

Swift: Catching Gamma Ray Bursts on the Fly

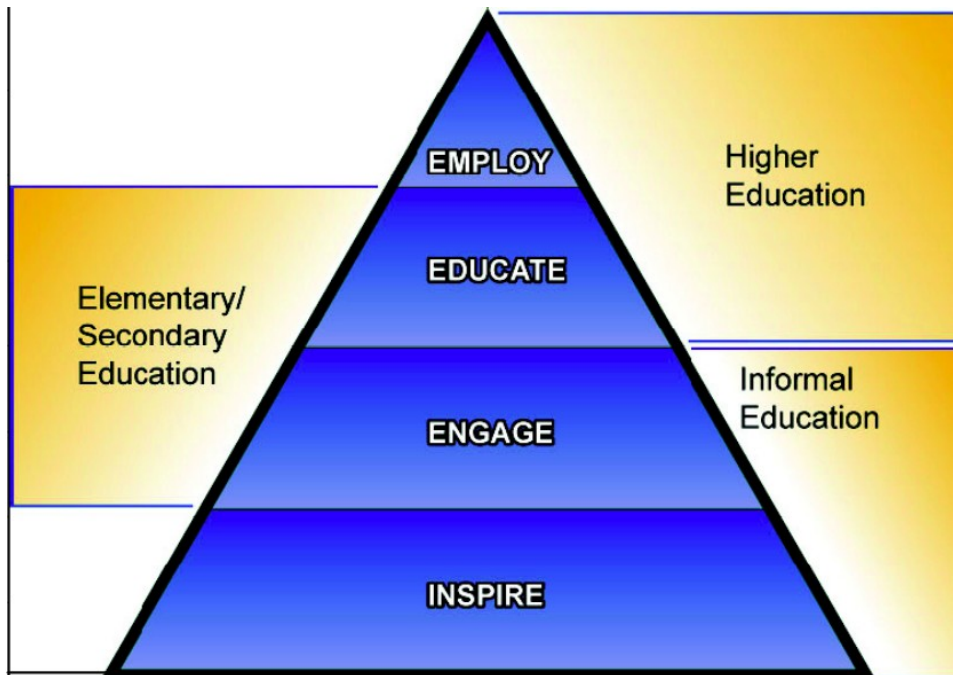
# **Ten years of Swift Education and Public Outreach**

Lynn Cominsky  
Sonoma State University

November 18, 2009




# NASA Education Framework



- **Released in 2008**

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

- **Emphasis on workforce development for under-represented populations**

A composite image showing the Swift satellite in space on the left and a bright gamma-ray burst with radiating lines in the center.

Swift: Catching Gamma Ray Bursts on the Fly

A person in a white lab coat looking through a telescope, with a starry background.

XRT  
BAT  
UVOT

# Informal and Public Outreach

- Multi-media experiences
- Popular websites
- High-leverage activities conducted by the *Night Sky Network* of amateur astronomers

A banner for the Night Sky Network featuring a starry sky background and silhouettes of people looking through a telescope.

