Welcome

Fermi Data Analysis Workshop

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Workshop Objectives

- Today we'll cover *Fermi* analysis basics:
  - Data content, selection cuts, caveats
  - Analysis methodologies, synopsis of tools
    - ML method→ point source analysis
    - Light curve & pulsar analysis
- Emphasis on hands on analysis
  - roving support staff
- Feedback & discussion
- GI Program: Guidelines for Proposer

Agenda, Staff

8:30 - 9:30	Registration, Setup	
9:30 - 9:40	Overview, Workshop Objectives	Shrader
9:40 - 9:50	Data Selection, Exploration	Ferrara
9:50 - 10:10	Hands on Session 1	All
10:10 - 10:25	Point Source Analysis	Davis
10:25 - 10:40	Using the Catalog for Analysis	Ferrara
10:40 - 11:15	Hands on Session 2	All
11:15 - 11:30	Q&A, Review	All
11:30 - 12:00	Hands on Session 2 (con.)	All
12:00 - 13:00	Lunch Break	
13:00 - 13:15	Advanced Likelihood Topics	Hays
13:15 - 14:15	Hands on Session 3	All
14:15 - 14:30	Light Curve Analysis	Corbet
14:30 - 15:15	Hands on Session 4	All
15:15 - 15:30	Summary, Feedback	All
15:30 - 15:45	GI Program	Shrader
15:45 - 16:00	GI Program Q&A	All
16:00	Adjourn	

Prerequisites

- Science Tools Installation – hopefully done prior, but we can help as needed
  - Workshop web page is useful resource
- Sample datasets on workshop web page
  - – can substitute alternative data selections, but be cognizant of run-time, S/N issues
- Access to Fermi SSC web site
  - Data analysis documentation sets
    - Threads, Cicerone, Reference ('fhelp') docs

A Few Fermi Analysis Basics

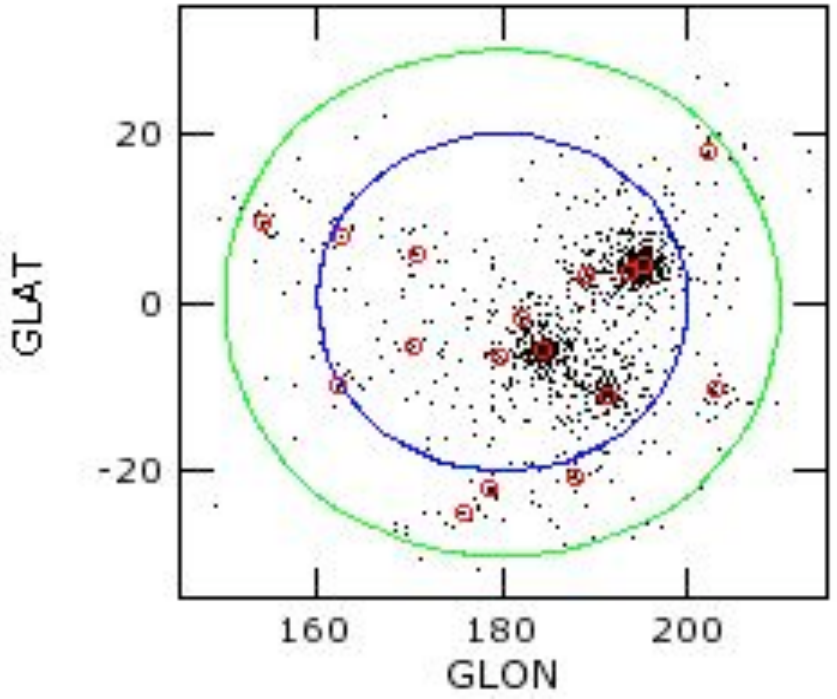
What's different about Fermi data analysis?

