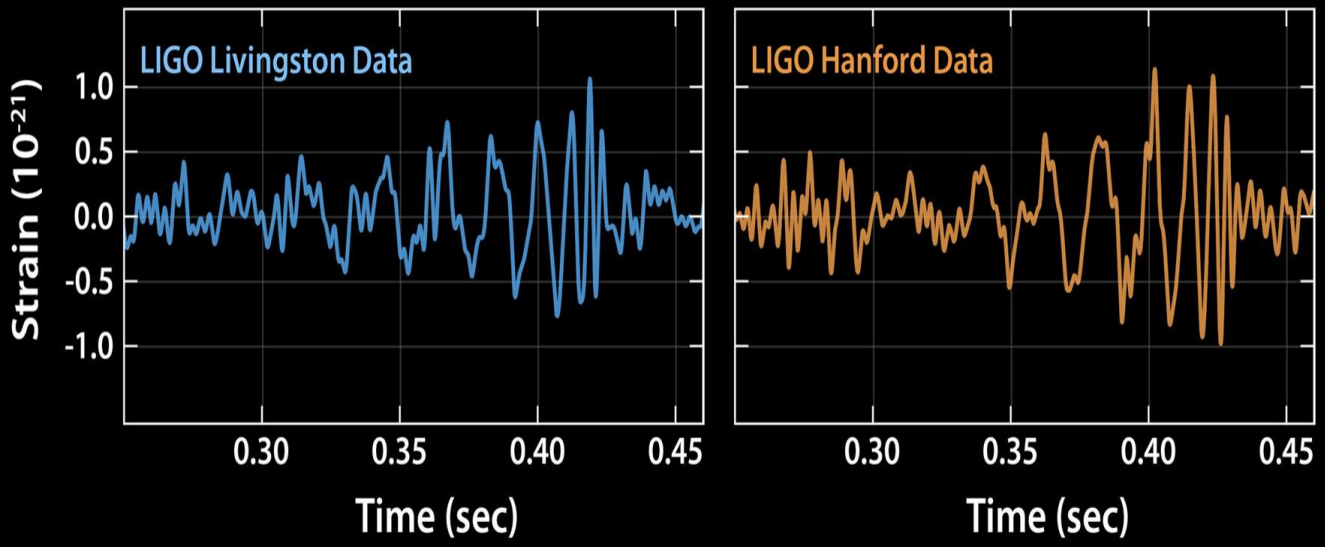
Hanford, WA

Livingston, LA

Twin Observatories

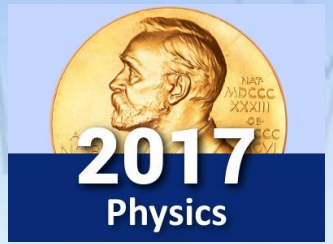


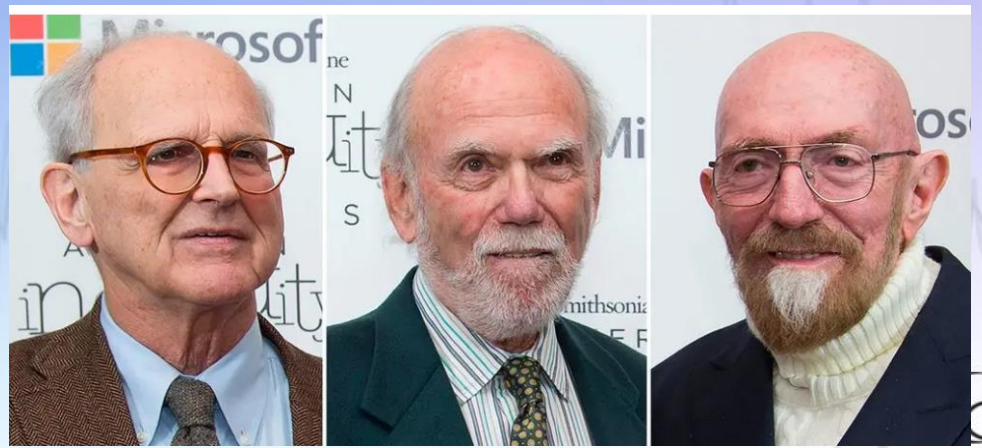
What LIGO Observed 9/14/15



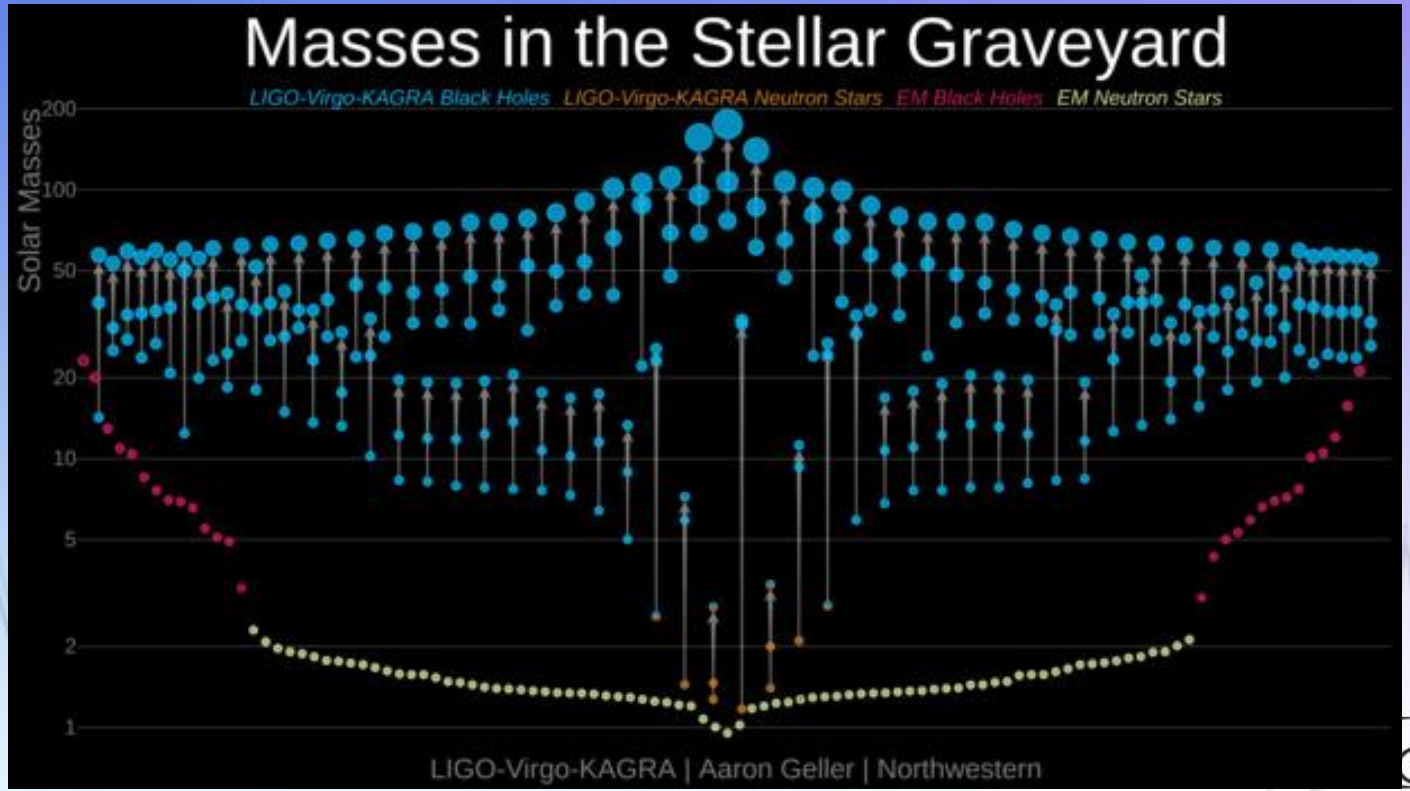
2017 Nobel Prize in Physics

- October 2017: Nobel prize in Physics given to Rainer Weiss, Barry Barish and Kip Thorne
- *"for decisive contributions to the LIGO detector and the observation of gravitational waves"*





GW and EM masses through O3b (March 2020)



Resources

- LIGO websites: http://www.ligo.org
  http://ligo.Caltech.edu
- Summary of detection graphics:
  http://ligo.org/detections.php
- *Teaching Einstein's Universe* course materials (including noise sources):
  http://edeon.sonoma.edu/ligo
- Squeezed light videos:
  https://www.ligo.caltech.edu/video/ligo20231023v2
  https://www.ligo.caltech.edu/video/ligo20231023v1

GUEST SPEAKERS

Fusion ignition updates and advancements in freeform optics

Dr. Tayyab Suratwala

Program Director for Optics and Materials Science & Technology (OMST) in the NIF & Photon Science Directorate

Lawrence Livermore National Laboratory

For more information and possible slide distribution please reach out to: Suratwala1@llnl.gov

Workforce Development

Alexis Vogt, PhD
MONROE COMMUNITY COLLEGE

OPTICS MANUFACTURING TECHNICIAN APPRENTICESHIP

- **Structured "earn and learn" solution**
  - 2,000 hours/year
  - Customizable program to meet your manufacturing process
- **Related technical instruction**
  - Minimum 144 hours/year
- **Apprentices work in various departments learning manufacturing processes**

OPTICS MANUFACTURING TECHNICIAN APPRENTICESHIP

- **Benefits to Employers**
  - Highly skilled workforce
  - Increased employee retention
  - Improved attendance, productivity, and quality

- **Benefits to Apprentices**
  - Long-term career opportunities
  - Workplace relevant skills
  - Industry recognized credentials
  - Earn academic credit

ROI **$1.47** for every $1 invested from increased productivity, reduced waste, and increased innovation

Every $1 invested in apprenticeships leads to a public return of approximately **$28** in benefits

https://nationalapprenticeship.org/roi

APPRENTICESHIP PARTNERS

Structured earn & learn program: on the job training + related technical instruction

OPTIMAX

THORLABS

ESCO optics

Nu-Tek Precision Optical Corporation

Seeking additional optics companies!

