

# The Fermi Science Support Center

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## Abstract

The Fermi Science Support Center (FSSC) serves as the primary interface between the Fermi Gamma-ray Space Telescope mission and the scientific community. The FSSC supports the planning and scheduling of science observations and maintains an archive of all publicly accessible Fermi data products (currently this is primarily data from the Gamma-ray Burst Monitor (GBM), but will ultimately include all Fermi data products). The FSSC also maintains and distributes data analysis software and associated documentation as well as providing technical and scientific support. In addition, the FSSC is administering the guest investigator program for NASA Headquarters and provides proposal preparation tools and documentation. We present an overview of the FSSC's role in each of these activities.

## Providing Data to the Community

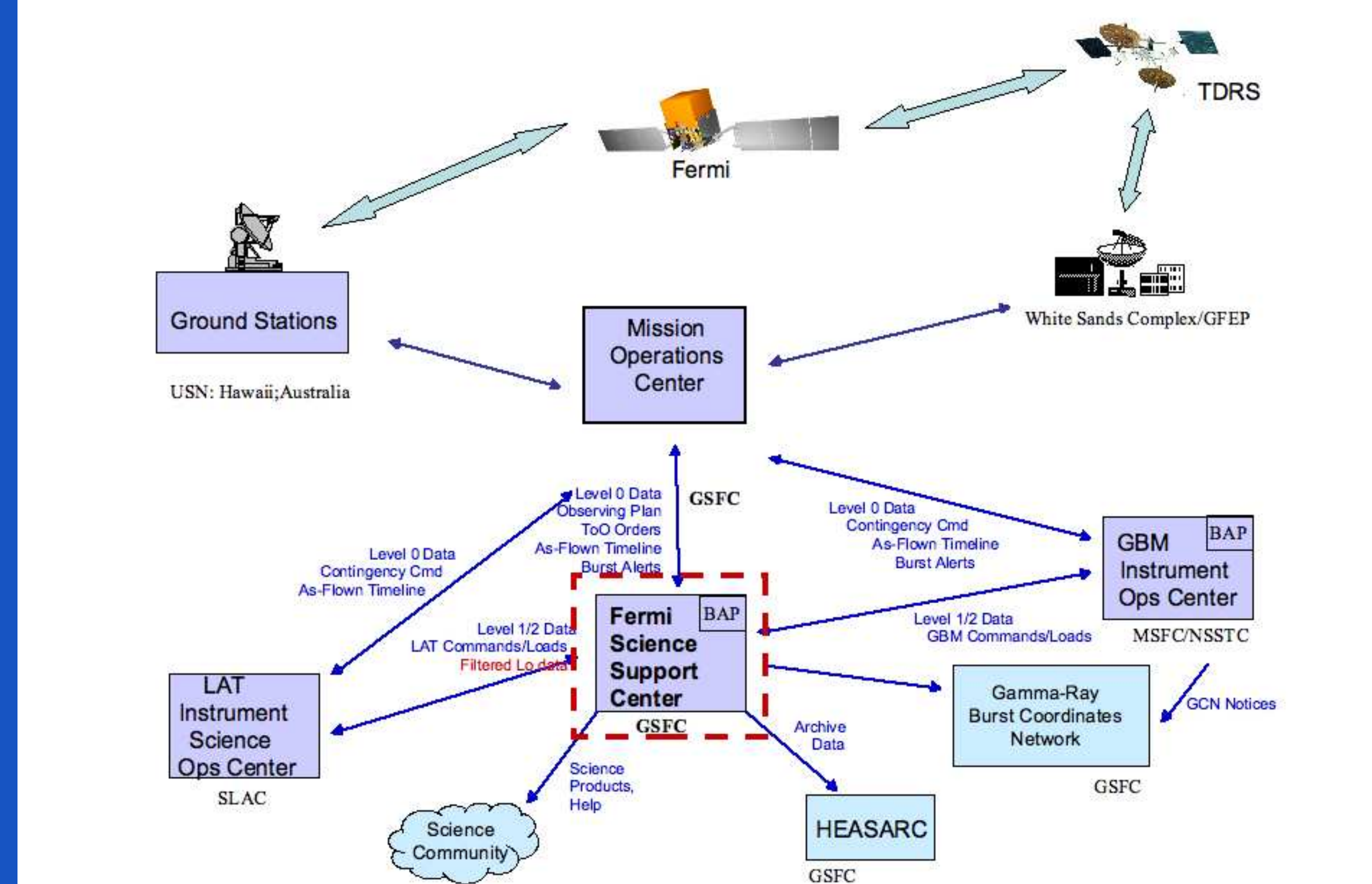
All public data from the Fermi mission will be available through the FSSC's website. Much of the data will be served through the NASA High Energy Astrophysics Science Archive Research Center's (HEASARC) Browse interface. Browse is the interface to the archive for all of NASA's high energy astrophysics data from both current and previous missions. Data not available through Browse will be served directly from the FSSC's website. Here we provide a short overview of the types of data available and the data access policy for the Fermi mission. For full details on the data available see **Poster 668.05** and **Poster 668.06**.