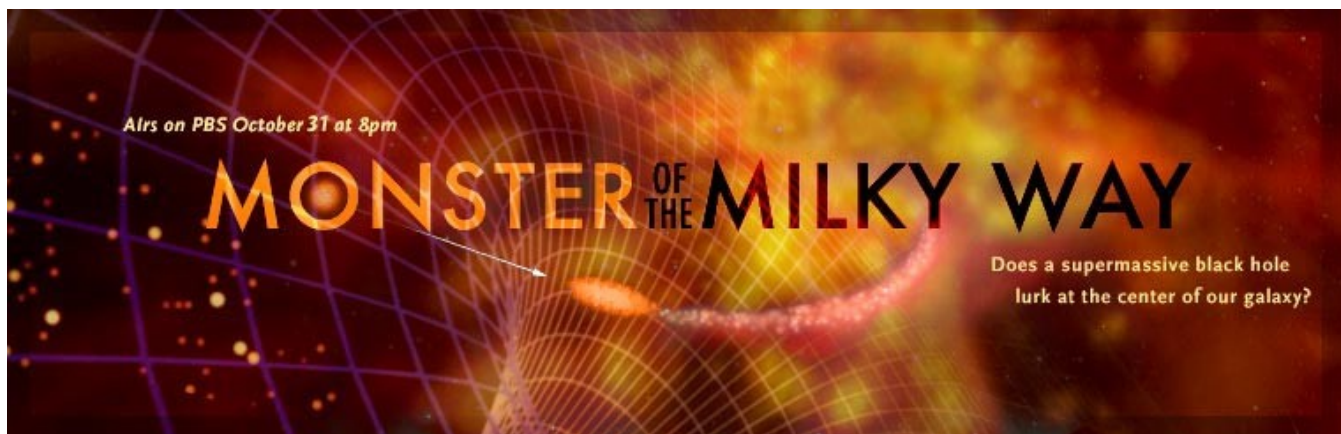
**Night Sky Network**

Astronomy Clubs bringing the wonders of the universe to the public



# Multi-Media Experiences

- Black Holes: The Other Side of Infinity – *now at the Goddard GeoDome!*
  - Features Swift launch and animation
- Also PBS NOVA show features Swift
- <http://www.pbs.org/wgbh/nova/blackhole>





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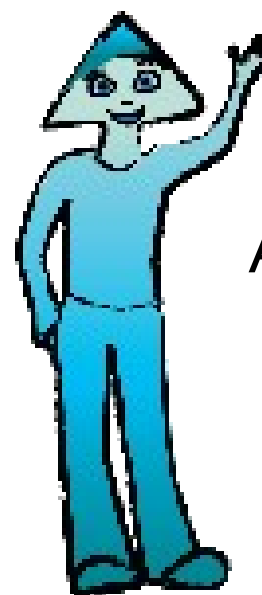
## Swift Websites

- E/PO site: <http://swift.sonoma.edu>
- *GRB SkyMap*: <http://grb.sonoma.edu>
  - All bursts since August 2004
- MySpace:  
<http://myspace.com/swiftsatellite>
  - 219 friends
  - Blog with current events
- Facebook (must be a member to view, 646)
- Swift Newsletter: Eleventh issue now online
  - Science news, mission report, E/PO news and



## Epo's Chronicles

- Continues weekly
- Translated into French, Spanish and Italian
- Special “episodes” for IYA that feature NASA’s monthly “go-observe” objects.
- Lithos with IYA episodes distributed to Night Sky Network clubs
- Over 10,000 lithos sent out to date



Alkina



Epo

## Swift: Catching Gamma Ray Bursts on the Fly

# Swift Special “Eposode”



This special episode of Epo's Chronicles is not part of the main storyline.

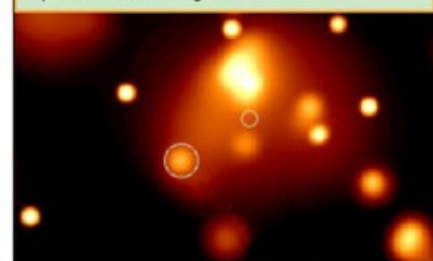
⌋ Gathering data on a supernova in progress.



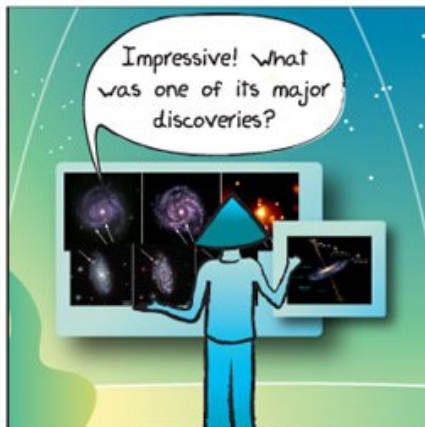
⌋ Swift was a gamma-ray detecting space telescope launched in 2004.



⌋ It was designed to rapidly and precisely determine the locations of gamma-ray bursts and observe their afterglows at X-ray, ultraviolet, and optical wavelengths.



Impressive! What was one of its major discoveries?



⌋ Astronomer Alicia Soderberg and her team, using the Swift satellite, were the first to observe a star in the act of exploding.



Wow, it must have been very exciting to be the first ones to see such an event!