LACROIX PRECISION OPTICS

OPTIPRO

CORNING

zygo

THORLABS

RTX

STEPS TO DEVELOP AN OMT APPRENTICESHIP

Determine company's critical work function

for the on-the-job learning

Identify related technical instruction

aligned to the work functions

Submit application

Receive approval

Select & register apprentices

Start apprenticeship

To get started contact – Bob Lasch rlasch@monroecc.edu (585) 292-2678

National Work-based Learning Coordinator
Monroe Community College | Optical Systems Technology

$4.4M

Office of Naval Research
ONR
Science & Technology

Department of Defense
DoDSTEM
Science · Technology · Engineering · Mathematics

$5.2M

Workforce development

Rosalie Clemens

VP, Workforce Development & Community Engagement

AmeriCOM

American Center for Optics Manufacturing

The Backbone of America's Precision Optics Industry

AmeriCOM
CENTER FOR OPTICS MANUFACTURING

Industry, academia and government working together

AmeriCOM's two pillars

Workforce Development

Establish and maintain a national network of regional optics training ecosystems

Manufacturing R&D

Identify and develop breakthrough, new manufacturing technologies and methods

Current ecosystems

Monroe County Community College (New York)	Sussex County Community College (New Jersey)	Front Range Community College (Colorado)	Valencia Community College (Florida)
Flagship program w/ model framework	$1.25M equipment investment	$1.5M equipment investment	$1.2M equipment investment
• Currently ~130 students enrolled • Facilities to greatly expand • Successful training and apprenticeship prgm	• Fall 2023: 13 students • Spring ‘24: 17 students • Two-year associate degree and one-year CNC certificate	• Fall 2023: 16 students • Spring ‘24: 21 students • Two-year associate degree and a one-year certificate	• Graduation of 12 students in February • Next ~14 students • 3 cohorts/a (15 wks) • Expanded lab construction ongoing

All programs have the same challenge to recruit and maintain instructors.

Call to action – current ecosystems

Please help address 2 major challenges that all programs have in common:

1. Not enough students
2. Not enough instructors

Bring in students	Bring in instructors
• Be an optics evangelist in your community – as company and individual • Offer (paid) internships • Have *Bring-Kids-To-Work* days and *Industry Days* for high schools • Offer ride services for students • Be a diverse and inclusive employer	• Encourage employees to serve as instructors and adjunct faculty • Allow them to do this on company time • Offer it as a leadership/professional development opportunity • Provide or offer access to teaching education (e.g., Coursera certificate)

Start taking action today! It's easy and doesn't cost a lot to make a real difference!

Prospective ecosystems

1. Keene State College (NH)
Site for diamond turning and thin film coating

3. Southern California region
High concentration of classic optics

2. Arizona region
High concentration of “modern” optics

4. Montana
Designated *Tech Hub* with emphasis on photonics industry

5. Alabama
High concentration of defense contractors w/ optics needs

6. New England expansion
Creation of a “super-ecosystem” with several specialties

Please help us identify other prospective ecosystems!

Call to action – prospective ecosystems

Please help address the major challenge that new programs have in common:

1. Long stand-up time
2. College system bureaucracy (we cannot change this)

Accelerate start-up time

- Throw a decisive voice-of-industry behind a new program
- Help AmeriCOM implement a fast-track approach: start with certificates, microcredentials before implementing a 2-yr associate program
- Provide adjunct instructors
- Support program leadership financially (e.g., endowed full-time faculty)
- Help fill the student pipeline
- Offer technical assistant to college (e.g., maintenance of equipment)

Industry can drive the implementation speed with its support! Start acting today!

AmeriCOM

Contact us!

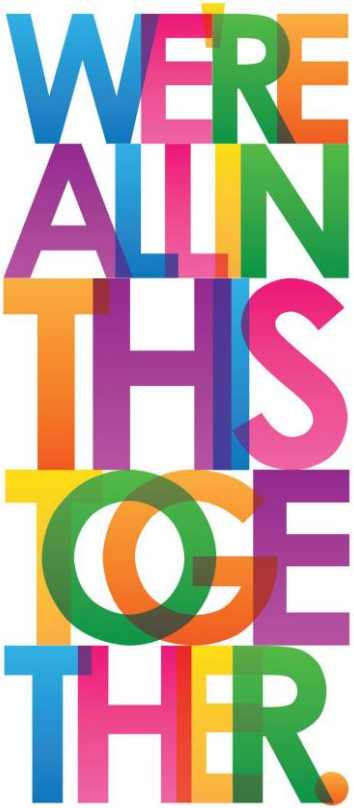
Rosalie Clemens

VP, Workforce Development and Community Engagement

P: 585-200-6267

E: rclemens@americom.org

Thank you for your ongoing support!!



Thank you and enjoy Photonics West

APOMA

Photo credit: LaCroix Precision Optics