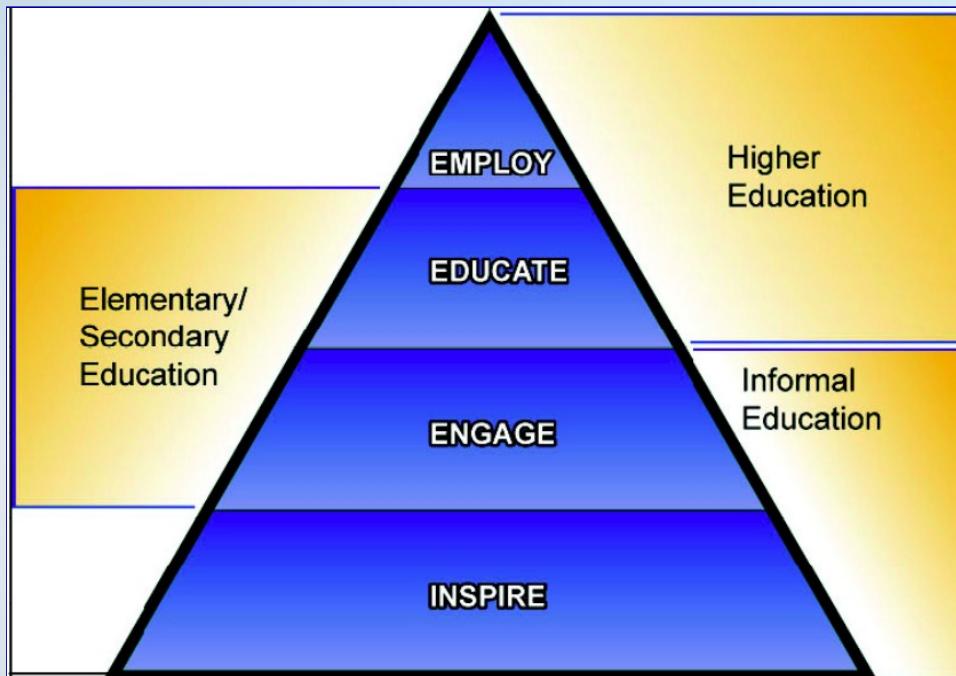




Education and Public Outreach Program Status Fermi User's Group 9/27/08

Prof. Lynn Cominsky
Sonoma State University

NASA Education Framework



- Informal education and public outreach
- Elementary & Secondary education
- Higher Education

Emphasis on workforce development for under-represented populations

Fermi in the MySpace community



"Yippeee! I am in
spaaaaaaaaacccccccccccceeeeeeeeeee!"

Male
22 years old
ROHNERT
PARK,
CALIFORNIA
United States

<http://www.myspace.com/glast>

Fermi now has 281
friends, and a blog

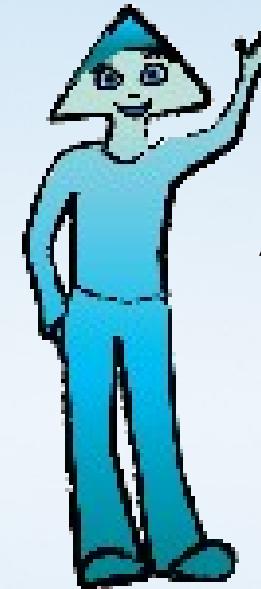
USRA PBS video is
linked via YouTube

French GLAST video also
linked.

And Ritz blog..... And
more!

Epo's Chronicles

- New weekly webcomic – debuted right after Fermi was launched
- Special Fermi renaming “eposode”
- Main story line follows Epo, a sentient spaceship and her humanoid companion Alkina as they search the Universe to discover their origins.
- Now being translated into French, Italian and Spanish

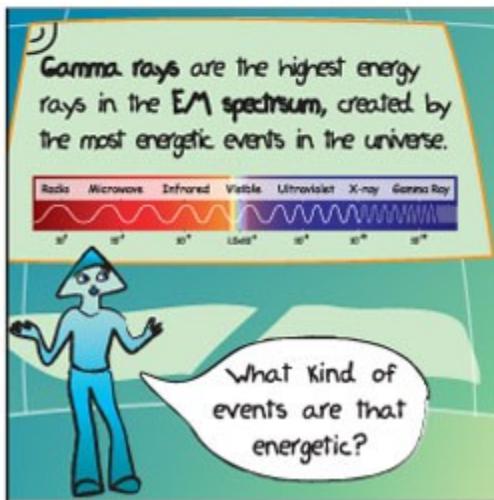
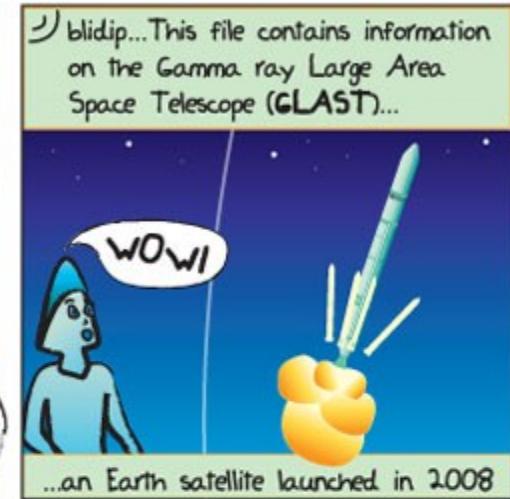
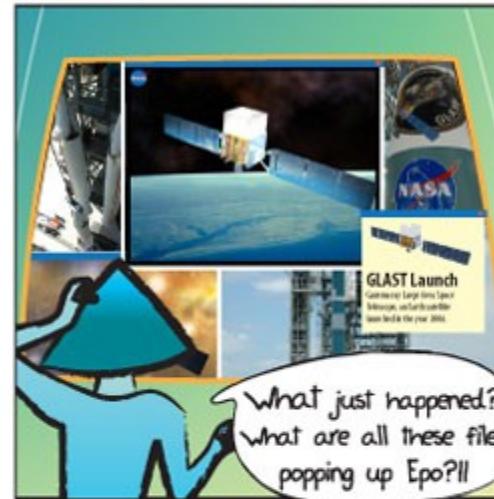