Fermi will provide a variety of scientific data from its primary instruments, the Gamma-ray Burst Monitor (GBM) and the Large Area Telescope (LAT). In addition to the primary data products from the two instruments, various source catalogs, as well as data from bursts and other transients will be provided.

In addition to the science data, various data products dealing with the spacecraft will be available. This will include proposed and observed science timelines for coordinating simultaneous multi-wavelength observations, spacecraft alerts, pointing and livetime history data, and various other spacecraft related data.

During the first year of the mission, LAT event data are available only to the instrument team and the interdisciplinary scientists as they calibrate the instrument. After the end of the first year, these data will become publicly available. Starting the second year, all subsequent data acquired by the spacecraft will be immediately in the public domain and there will be no proprietary data period. The only exception to this is that during the first year, data corresponding to detected transients and a few selected sources (~ 23) will be made publicly available as well. Full details on the Fermi Data Policy can be found on the FSSC website.

## FSSC & Fermi Ground System Architecture



## User Support

One of the primary roles of the FSSC is to support the user community throughout the lifetime of the mission. This includes providing data and tools as well as assistance in using the tools and education about the capabilities of Fermi and the data. The FSSC will also provide individual assistance with software and data. The FSSC's website will provide updates about the status of the mission. The FSSC will also host conferences and workshops to provide education and experience with the Fermi Science Software and a forum for users to report on scientific results. The FSSC website will also host tutorials, a help desk, and a FAQ.

## Proposal Planning Tools

To assist scientists in making GI proposals, the FSSC will provide a set of tools for planning observations and submitting proposals. The tools include:

Source Sensitivity Calculator estimates the detectability of a point source by the LAT based on spectrum, flux, and sky position.

Fermi Simulated 1D Spectral Analysis via the HEASARC's WebSpec tool (or XSpec).

Exposure Time History Display plots the exposure time for a specific point to determine the total exposure accumulated on a target.

Count and Exposure Maps provide counts, exposure, and flux maps of the entire sky on various time scales.

## Observation Scheduling

The FSSC is responsible for generating the scientific observing plan for Fermi based on the accepted proposals and the sky survey requirements. Fermi is expected to spend most of its time in sky survey mode.

Scheduling is done at two levels, a long-term schedule for the entire cycle (1 year), and a weekly timeline. The Long-term Schedule is generated before the beginning of the cycle from all of the accepted GI proposals. This timeline will be posted on the FSSC website and the GI's will be notified of the expected observation dates. The long-term schedule will be updated during the cycle to account for ToO observations or Autonomous Repoints (ARs) which are automated slews of the observatory to observe transient sources (expected once or twice a month).

After the week's observations have been completed, the MOC provides the FSSC with an as-flown timeline generated from spacecraft telemetry. The FSSC checks this against the final science timeline to verify that all scheduled observations were carried out and to reschedule any that were missed.

Fermi supports Target of Opportunity (ToO) observations. Requests for ToO observations can be submitted via the FSSC website using an RPS form similar to that used for the RXTE mission. Once submitted, the FSSC advises the Project Scientist whether the proposed ToO is feasible; the Project Scientist is responsible for approving or rejecting the proposal. The ToO submitter will be notified of the acceptance or rejection of the request and all accepted ToOs will be tracked on the FSSC website.

At all times, the scientific community will have access to the most up-to-date version of the timelines available to allow for planning multi-wavelength or simultaneous observing campaigns.

## GI Program Schedule

- ScienceTools released: Early February, 2009
- Proposals Due: March 6, 2009
- Proposal Peer Review: Mid May, 2009
- Proposal results released: Mid June 2009
- Fermi Cycle 2 Begins: August 14, 2009
- Cycle 2 funding released: August, 2009

## GI Program

The Fermi mission supports a Guest Investigator (GI) program that is administered by the FSSC for NASA Headquarters.

For cycles after the first year, there will be ~ 100 accepted GIs. GIs during these cycles may request pointed observations or special survey patterns as part of their proposal if scientifically justifiable. However, it is expected that most, if not all, of these proposals will be for support to analyze data acquired during survey mode operation. During this phase of the mission, all data, including the data from the first year will be available to the public from the FSSC's website.

Proposals are submitted through the FSSC website using RPS and will consist of a two phase proposal process. Initially proposers will submit their science proposals for review. Some GIs will then be requested to submit budgets, but not all those who submit budgets will be awarded funding.

## Analysis Software

The FSSC will provide a suite of analysis tools for the Fermi data. The software is a collaborative effort between the instrument teams and the FSSC. The tools will be integrated into the HEASARC's ftools suite. Here we provide a short overview of the Standard Analysis Environment (SAE) (for details see **Poster 468.07**).

- General Analysis - The SAE provided by the FSSC will consist of several general purpose tools to assist in analyzing data.
- GRBs - The SAE will provide several tools for the study of GRBs including tools for spectral and temporal analysis, model fitting, and tools for generating the response functions and binning events.
- Pulsars - The SAE will provide a number of tools to assist in pulsar analysis including period search and profiling tools, and a pulsar ephemeris extraction.
- Data Simulation - The SAE also provides an observation simulator.