Scotland Physics Teacher Exchange

LIGO Livingston and University of Glasgow Astrophysics

William Katzman
Stephen Collins
Vernita Adkins
NSTA New Orleans - Dec 1, 2017

About the program

Scotland	Louisiana
Certified physics teacher surplus	Certified physics teacher deficit
Homogenous but diversifying	Very diverse

Teacher Exchange!

Year 1: 2 teachers from Louisiana go to Scotland for 3 weeks.

Year 2: 2 teachers from Scotland go to Louisiana for 3 weeks. *recruiting*

Scotland - Louisiana - LIGO connection

- Livingston, Louisiana home to one of three gravitational wave detectors
- Livingston, LA: Home of LIGO's Science Education Center
- LIGO Scientific Collaboration: 1200+ members
  - Including Scotland & Louisiana
  - Dedicated to gravitational wave astronomy
- Funded by National Science Foundation grant to Baton Rouge Area Foundation

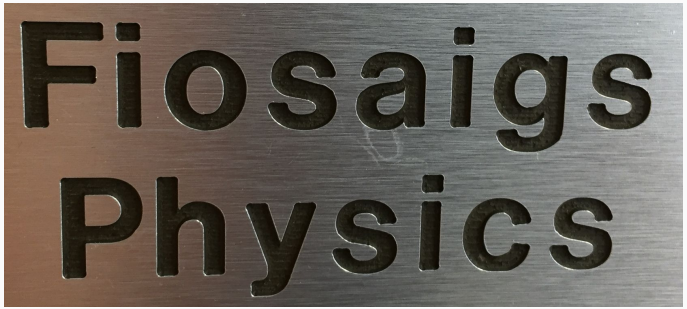
What we learned visiting Scotland

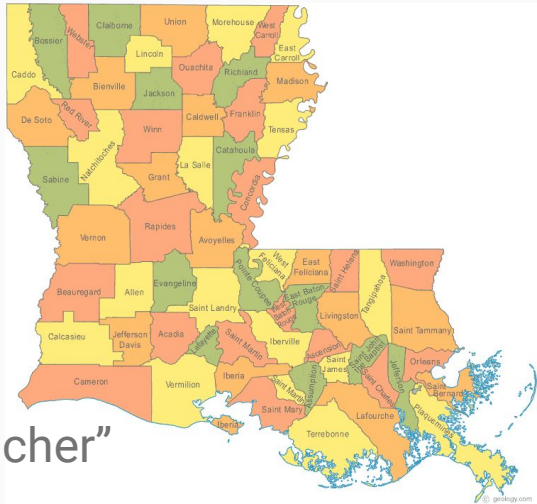
- Cutting edge research
- Scottish attitudes and the Scottish school model support science
- Areas to emulate
  - support for teachers
  - Clear pathways to technology and scientific fields outside of Universities

Scottish culture and science

Scotland and LA population is about the same (5.3M vs 4.7M)

Scotland area somewhat smaller (31K vs 52K mi^2)





Different reactions to “I’m a Physics teacher”

Scottish informal science education

Glasgow science center - museum, setting for science fair exhibit and awards

Dynamic Earth - Geology focus on the royal mile in Edinburgh

Scottish culture celebrates science

Scientists, engineers, and thinkers are celebrated

Scottish School Structure

- All school administrators are former or current teachers
- Science Lead Teachers support all of the sciences
- Departmental Lead Teachers support teachers in department
    - Physics Lead Teacher

Science Curriculum Structure

- Secondary 1-3 are required take all sciences
- Secondary 4 to advance students are not required to take sciences
- Sciences are needed for entry into universities
- Students can choose to take up to three sciences

Scottish National Physics Standards and Exams

National 1-3-enable learners to acquire basic knowledge of concepts in physics and be able to apply their understanding to practical situations.

National 4-enables learners to develop the ability to solve problems and establish relationships in physics by acquiring a broad knowledge base, practical skills and basic mathematical skills.