Alkina

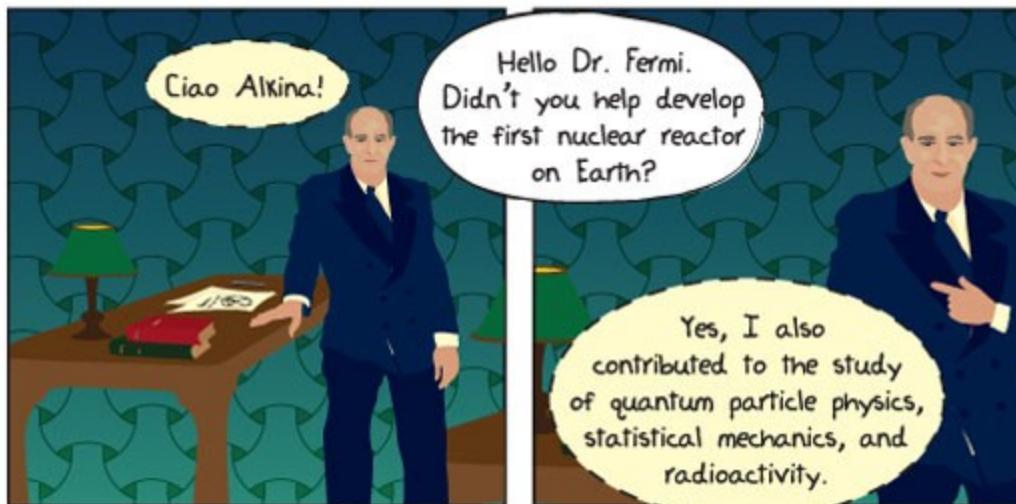
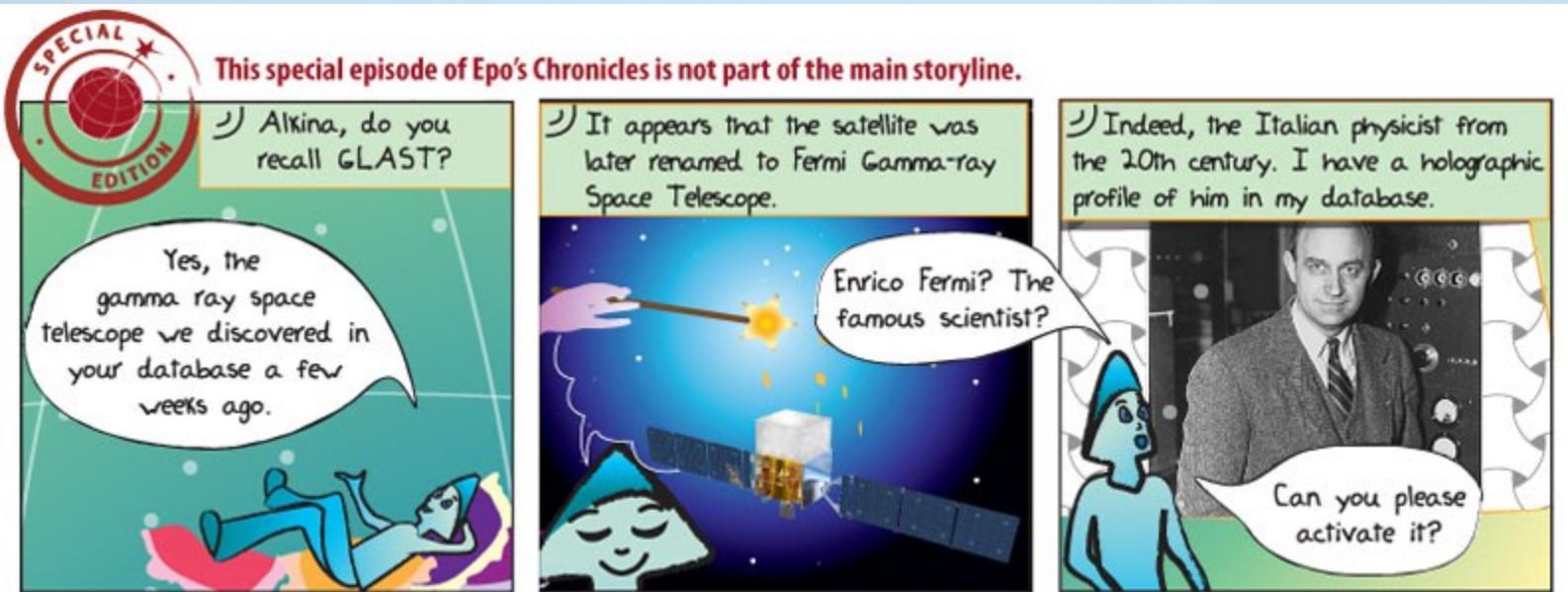


Epo

Epo's Chronicles



Epo's Chronicles





Space Mysteries

- <http://mystery.sonoma.edu>
 - Galactic Doom Space Mystery finally in test phase (again!)