# 365 Days of Astronomy

- Epo's Chronicles podcast featuring Alkina, Epo and a special IYA-inspired "guest"
- Episode aired on 9/16/09



<http://365daysofastronomy.org/>





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# IYA Activities with other Missions

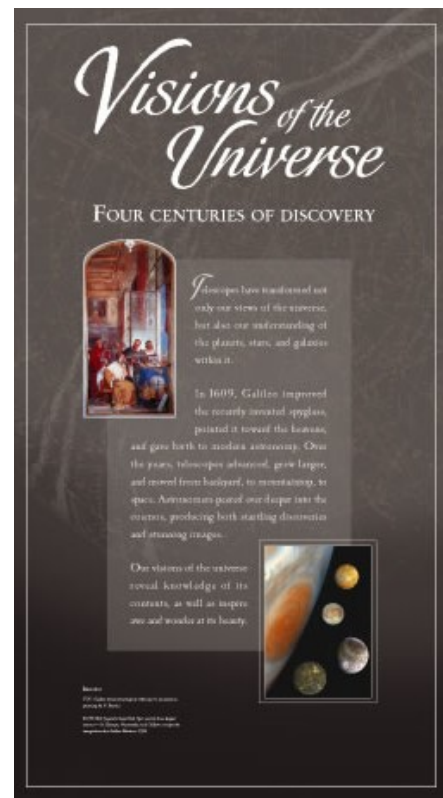
- From Earth to the Universe – SSU created a small traveling exhibit that is roaming the SF Bay Area




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# IYA Activities with other Missions

- Visions of the Universe is a Library exhibit that is being supported by the Educator Ambassadors who are doing workshops in mostly rural locations








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XRT  
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# Supernova! Toolkit

- NSN: Over 200 clubs nation-wide
- Joint project with Suzaku, GLAST and XMM-Newton, developed by Astronomical Society of the Pacific

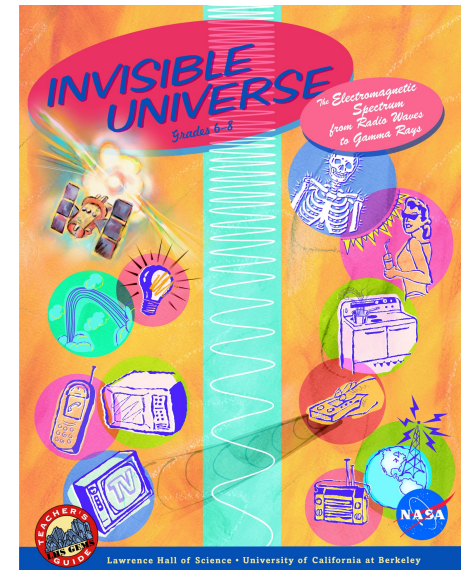




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# Elementary & Secondary Education

- Standards-aligned classroom materials
  - GEMS Guide: Invisible Universe
  - GRB Educator's Guide
  - Newton's Laws Poster Set
  - Swift Eyes Through Time
- Educator Ambassadors
- After-School Programs

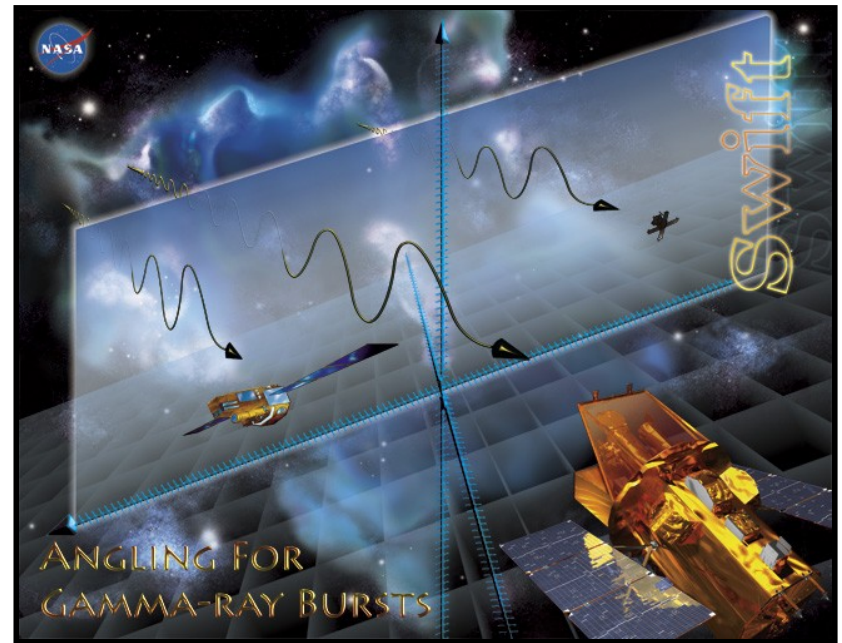






# Classroom Materials for grades 7-12

- Approved by NASA and in wide distribution:
  - *GEMS Guide* – *needs updating*
  - GRB Educator's Guide
  - Newton's Laws Poster Set



