The Impact of the Fermi Education Program (2001-2015)

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In 2013 NASA announced a change to their long-standing framework for E/PO. Education - to be handled by Agency-selected teams proposed to 2015 CAN-AO.

- K-12 STEM formal
- Informal education
- Higher Education

Communications and Outreach – still the responsibility of individual missions.
Informal Education

• Paper products
  ▪ GLAST/Fermi models – over 9000
  ▪ GLAST/Fermi lithos – over 10,000
  ▪ GLAST/Fermi factsheets – over 10,000
  ▪ GLAST/Fermi card game – over 7000
• Space Mysteries – interactive video games
• After-school clubs, websites, exhibits, and more…
Black Hole Planetarium Show

- Seed funded by GLAST E/PO
- Directed by Tom Lucas
- Narrated by Liam Neeson
- Premiered 1/10/06 at the Denver Museum of Nature & Science
- Seen by > $10^6$ worldwide
- Over 30K FAQs
Epo`s Chronicles

- Weekly from 2008-2013
- Translated into French, Spanish and Italian
- Calendars for 2010 featured IYA “Go Observe” objects
- Calendars for 2011 featured high-energy astrophysics missions including Fermi
- About 1500 calendars distributed in 2010 and 2011
- Read by about 7,000 per month, 80,000 unique IPs per year in 2013
Space Mysteries

• Interactive video games that teach astronomy
• Original 3 mysteries funded by NASA LEARNERS
• Two more mysteries funded by Fermi E/PO
  • Solar Supernova?
  • Galactic Doom?
• Played by over 40K over past 10 years

http://mystery.sonoma.edu
Supernova! Toolkit

- Developed by ASP for NSN of over 200 amateur astro clubs
  - Over 246,000 attendees through 2000 events (through 10/15)
  - Over 39,000 minorities and over 59,000 women/girls

Joint with Swift, XMM and Suzaku

Night Sky Network
Astronomy Clubs bringing the wonders of the universe to the public
IYA 2009

• Epo’s Chronicles Lithos for each month’s “Go Observe” object
• Over 18,000 distributed through NSN
• Traveling exhibit reached over 100K in SF Bay Area

Joint with Swift, XMM-Newton
Elementary & Secondary Education

- Standards-aligned classroom materials
  - Active Galaxy Educator’s Guide & Pop-up
  - Supernova Educator’s Guide
  - Black Hole Resources
  - 3 TOPS guides
    - Far Out Math
    - Scale the Universe
    - Pi in the Sky
- Educator training
  - Educator Ambassadors
  - NASA’s Multi-wavelength Universe online course
Classroom Materials for grades 5-12

• Approved by NASA and in wide distribution:
  - Active Galaxy Educator’s guide > 6000
  - Active Galaxy Pop-up and guide > 3000
  - Supernova Educator’s Guide > 3000
  - TOPS Far Out Math > 3000
  - TOPS Scale the Universe > 5000
  - TOPS Pi in the Sky > 2500

• Additional distribution through downloads (about 10,000 per year for all Fermi guides)
Long-term Fermi EAs
- Jeff Adkins (CA)
- Teena Della (BC)
- Mary Garrett (MI then GA)
- Daryl Taylor (NJ then CT)
- Pam Whiffen (AZ)
- Christine Royce (PA)
- Mandy Frantti (MI)
- Linda Smith (NJ)

Have reached over 37,000 students and teachers through over 375 lectures, mini-courses and workshops

Some may continue…?
Astro4Girls

- Fermi Educator Ambassadors Whiffen, Smith, Della and Frantti
- Partnership with public libraries in under-served regions of the USA

Joint with other Astrophysics missions
Multi-wavelength Universe professional development

- Offered in 2011 and 2012
- About 25 educators each year
- Online course

https://universe.sonoma.edu/cosmo/course/view.php?id=5
Higher Education

- Authentic research experiences through the Global Telescope Network
- ~42 partner institutions
- ~$10^3$ HS and college students have gotten data
- 15 SSU HS summer interns
- >4K observations of > 30 Blazars
- Part of Skynet with UNC Prompt telescopes in Chile

New GORT dome at Pepperwood

http://gtn.sonoma.edu
Big Ideas in Cosmology

- Joint funded by Fermi and EPOESS
- Digital-first, media-rich curriculum for general education college students
- 18 units of material = 2+ semesters of Astronomy
- Informed by pre-conception research
- Specifically designed for hybrid (flipped) or online

http://www.greatriverlearning.com/Cosmology
**NASA Evaluation**

- All Fermi formal and informal products have passed NASA education product review and are listed at [http://nasawavelength.org](http://nasawavelength.org)

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Impact Summary

- Fermi Education programs have:
  - Provided informal materials to $>5 \times 10^4$ students and teachers
  - Provided informal multimedia experiences to audiences $> 10^6$ through websites, planetarium programs, IYA exhibits and more
  - Trained $>3.7 \times 10^4$ teachers to use formal materials through EA program (short-duration evaluated workshops)
  - Trained 50 teachers through NASA’s Multi-wavelength Universe (long-duration academic credit course)
  - Over 300 students using Big Ideas in Cosmology so far
  - Provided formal materials to $\sim 10^5$ teachers via web
  - Involved $> 10^3$ students in authentic STEM research through GTN/ground-based visible light observations
The Future

- SSU is part of NASA’s Universe of Learning team, led by STScI and selected by HQ
- Transition planning during 2016
  - Websites?
  - Paper products?
- Educator Ambassador program may continue
- Emphasis on pre-service teacher training, STEM experiences with URM.s
- Need to ensure Fermi science results are part of the plans going forward
- SSU will continue to support C&O