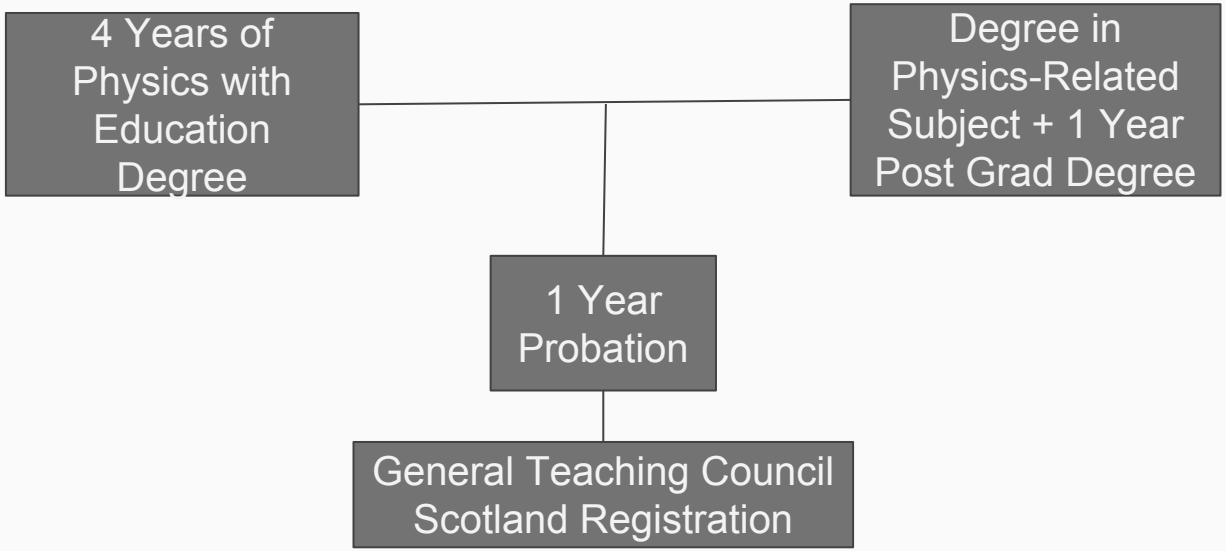
National 5-enables learners to develop a deeper understanding of physics concepts and the ability to describe and interpret physical phenomena using mathematical skills.

Scottish National Standards and Exams

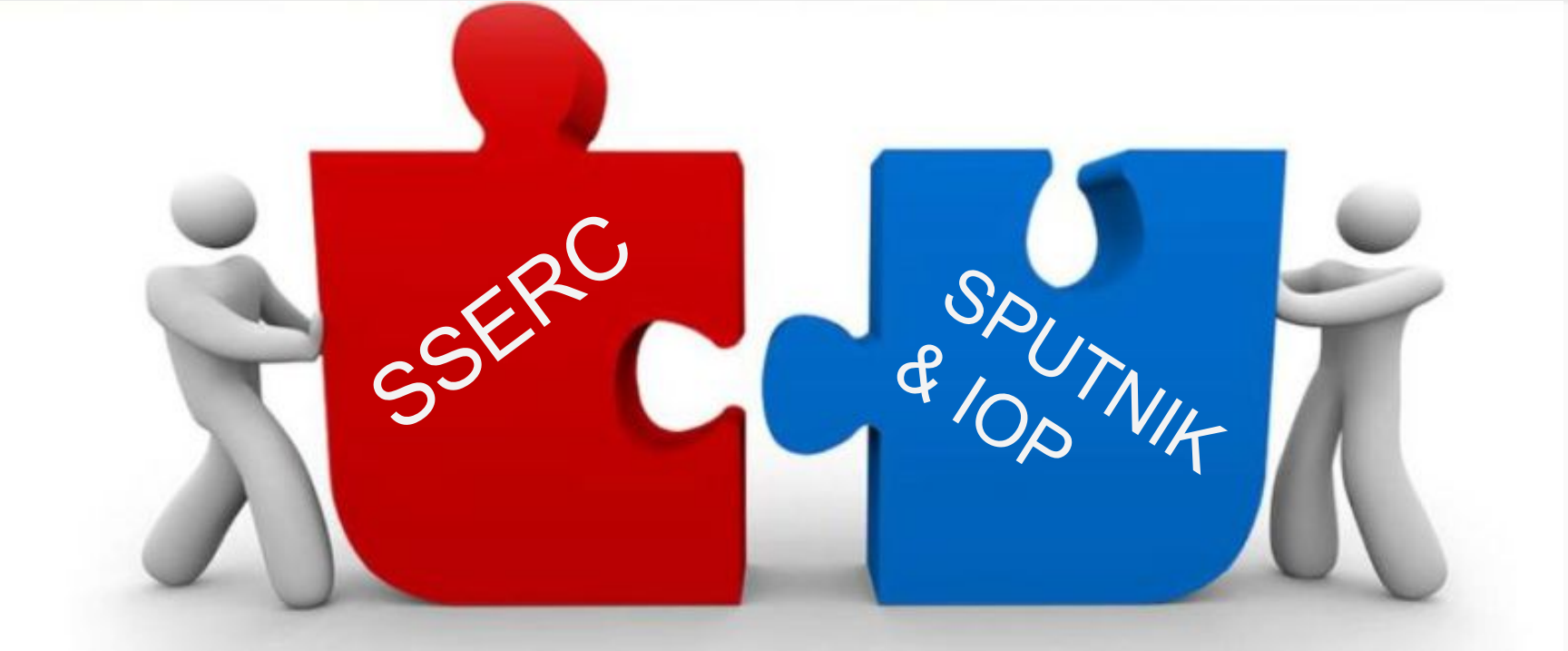
Higher-develops learners' curiosity, interest and enthusiasm for physics in a range of contexts. The skills of scientific inquiry and investigation are developed throughout the Course, and the relevance of physics is highlighted by the study of the applications of physics in everyday contexts.