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# Newton's Laws

- Reordered – over 4000 sets distributed to date







# Newton's Laws

- Satellite Educator's Association meeting workshop



20 different stations



Which law?



# Penn State E/PO: Swift Eyes through Time

- Six 5-minute video segments on a DVD, each with activity – some from WITN?
- Focus is process of Science
  - Earth, the Universe and Culture
  - Theories
  - Accidental Discoveries
  - The Relationship Between Science and Technology
  - Looking Back in Time
  - Creativity in Science
- *Now approved by NASA Product Review*



<http://www.wpsu.org/swift/>





# Educator Ambassadors Program

- Swift supports 5 EAs
  - Rob Sparks (Arizona)
  - Rae McEntyre (Kentucky)
  - Bruce Hemp (Virginia)
  - Janet Moore (Illinois)
  - David Beier (Missouri)
- Have reached over 9000 students and teachers through over 190 lectures, mini-courses and workshops
- Next EA training: July 26- 30, 2010 at SSU





# After-School Programs with Under-represented students

- **Roseland University Prep**
  - 30 RUP grads now at SSU
  - >90% Hispanic, low-income
  - After-school club since 2005
- **MESA Schools Program**
  - After-school clubs for 1-3 and 4-6 grades
- **MESA Engineering Program**
  - Now established at SSU
  - Hosted robotics conference in May 2009



Logan Hill w 4<sup>th</sup> thru 6<sup>th</sup> graders at Cali Calmecac



RUP students at MESA day



## Higher Education

- Authentic research experiences with high-school and college students through the Global Telescope Network
- 29 partner institutions
- “The Global Telescope Network,” K. McLin, G. Spear & Cominsky, in *EPO and a Changing World: Creating Linkages and Expanding Partnerships ASP Conference Series, Vol. 389*
- “Undergraduate Research Experiences with the Global Telescope Network,” K. McLin, K. Wyman, N. Broughton, K. Coble, & L.R. Cominsky, *Bulletin of the American Astronomical Society*, 2009AAS...21346102M