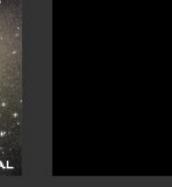


Space Mysteries

- First phase – teaching about galaxy types
 - Matching game

- Click on two squares to reveal galaxies
- Keep clicking until you match up the images
- Once you find a match, the name and type of the galaxy will be revealed.
- You can only click on two at a time, so remember where each one is!
- Once you have matched all the galaxies, click on an image to expand it and study its name and type closely.

[Continue to next step >>](#)

			
CARTWHEEL IRREGULAR/ PECULIAR	NGC 4622 SPIRAL	NGC 205 ELLIPTICAL	NGC 1427A IRREGULAR/ PECULIAR
			
MB2 IRREGULAR/ PECULIAR	NGC 1300 SPIRAL	MB2 IRREGULAR/ PECULIAR	NGC 1300 SPIRAL
			



Space Mysteries

- Second part teaches about active galaxies vs. quiescent galaxies

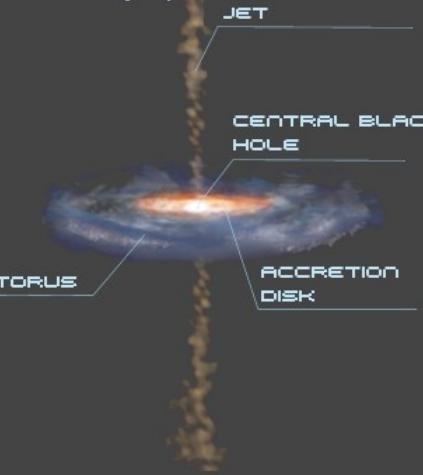
**EPO'S DATABASE
ACTIVE GALAXIES**



Continue

Click on the different regions of the AGN to learn more about its components

At the center of every galaxy a dense core of stars called a 'nucleus' is surrounded by stars and gas. Normally, the core of a disk or elliptical galaxy is small, relatively faint, and composed of older, redder stars. However, in some galaxies the core is intensely bright, shining with power equivalent to trillions of suns, easily outshining the rest of the light of the galaxy combined. A galaxy that emits such tremendous amounts of energy is called an active galaxy.





Space Mysteries

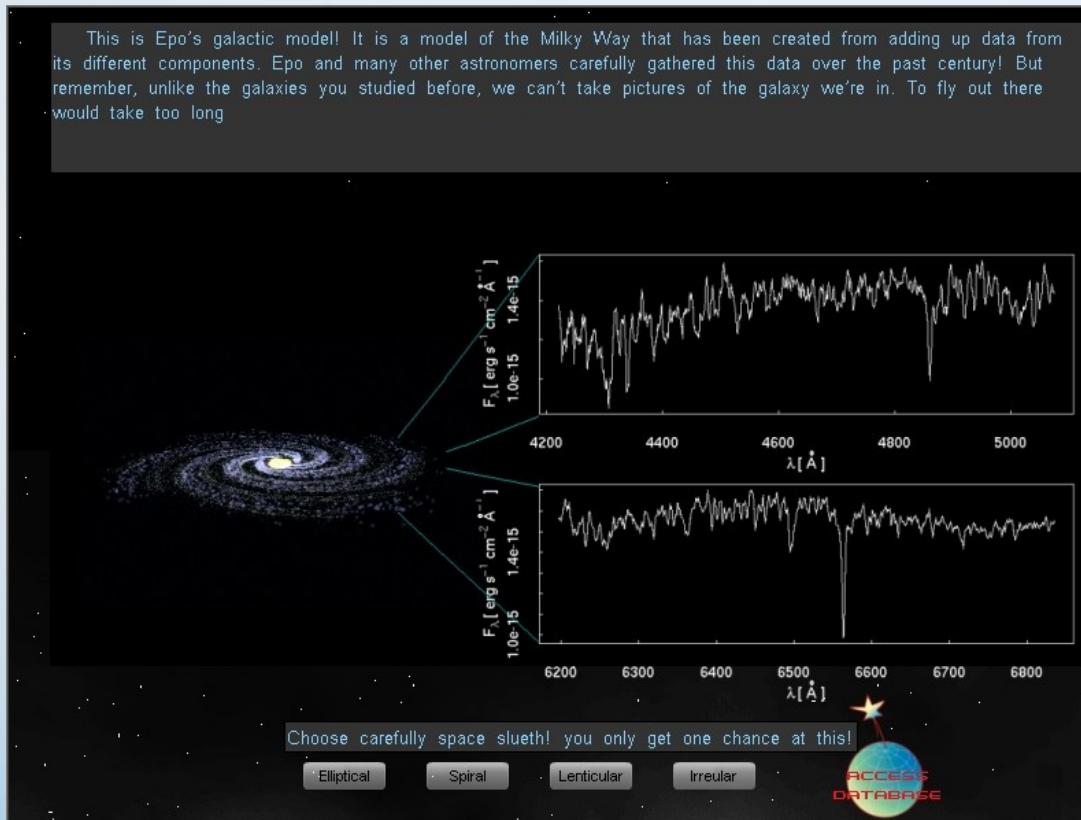
- Third part teaches about spectra and morphology
 - Compare active vs. inactive using real data (visible light but also some x-ray and other wavelengths)





Space Mysteries

- Final part asks student to analyze our galaxy
 - Uses model as if viewed from outside



Are we
doomed?

