

Planetary Wonderings
September Focus: GLAST/Fermi
By Mary-Frances Bartels, NASA Solar System Ambassador

Those who subscribe to NASA's Science News list (for subscription information see <http://science.nasa.gov/news/subscribe.asp>) recently read of NASA's newest space telescope, GLAST. The acronym stands for Gamma-ray Large Area Space Telescope. Launched on June 11, it was very recently rechristened the Fermi Gamma-ray Space Telescope in honor of the pioneer in high-energy physics. Enrico Fermi was the first person to suggest how cosmic particles could be accelerated to high speeds. His theory provides the foundation for understanding the new phenomena scientists hope this telescope will discover. Its mission is planned to last five years with a goal of ten years. The telescope is an international and multi-agency partnership with NASA, the U.S. Department of Energy, and agencies and institutions in France, Germany, Italy, Japan, and Sweden as well as other institutions in the U.S.

As its name implies, Fermi will study gamma rays. What are gamma rays? To understand gamma rays, one must first comprehend the electromagnetic spectrum. The spectrum consists of different kinds of light, or radiation, from long wavelength radio waves, through microwaves, infrared, visible light, ultraviolet, x-ray, and, finally tiny wavelength gamma rays. The smaller the wavelength, the more energetic the radiation is. Thus, gamma rays are the most energetic type of radiation in existence. Typical gamma rays seen by Fermi have a billion times as much energy as the visible light photons. It is believed that gamma rays are created when cosmic ray particles, energetic charged particles from space, collide with gas molecules, or atoms between the stars.

Why study gamma rays? Studying gamma rays will help scientists learn about the most energetic processes in the universe, which come from things that are the most exotic objects in the universe. Also, gamma rays from space can affect life on earth. While most gamma rays cannot penetrate Earth's atmosphere, a large gamma ray burst aimed "just right" could significantly damage the atmosphere, causing a mass extinction event.

What are the "exotic things" of the universe? These include pulsars, blazars (special kind of quasar), supernovas, black holes, unknown objects, and possibly, dark matter particles. NASA scientists expect Fermi will discover many new pulsars, reveal powerful processes near supermassive black holes at the cores of thousands of galaxies, and enable a search for signs of new physical laws.

How can students explore gamma rays? Sonoma State University in cooperation with NASA has a number of opportunities for students of all ages as well as amateur astronomers, or anyone interested in studying gamma rays.

- The most serious of students can join the Global Telescope Network (gtn.sonoma.edu). The GTN is an informal association of scientists, students, individuals and observatories interested in supporting NASA's Fermi, Swift, and XMM-Newton missions by making and analysing ground-based observations for objects related to the science of these missions.

- Check out Sonoma State’s Education and Public Outreach website at <http://epo.sonoma.edu/projects.php> . Especially, visit Gamma-ray Burst Real-time Sky Map, Space Mysteries, and Epo’s Chronicles near the bottom of the page. This site also includes downloadable classroom material.
- Play the Gamma Ray Burst Lottery Game at http://swift.sonoma.edu/grb_lotto/index.php. Guess where the next gamma-ray burst will be. There is a prize for the closest guess.

Find out where Fermi is now at <http://www.n2yo.com/?s=33053> !

Resource of the Month: <http://www.astrocappella.com/> AstroCappella is a project that joins astronomy and music. It was developed by astronomers and educators, and professionally recorded by the rocking *a cappella* group The Chromatics. Not only does AstroCapella have scientifically accurate songs, but each song has a group of classroom activities related to the song’s topic. Some of the songs and activities are available free for download.

Activity of the Month: Make an edible galaxy model, complete with a black hole, which is one source of gamma rays. All you need is a bagel, chocolate frosting, doughnut hole, and two ice cream cones. Check out <http://glast.sonoma.edu/teachers/agn/popup/tastyagnlitho06a.pdf> for instructions.

Suggestions, questions, and comments about “Planetary Wonderings” are welcomed and may be directed to stargazer @ keeplookingup.net (remove spaces). Past columns may be found at www.keeplookingup.net (click on “Planetary Wonderings” on the right side of opening screen) and at <http://www.freelists.org/archives/astronomyed/> (columns from Jan. 2007 to the present).

Remember to *keep looking up!*

Sources (not previously mentioned in article):

http://science.nasa.gov/headlines/y2008/26aug_firstlight.htm?list116241

<http://fermi.gsfc.nasa.gov/>

GLAST training for NASA Solar System Ambassadors, July 2008

http://www.space.com/scienceastronomy/astronomy/gammaray_bursts_010522-1.html

<http://www.space.com/scienceastronomy/080310-mm-grb-us.html>

<http://www.newscientist.com/article.ns?id=mg18725104.400>