<http://gtm.sonoma.edu> –  
*now NASA approved!*

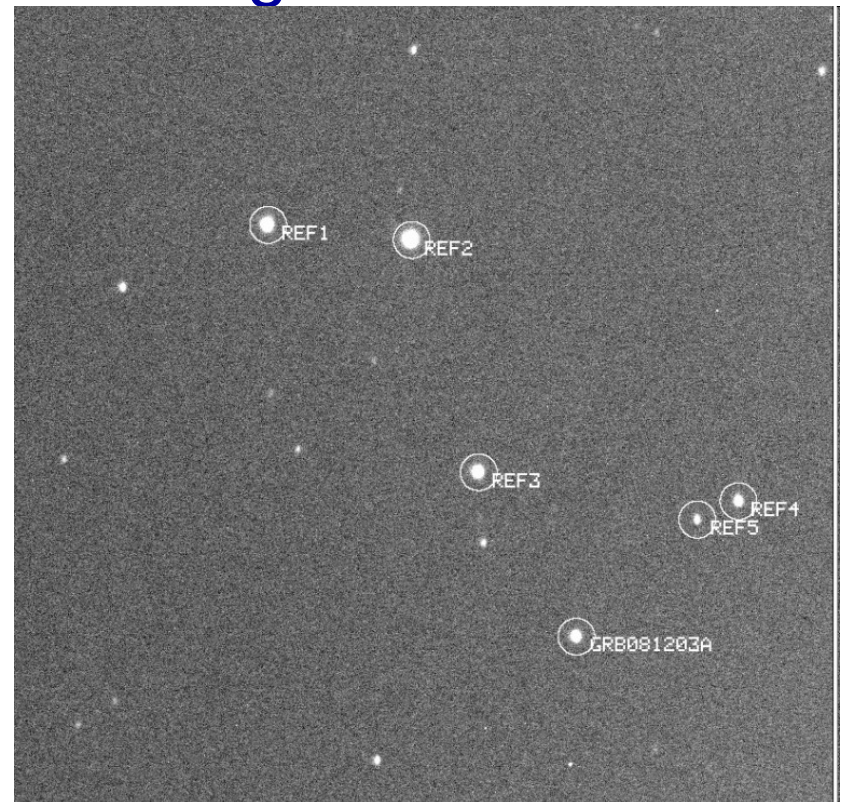
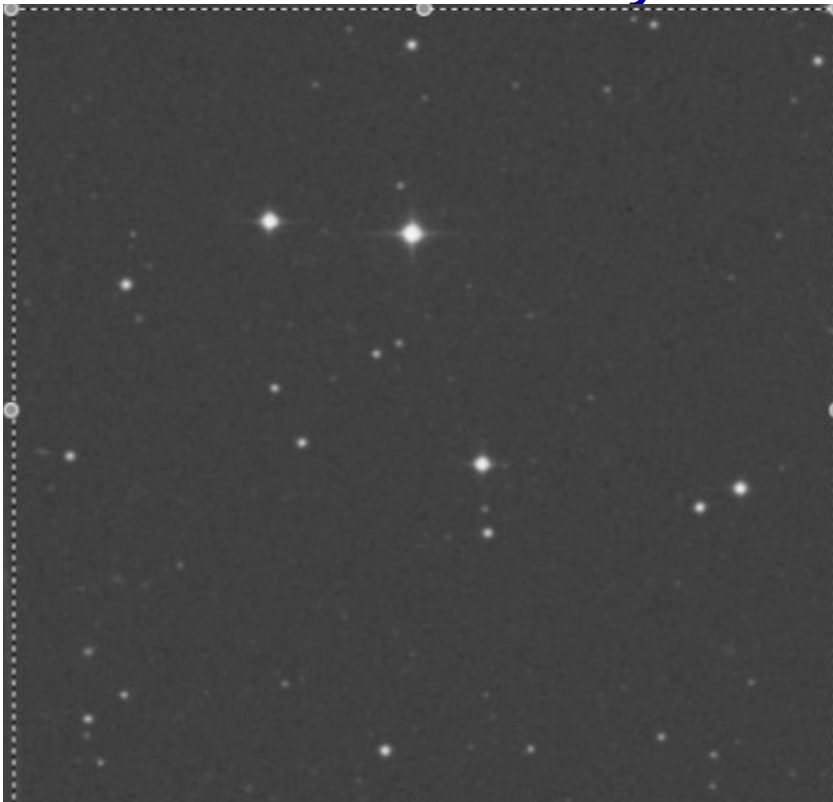




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# GORT Catches GRB 081203A

- GCN 8617 – SkyNet controlling GORT







## Future E/PO Plans

- Revise GEMS guide (published pre-launch)
- One new E/PO product – litho set?
- Continue Epo's Chronicles – including more Swift-oriented content
- Continue EA program with bi-yearly training
- Continue after-school clubs & MESA partnership
- Revise GRB site – get NASA Product Review approval
- Do additional teacher workshops using Goddard GeoDome – including Black Hole show
- Develop Newton's Laws short course w/EAs



## Swift PR Overview

- Two scientific symposia at AAAS organized
  - 2006: A Giant Flare from a Magnetar: Blitzing the Earth from Across the Galaxy
    - Hurley, Palmer, Gaensler and Inan
  - 2008: The World-Wide Hunt To Solve The Mystery Of Gamma-Ray Bursts
    - Gehrels, Wells, Chincarini and Piran
- 47 Press releases to date (launch and beyond)
  - 2009: 7 including z=8.2 burst – biggest story in GSFC/ASD
  - 2008: 8 including “Supernova caught in Act” and “Naked Eye burst”
  - 2007: 9 including Rossi Prize release
  - 2006: 9
  - 2005: 11 including first light of UVOT
  - 2004: 3 including launch and first light of BAT, XRT