- Structured sky backgrounds
- Energy-dependent point spread function
- Instrument response function(s) IRFs
  - Multiple dependencies: instrument design, event reconstruction, background & quality selections
- Wide field of view, continuously variable aspect

Energy Dependent PSF

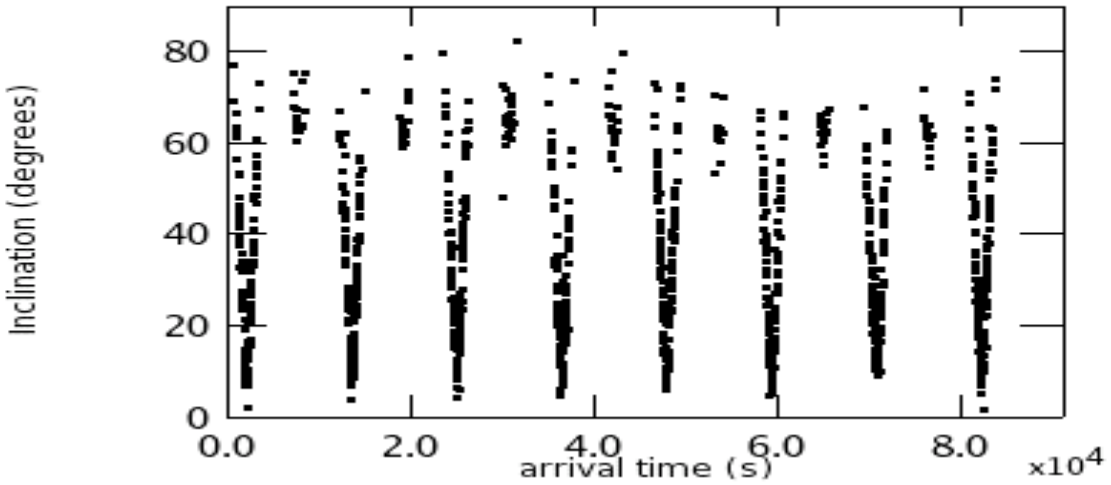
- **Sources must be fit simultaneously.**
  - Broad and energy-dependent PSFs: $\sigma_{68} < 3.5^{\circ}$ for 100 MeV (on axis) and $< 0.1^{\circ}$ for 10 GeV
  - Emission from nearby point sources overlap.
  - Intrinsic source spectrum affects the degree of source confusion.
  - "Source region" must be significantly larger than the "region-of-interest" (ROI).

- Anticenter region:



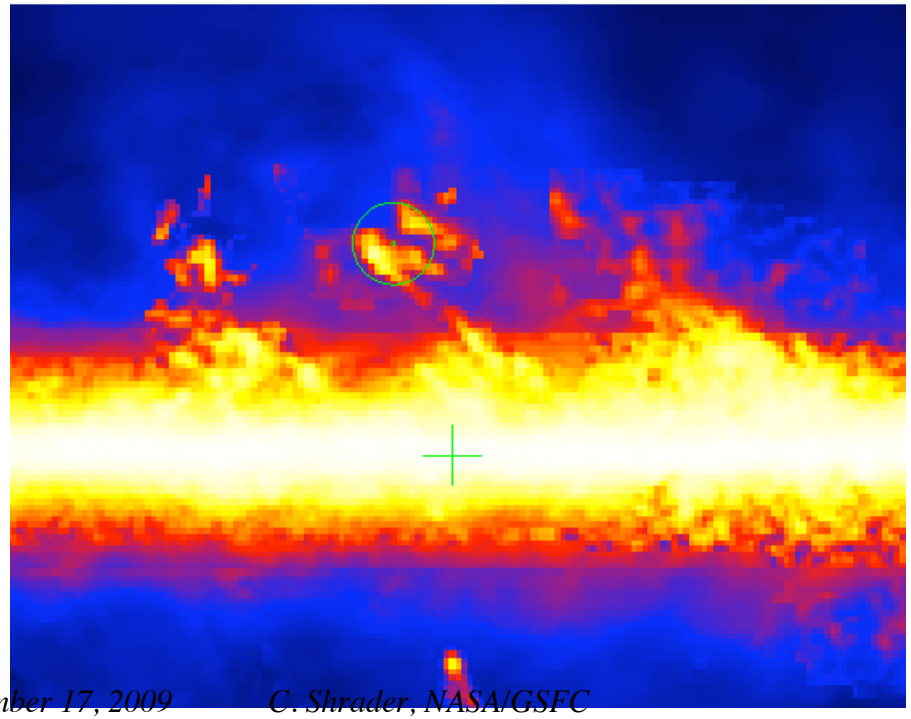
Continuously Varying Aspect

- Each event effectively has its own response function:
  - Large FOV, ~ 2.4 sr
  - Strong variation of response as a function of photon incident angle, $A_{eff} \propto \cos\theta$
  - Scanning mode of operation: 95 min orbit ⇒ continuous aspect changes of 4°/min.