Advanced Higher- enables learners to build on the knowledge and skills developed in the Higher Physics Course and to use their mathematical knowledge and skills to analyze and solve problems in real-life contexts. Through a deeper insight into the structure of the subject, the Course reinforces and extends knowledge and understanding of the concepts of physics and develops skills in investigative practical work.

Scottish Physics Teachers



Scottish Physics Teachers Support



SSERC - organizing PD at Universities

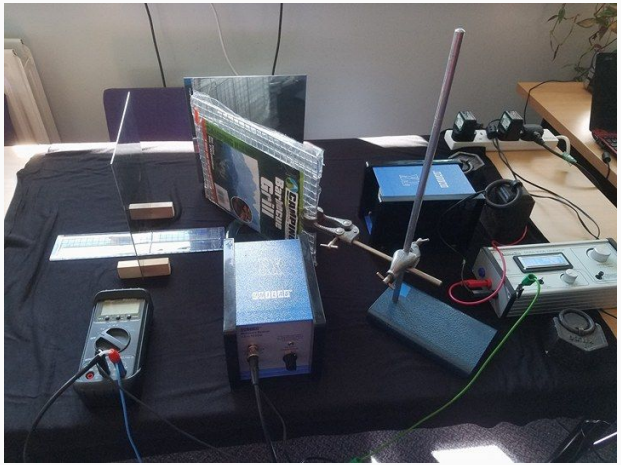
Ongoing Professional development for Physics teachers on topics in National Standards, from University Researchers

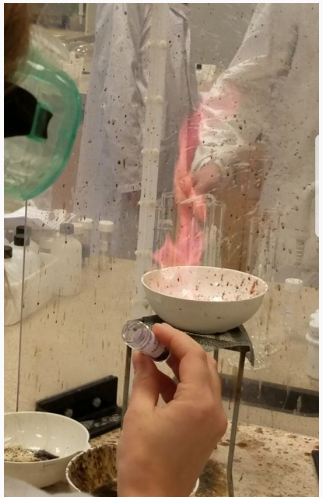
Our visit to Strathclyde University, Glasgow:

- seminar with University researchers
- hands-on labs w/take-away materials for teachers
- open discussion with National standards developer

SSERC - PD at Dunfermline

Professional development and community building for new and experienced teachers includes seminars, workshops, demonstrations





SSERC remote and onsite support

SSERC education support (master teachers) make school visits to support teachers, offer safety consultation

SSERC-produced lab kits are distributed to teachers and demonstrated via webcast after school hours

SPUTNIK and the Scottish IOP

- SPUTNIK - online forum exclusively for Scottish physics teachers
- Run by the Institute of Physics (IOP) in Scotland
- the medium for debating the big issues facing physics teaching nationally
- a contact point for exchanging ideas for addressing national standards
- Like US, Scottish Physics teachers can be isolated - offers an online community for solving everyday problems in the classroom.