Night Sky Network Toolkit

- SUPERNOVA!
- Joint with Swift, XMM-Newton and Suzaku
- Developed by Astronomical Society of the Pacific
- Finished in May 2008 – distributed to over 200 clubs



2 AstronomyCast questions shows

- Questions from Farmersburg School and Curtis High School
 - The Sky (2)
 - Optics (2)
 - Light as a Particle (2)
 - Stars and Stellar Evolution (6)
 - Understanding by Starlight (3)
 - Light and Color (1)
 - The Earth's Atmosphere and the Electromagnetic Spectrum (2)
 - Our Sun and Life on the Main Sequence (2)
 - Stellar Evolution II: High mass stars (1)
 - Limits on Maximum Star Size (1)
 - Extragalactic Astronomy and Cosmology (8)
 - Dark Matter (1)
 - Bonus: Black Holes, Redux (6)
 - Blackhole Feeding Habits (2)
 - Blackhole's Mathematical Sibling: The White Hole (2)
 - Detecting Blackholes (1)
 - Human Exploration (3)



<http://astronomycast.com/education>

Pre-Launch Workshops

- Two teacher's workshops at KSC:
- 30 Pre-service teachers – Lynn and Dave Thompson
 - 1 hour – Friday June 6
- 25 In-service teachers – Lynn, Kamal and EAs
 - 3 hours – Saturday June 7
 - Active Galaxy pop-up book – Tasty Active Galaxy activity
 - Active Galaxy Educator's Guide – Paper AG activity
 - GLAST litho - Make your own pulsar activity



Making tasty
active galaxies

Tasty and paper AGs



Pulsar
model

Supernova Educator Unit – with XMM

- 3 activities in guide
 - Fishing for Supernovae
 - Crawl of the Crab
 - Magnetic Poles and Pulsars
- + **Science literacy activity**
 - Two news articles from XMM
 - Compare measurements of pulsar magnetic fields



Approved by NASA Product Review – July 2008

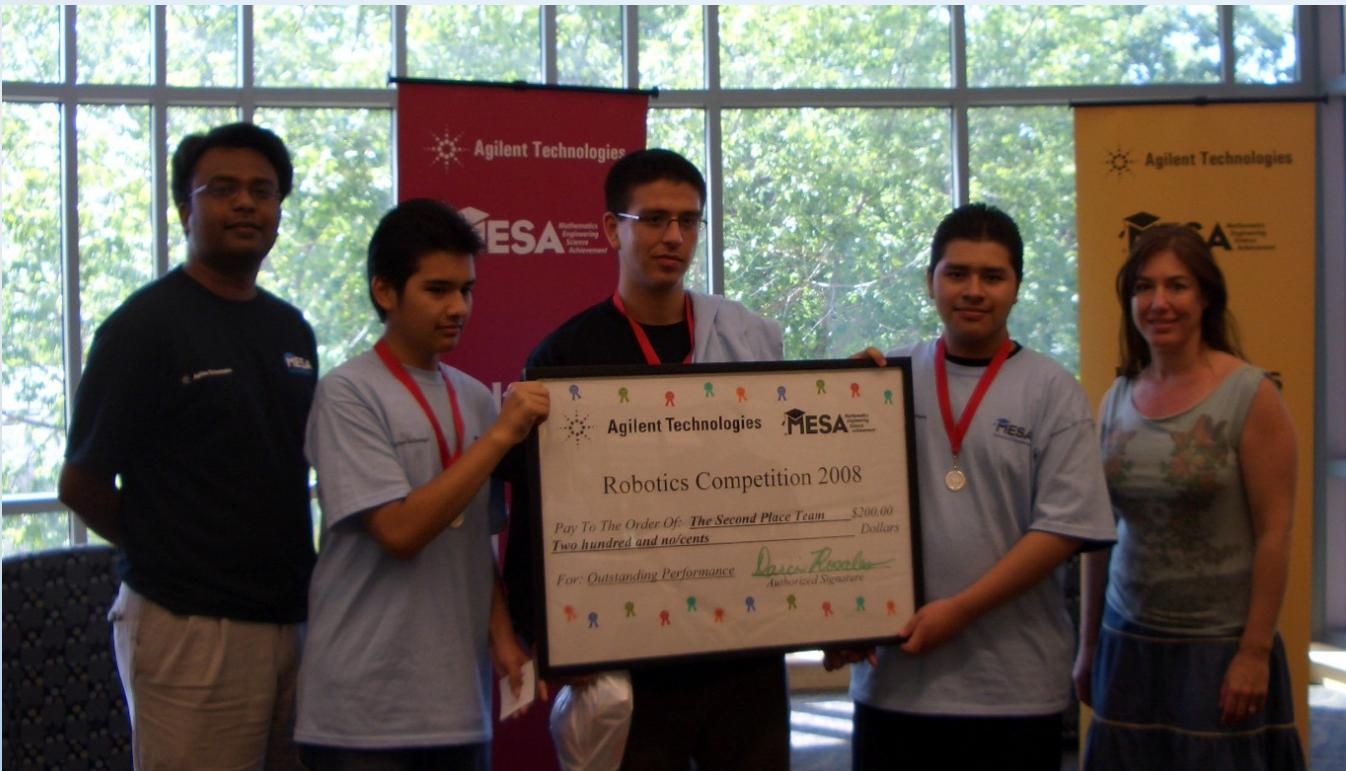
Educator Ambassador Training 2008

- July 28 - August 1, 2008 at SSU
- Focus was on 2-day “Dark Universe” mini-course and “EA Share-a-Thon”



After-school programs

- Roseland University Prep
 - Robotics competition – 2nd place
 - Summer Program – 2nd year



After-school programs

- Cali Calmecac afterschool program in year 2



Kevin John with 4-6 graders

Jessica Olivera with 1-3 graders



RUP Summer Experience 2008



29 out of 65 graduates from May 2008 are now enrolled at SSU!