Diffuse Emission

- Emission results from cosmic ray interactions with interstellar gas.
- Models rely on HI & CO observations for the gas distribution
- These observations reveal structures on angular scales similar to the PSF:



Useful Information

- Web URLS:
  - http://fermi.gsfc.nasa.gov/workshops/data_analysis_dec09/ Workshop web site
  - http://fermi.gsfc.nasa.gov/ssc/ FSSC home
  - http://fermi.gsfc.nasa.gov/ssc/data/access/ Data access
  - http://fermi.gsfc.nasa.gov/ssc/data/analysis/ Data analysis page
  - http://fermi.gsfc.nasa.gov/cgi-bin/ssc/faq/glastfaq.cgi FAQs

Cycle-3 Timeline

Announcement (as part of ROSES 2008)	September, 2009
Release online proposal aids & documentation	November 5, 2009
Notices of Intent (optional)	November 16, 2009
Proposals Due	**February 5, 2010**
Proposal Peer Review	April, 2010
Stage-II (budget proposal) solicitation	May 2010
Budget deadline, processing & grants administration	June-July 2010
Fermi Cycle 3 Begins	Mid August, 2010

Let's get started …

Extra Slides

Important resource:

FSSC data analysis web page

GODDARD SPACE FLIGHT CENTER

+ NASA Homepage
+ GSFC Homepage
+ Fermi Homepage

SEARCH Fermi: Search + GO

Fermi Science Support Center

HOME | RESOURCES | PROPOSALS | DATA | HEASARC | HELP | SITE MAP

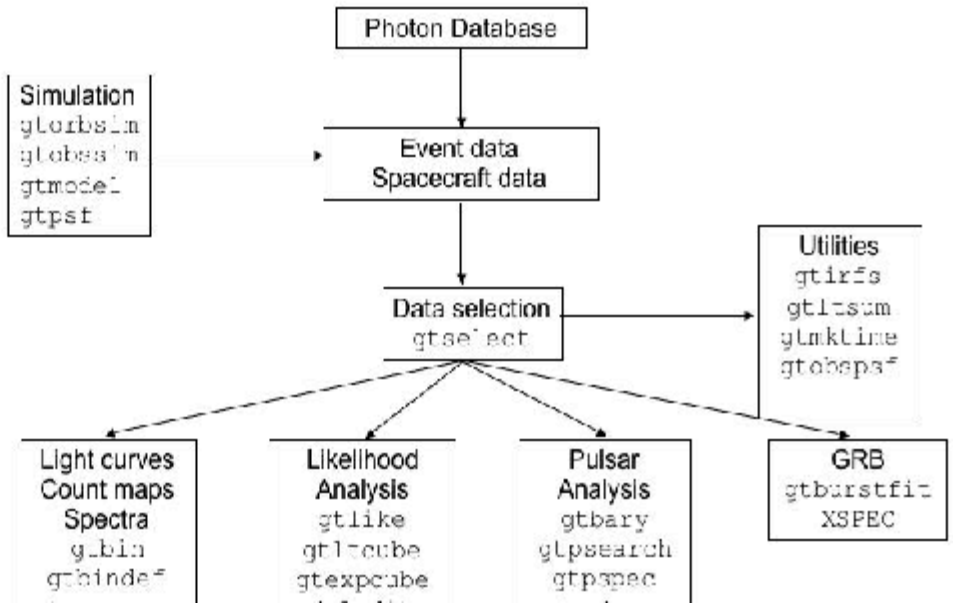
+ FSSC Home

Data

- Data Policy
- Data Access
- Data Analysis
  - + System Overview
  - + Caveats
  - + Software Download
  - + Documentation
  - + Analysis Threads
  - + User Contributions
- Newsletter
- FAQ