Colleges and Industry

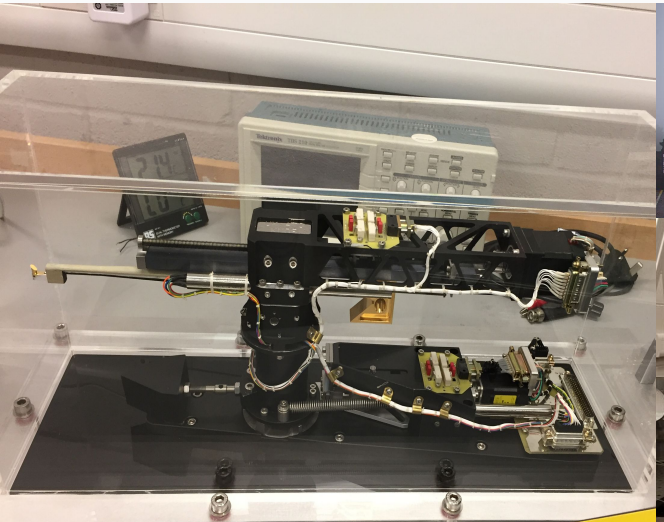
- Competitive public/private career fair
- industry/college internship partnerships (apprenticeship)

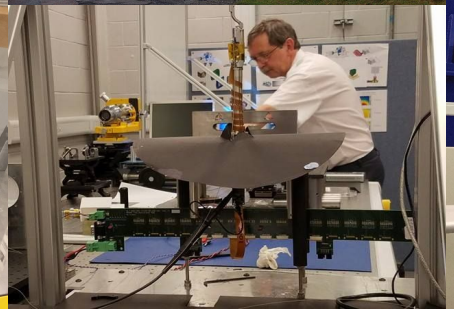
Scottish Universities

Free!

Royal Observatory

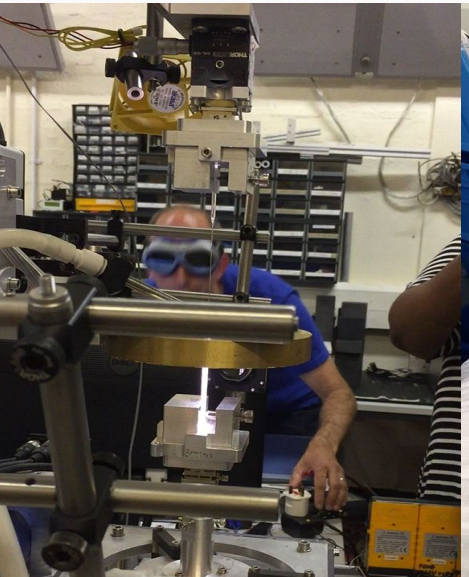
Next generation optical telescope under construction