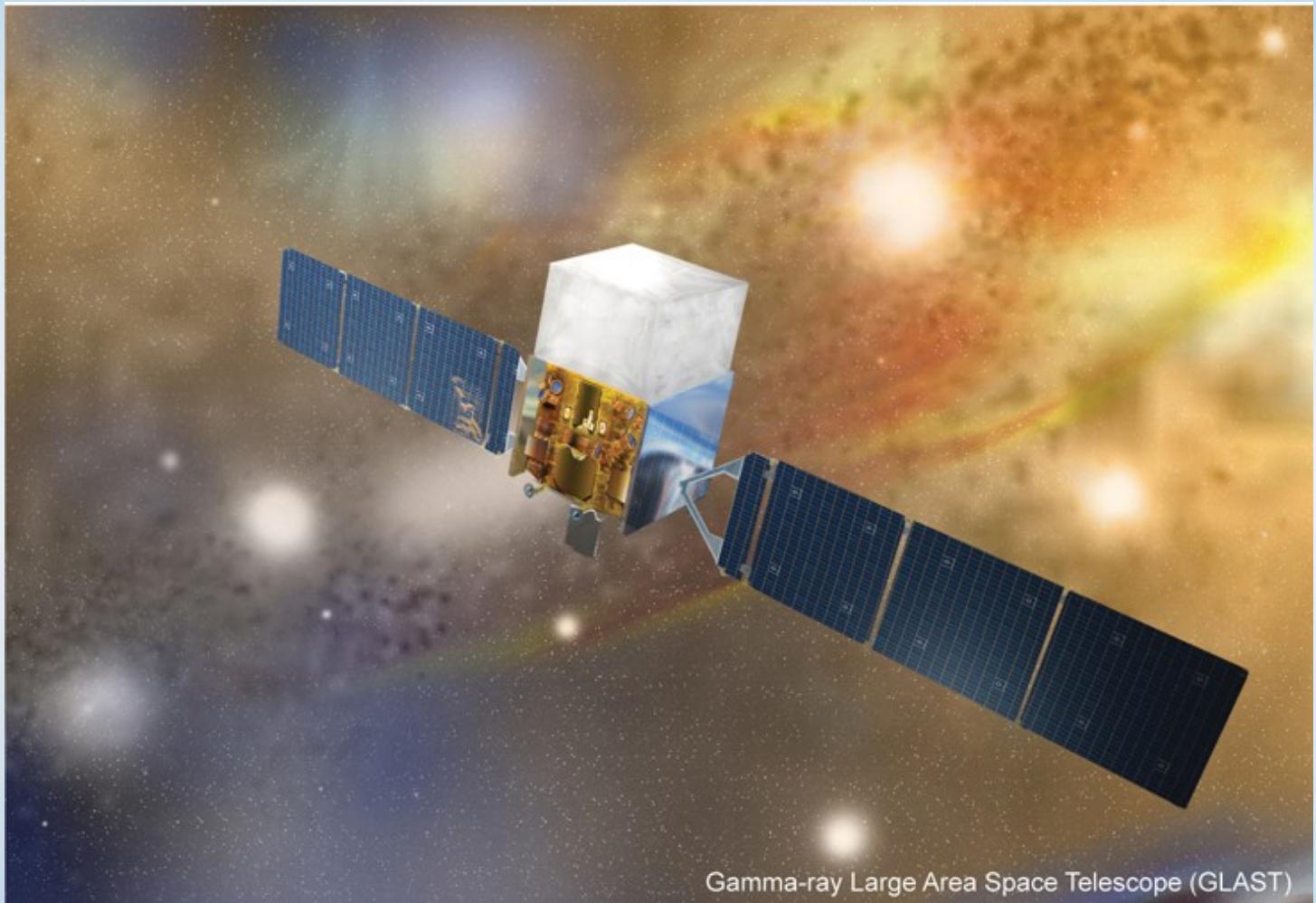
Global Telescope Network 8/08

- New website now online
- 23 Member Institutions
- Jeff Adkins at Deer Valley High School had AAS paper on GTN object with Spitzer data (too)
 - Dr. Kim Coble at Chicago State University has been testing our activities and had two students working with GTN data who gave talks in Chicago
 - We have extensive photometric data on 3C454.3 campaign and also BL Lac campaign





GLAST Litho



Gamma-ray Large Area Space Telescope (GLAST)

Approved by NASA Product Review, distributed at launch

GLAST Launch Materials

- GLAST launch factsheet – approved by NASA product review, distributed at launch
- GLAST public brochure – revised for launch

Gamma Ray Origins?