## Press Releases

- November 10, 2009 - Swift, XMM-Newton satellites tune into a middleweight black hole
- September 16, 2009 - Swift Creates Best-Ever Ultraviolet Image of Andromeda Galaxy
- June 8, 2009 - Keck Study Sheds New Light On 'Dark' Gamma-ray Bursts
- April 28, 2009 - New Gamma-ray Burst Smashes Cosmic Distance Record
- February 28, 2009 - NASA's Swift Spies Comet Lulin
- February 10, 2009 - NASA's Swift, Fermi Probe Fireworks From a Flaring Gamma-Ray Star



## Press Releases

- January 6, 2009: NASA's Swift Shows Active Galaxies Are Different Near And Far
- September 19, 2008 - Swift Catches Farthest Gamma-Ray Burst
- September 10, 2008- "Naked-Eye" Gamma-Ray Burst Was Aimed Squarely At Earth
- May 21, 2008 – NASA's Swift Satellite Catches First Supernova in the Act of Exploding
- May 19, 2008 – The Mouse That Roared: Pipsqueak Star Unleashes Monster Flare
- May 2, 2008 - Gehrels Elected Fellow of American Academy of Arts & Sciences
- March 20, 2008 - Satellite Detects Naked-Eye Explosion Halfway Across Universe
- February 26, 2008- Swift Satellite Catches a Galaxy Ablaze with Starbirth





## Press Releases

- January 9, 2008 - Swift and Gemini Probe Mysterious Distant Explosion
- December 18, 2007 - 'Shot in the Dark' Star Explosion Stuns Astronomers
- October 30, 2007 - Swift helps shatter Black Hole Record
- September 12, 2007 - NASA Astronomers Find Bizarre Planet-Mass Object Orbiting Neutron Star
- July 30, 2007 - Japanese and NASA Satellites Unveil New Type of Active Galaxy
- June 26, 2007 - NASA's Swift Sees Double Supernova in Galaxy
- May 22, 2007 - Gamma-ray Bursts Active Longer Than Thought
- March 15, 2007 - Robotic Telescope Unravels Mystery of Cosmic Blasts



## Press Releases

- March 8, 2007 - Gamma-Ray Birth Cries Suggest Massive Magnetic Engines
- January 16, 2007 - Top High-Energy Astronomy Prize Awarded for Swift Discoveries
- December 20, 2006 - NASA Satellite Discovers New Kind of Black Hole Explosion
- November 21, 2006 - Twin Star Explosions Fascinate Astronomers
- November 6, 2006 - Monster Stellar Flare Seen by NASA Scientists Dwarfs All Others
- October 5, 2006 - NASA Performs Headcount of Local Black Holes
- October 5, 2006 - Scientists Determine The Nature Of Black Hole Jets



## Press Releases

- October 4, 2006 - Mug Shots of Supernovas Reveal Two Key Findings
- August 30, 2006 - Caught in the Act, Scientists Watch Supernova Explode
- May 12, 2006 - X-rays Fly as Cracking Comet Streaks Across the Sky
- February 24, 2006 - Scientists Detect New Kind of Cosmic Explosion
- December 14, 2005 - Cosmic Explosion Could Be Black Hole Swallowing Neutron Star
- October 5, 2005 - In A Flash Nasa Helps Solve 35-Year-Old Cosmic Mystery
- September 12, 2005 - Most Distant Explosion Detected, Smashes Previous Record





## Press Releases

- August 18, 2005 - NASA's Swift Satellite Finds Newborn Black Holes
- May 11, 2005 - NASA Scientists Catch Unique Gamma-Ray Burst
- April 5, 2005 - Swift Mission Nabs Its First Distance Measurement to Star Explosion
- February 18, 2005 - NASA Observes One of Brightest Cosmic Explosions
- February 15, 2005 - NASA's Newest Observatory Detects Record-Making Gamma Rays
- February 01, 2005 - Swift Sees Pinwheel Galaxy, Satellite Fully Operational
- January 21, 2005 - Swift Mission Images the Birth of a Black Hole
- January 5, 2005 - NASA Swift Mission Turns on and Sees a Blast of Bursts

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ART BAT UVOT

## Recent PR Art



By Aurore  
Simonnet



Dark GRB in dusty galaxy