Overview: LAT Data Analysis Tools

Through a collaborative effort between the Fermi Science Support Center and the LAT instrument team a suite of instrument specific science analysis tools has been developed for public release. This software will be distributed and maintained by the FSSC. It has been designed within the framework of the HEADAS FTOOLS methodology, to ensure cross-mission compatibilities wherever possible and to minimize the learning curve for users of other high-energy astrophysics mission data sets. The general analysis flow is illustrated in this graphic:



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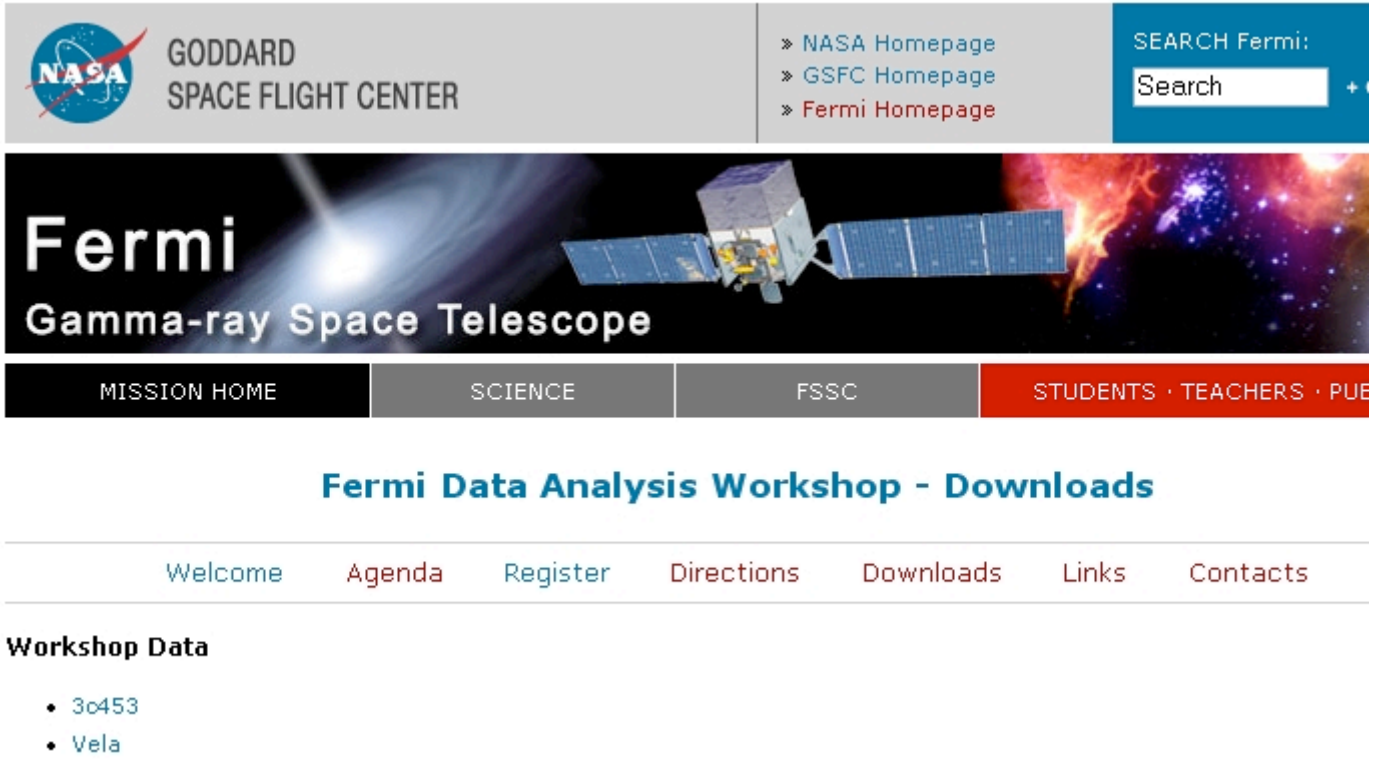
Sample data sets posted online:

Vela Pulsar,
3C 454.3



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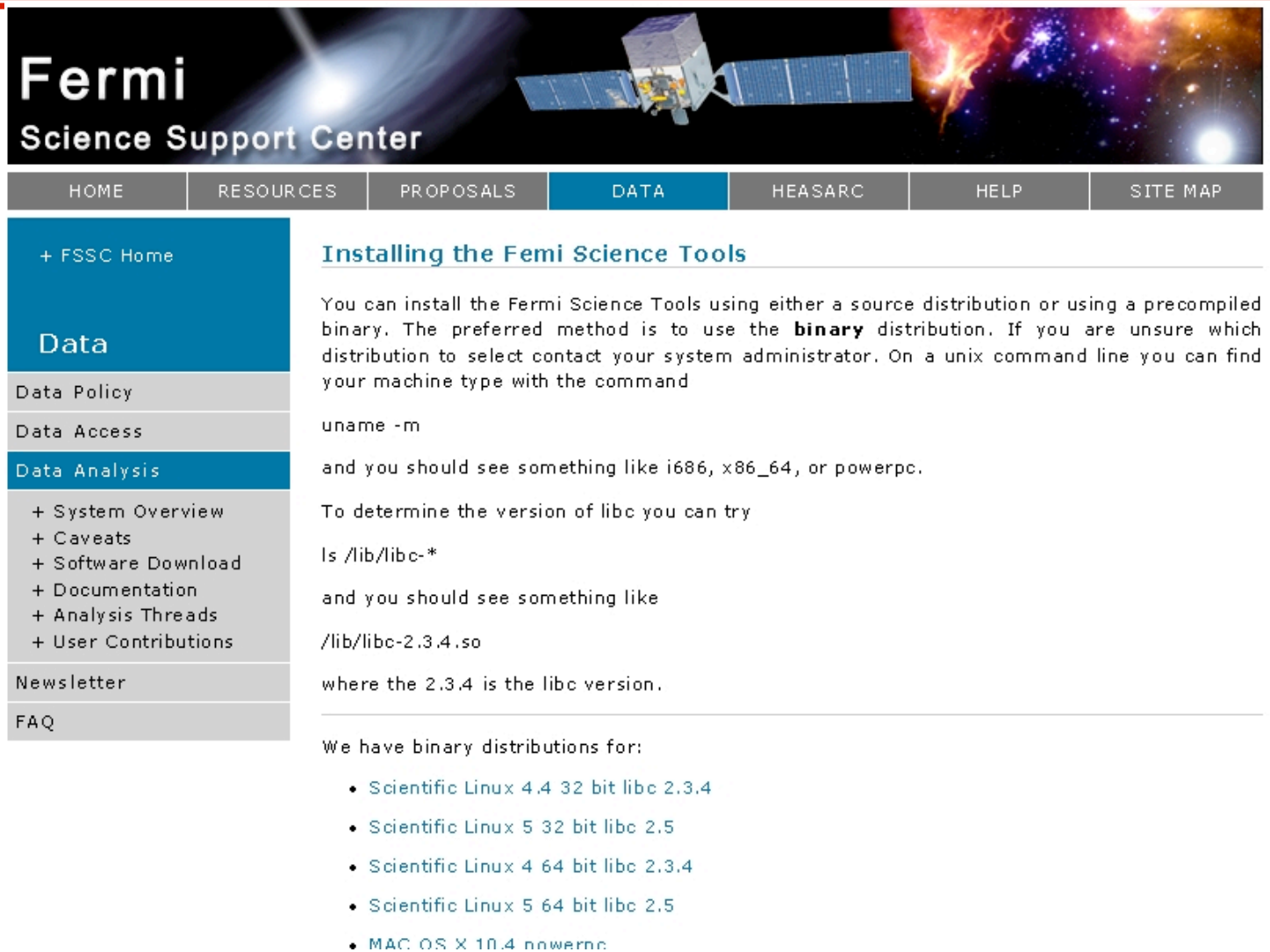
Science Tools Download Page:

Hopefully this has already been done(?) but if not, refer to this page for supported platforms, installation instructions