At the core of GLAST's mission is finding out what gives birth to the diverse spectrum of gamma rays. There are many intriguing possibilities including active galaxies, blazars, gamma-ray bursts, and neutron stars.

Gamma rays permeate the cosmos. They are emitted from objects as nearby as our own Sun and Milky Way Galaxy to those as far away as tremendous explosions in the early universe. GLAST, NASA's new gamma-ray observatory, will look for answers to the extreme universe. With a huge leap in all key capabilities, GLAST will enable scientists to answer complicated and perplexing questions related to supermassive black-hole systems, gamma-ray bursts, pulsars and the origins of cosmic rays. GLAST will also uncover new sources of gamma rays and will enable searches for signals of new physics.

NASA's GLAST mission is an astrophysics and particle physics partnership, developed in collaboration with the U.S. Department of Energy along with important contributions from academic institutions, laboratories and partners in France, Germany, Italy, Japan, Sweden and the United States.



Active Galaxies and Blazars – An active galaxy is a galaxy with a supermassive black hole at its center that is rapidly accreting energy radiation from the swirling disk of matter falling into them. Some of these black holes also eject streams of matter thousands of lightyears at very nearly the speed of light. Blazars are thought to be Active Galaxies whose jets happen to be pointing straight towards us. When this happens, we see gamma rays associated with the jets.

Anatomy of a Space Telescope

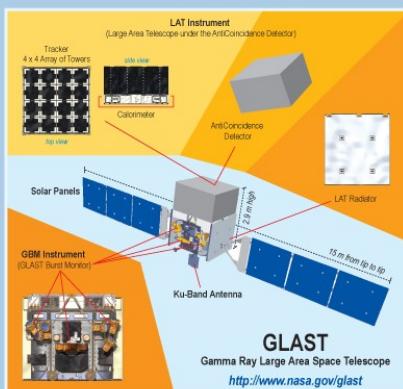
Large Area Telescope (LAT)

The Large Area Telescope, the observatory's primary instrument, will see an enormous 20 percent of the sky at any given time, and will detect the arrival time, and direction of gamma rays broadly ranging in 20 MeV (20 million electron volts) to 300 GeV (300 billion electron volts). The LAT's field-of-view is four times that of its predecessor instrument, EGRET, which operated on board the Compton Gamma-Ray Observatory (CGRO) from 1991-2000. The sensitivity of the LAT is approximately 30 or more times that of EGRET depending on energy.

GLAST Burst Monitor (GBM)

Gamma-ray bursts (GRBs) are elusive and short-lived. Although they are the most energetic explosions in the universe, it is challenging to catch them even with a telescope with as large a field-of-view as the LAT. The GLAST Burst Monitor will be able to provide all-sky coverage with an array of 12 low and 2 medium-energy gamma-ray detectors pointing in different directions from the spacecraft. These detectors will track the direction and time histories of GRBs and other rapidly flaring gamma-ray sources. The GLAST Burst Monitor will detect approximately 200 GRBs each year, as well as solar flares, and other short-lived, high-energy cosmic events.

GLAST
Gamma Ray Large Area Space Telescope
<http://www.nasa.gov/glast>



Dark Matter

Dark Matter – The origins of dark matter, specifically the matter that makes up 22 percent of the universe, remains a mystery. Dark matter is made up of hypothetical particles called WIMPs (Weakly Interacting Massive Particles), as many scientists theorize, then interactions of these WIMPs may produce gamma rays detectable by GLAST's Large Area Telescope. If so, GLAST could provide scientists with data that shed critical new light on the mystery of dark matter.

Unidentified Sources – It is likely there are many more types of gamma-ray sources among those presently unidentified and those to be discovered by GLAST. The superior angular resolution of GLAST's Large Area Telescope should help unveil the nature of these mystery sources, providing new understanding of the origin of their gamma rays and possible new laws of physics.

Cosmic Rays and Superova Remnants

Cosmic Rays – Cosmic rays are atomic particles that are accelerated to very near the speed of light by mechanisms that are still a mystery. One theory suggests that these particles are accelerated by the shockwaves of supernovae. The LAT will be searching for the gamma-ray signature of this acceleration.



Neutron Stars – When the core of a massive star undergoes gravitational collapse, it forms a very dense object known as a neutron star. These objects have densities on the order of 10^{13} kg/m³. [Imagine condensing Mt. Everest down to the size of a sugar cube.] With magnetic fields trillions of times that of Earth, these objects work like high-energy particle accelerators, expelling jets of gamma rays which rotate through our line of sight, producing pulsations that we can observe. Other neutron stars – the so-called magnetars – may possess even stronger magnetic fields. Magnetar quakes can unleash tremendous flares of gamma rays.



Cosmic Rays and Superova Remnants – Cosmic rays are atomic particles that are accelerated to very near the speed of light by mechanisms that are still a mystery. One theory suggests that these particles are accelerated by the shockwaves of supernovae. The LAT will be searching for the gamma-ray signature of this acceleration.