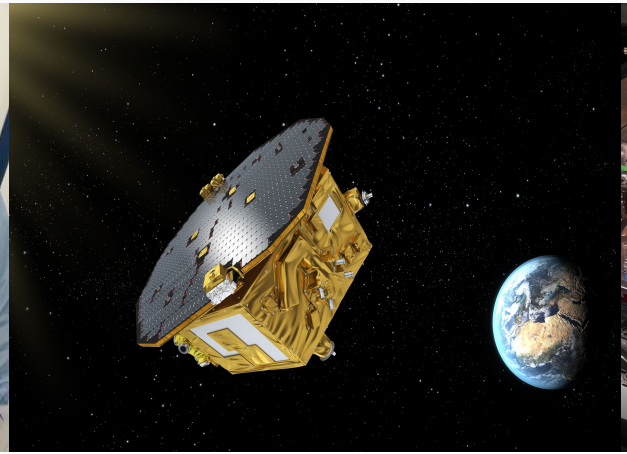


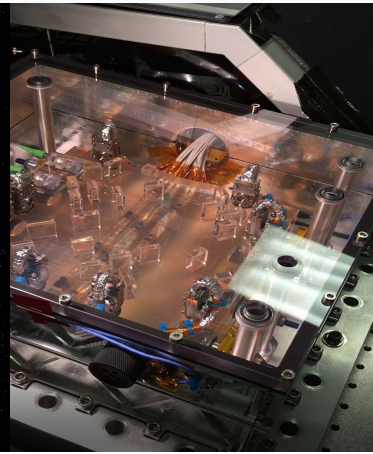


U Glasgow Astrophysics

LIGO components



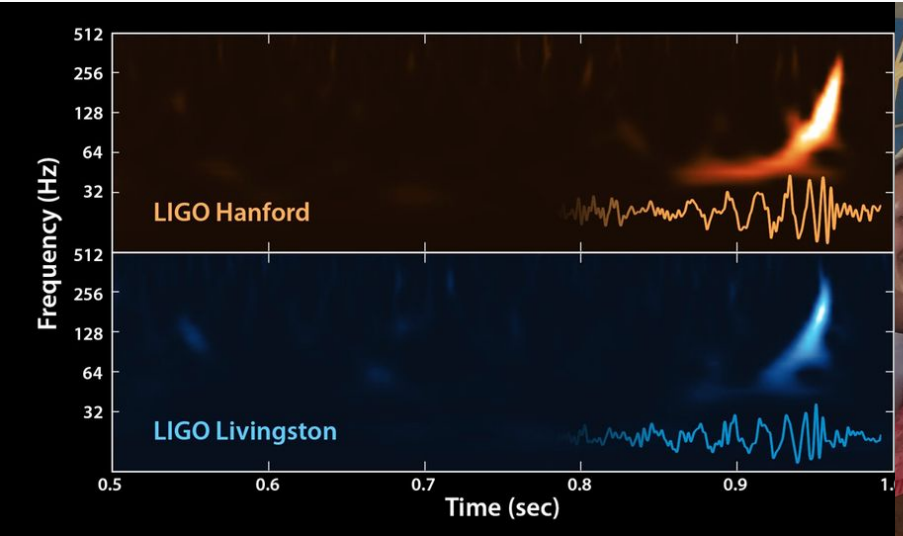


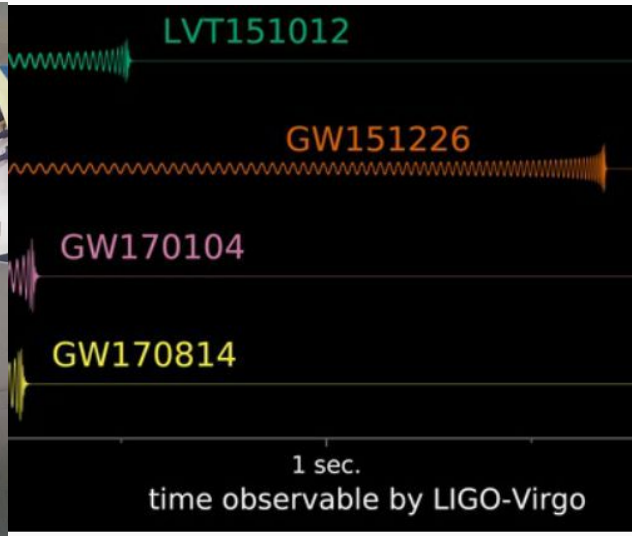


LISA - the Light Interferometer Space Antenna

Classroom impact

The fruits of the work we were immersed in couldn’t be more topical or engaging for students





Thanks

National Science Foundation

Baton Rouge Area Foundation

William Katzman and the team at LIGO Livingston

Dr Martin Hendry and the AstroPhysics group at University of Glasgow

Gregor Steele, SSERC

Drew Burrett, IOP

The Future

Currently recruiting schools for Scotland teachers to visit

Contact: William Katzman, william.katzman@ligo.org 225-686-3134

Interested in going in year 3 (summer 2019, apply in January 2019)

Announced at: https://www.ligo.caltech.edu/LA/page/upcoming-workshops