Post-launch E/PO Plans

- Increased emphasis on GTN, after-school programs and the pipeline
- Continue teacher workshops
- Update all materials
- New litho set featuring first sky map and discoveries for each type of object
- Cosmology on-line course
 - Needs additional funding (two proposals have been submitted)
 - Has publisher support (Kendall-Hunt)
- International Year of Astronomy (2009)
 - NASA coordinated activities
- Fermi data into WWT (tours), Google Earth



PR Update

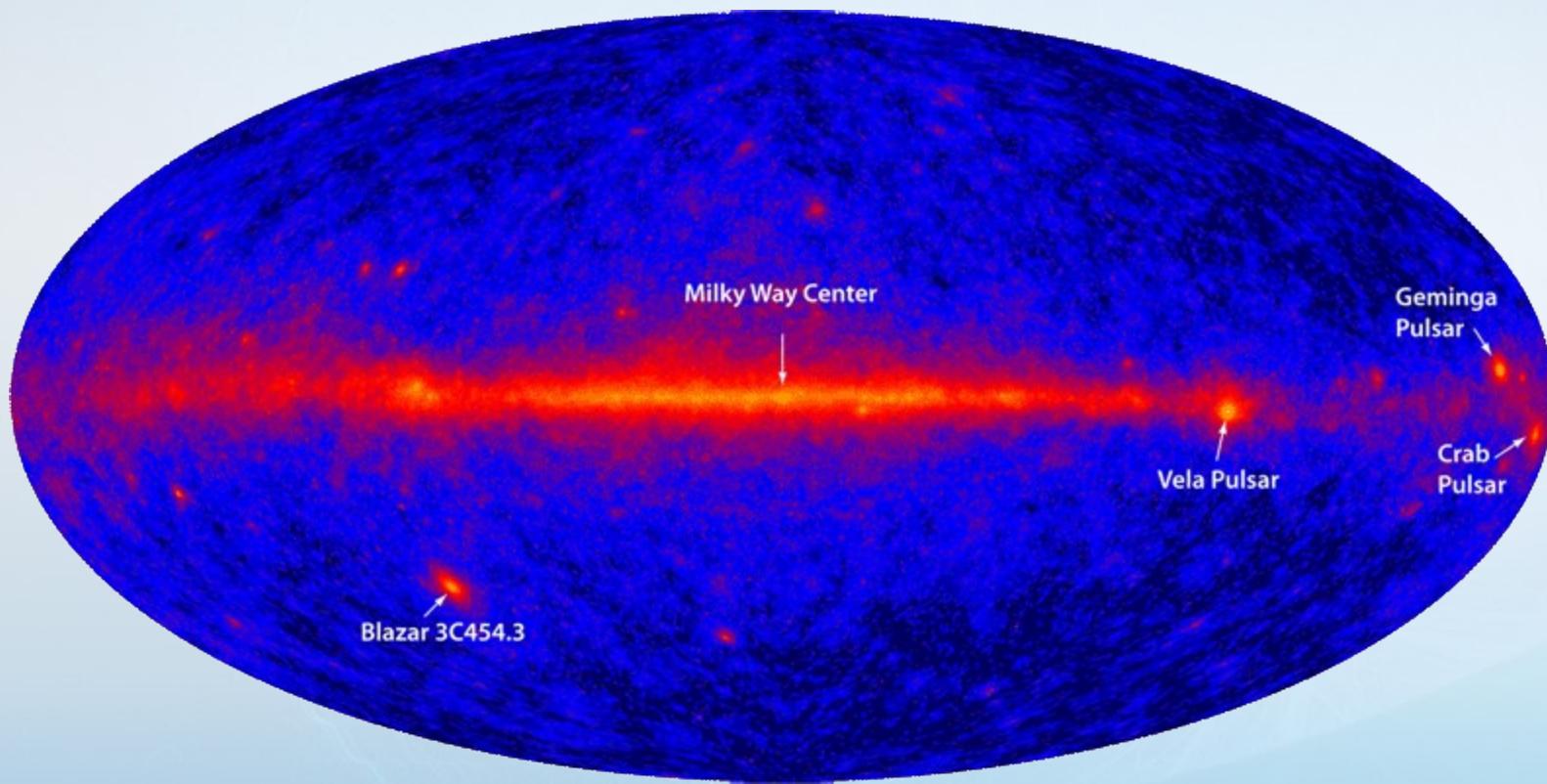
- At KSC:
 - Pre-launch briefings
 - Rob Gutro and LRC staffed the press room, answering questions from reporters, and writing launch delay reports.
 - LRC did stand ups with local TV crews on launch day
- New science writer at GSFC – Francis (Frank) Reddy, who is now running bi-weekly PR telecons and writing release drafts

Scene at the “Press Site” near KSC



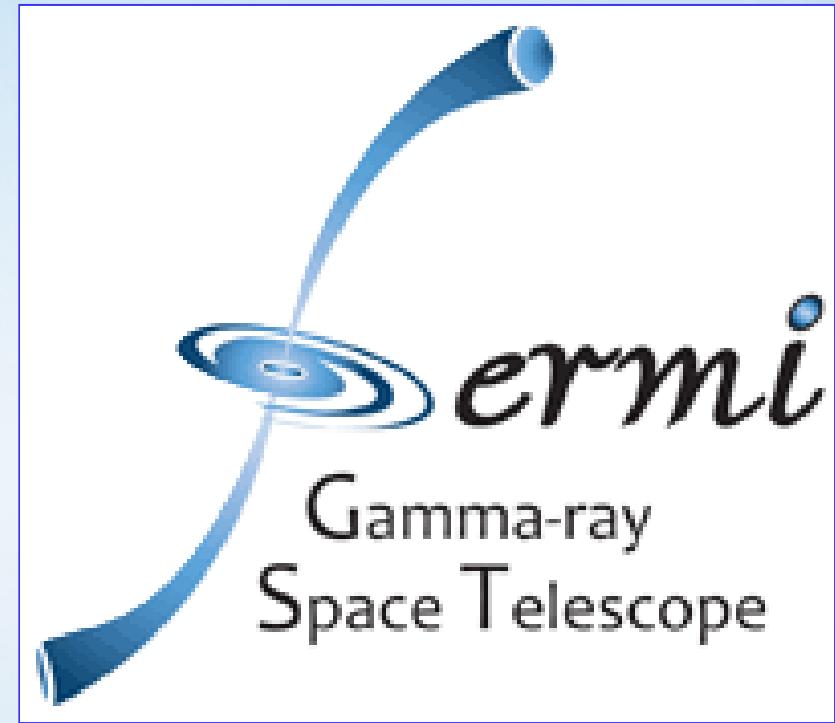
PR Update

- First Light Telecon 8/26/08
 - 16 reporters called in, many stories resulted



GLAST Renaming

- Announced in first light telecon
- E-mails sent to over 8000 suggestors with new name and info
- Web sites being changed (slowly....)



Logo by Aurore Simonnet

Press Release: NASA Renames Observatory for Fermi, Reveals Entire Gamma-Ray Sky



Press Releases from HQ or GSFC since March 3, 2008

- GLAST Spacecraft Arrives in Florida to Prepare for Launchh
3/4/08
- NASA's GLAST Satellite gets Twin Solar Panels in Prep for
Launch 3/31/08
- NASA Selects Three Research Fellows for GLAST Mission
4/7/08
- GLAST has Eyes for Gamma Rays 4/8/08
- NASA Opens GLAST Monitor Center 4/9/08
- GLAST Rocket Coming Together 4/14/08
- Powerful Antenna Attached to NASA's GLAST Satellite
4/21/08

Press Releases from HQ or GSFC since March 3, 2008

- NASA's GLAST Gets Shades, Blankets for the Beach
5/13/08
- Excitement Builds as GLAST Readies Its Gamma-ray Vision! 5/30/08
- GLAST is Ready to Go! 6/10/08
- GLAST Successfully Launched 6/11/08
- GLAST Safely in Orbit, Getting Check-ups 6/18/08
- GLAST Mission Operations at NASA Goddard Powered Up
7/2/08
- GLAST Team Fine-Tuning Instrument and Operations
7/28/08

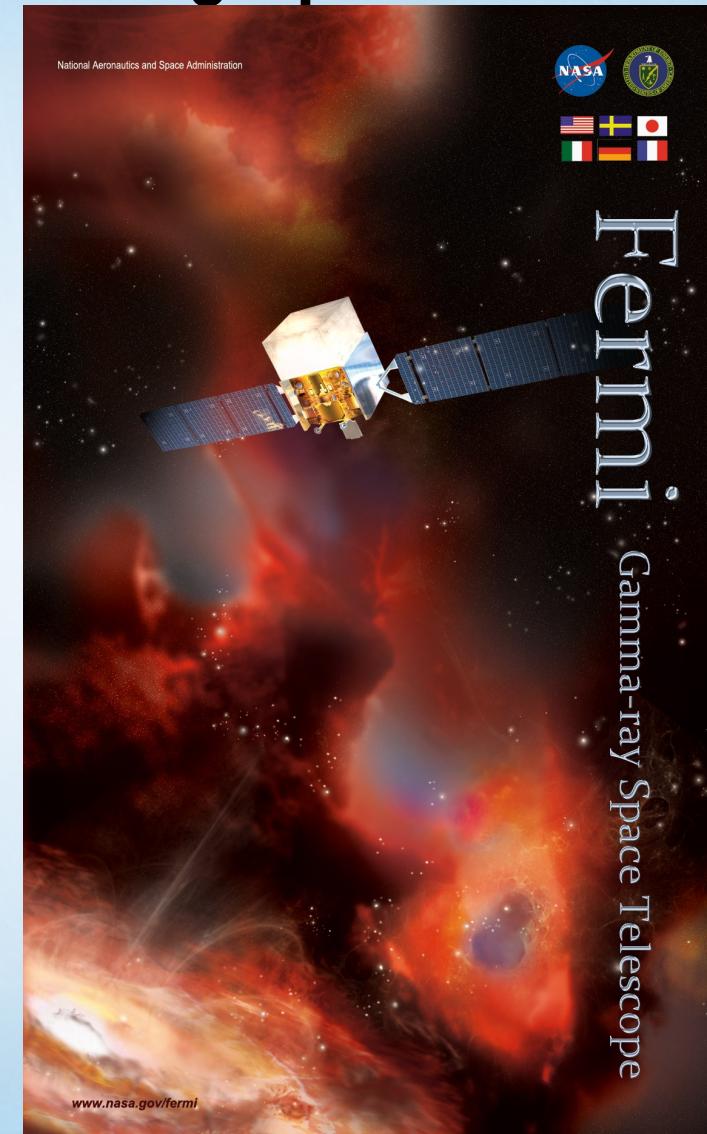


New Exhibit Booth graphic

- May debut at Huntsville GRB Meeting



Plus new
giveaway!



PR and E/PO Summary

- Emphasis post-launch will be on widening our scope from active galaxies, supernovae, pulsars and GRBs to include cosmology (especially dark matter)
- Increased coordination with other NASA E/PO programs, especially for IYA
- Increased penetration into the Web 2.0 world using Fermi data – WWT, Google Earth, IYA activities