



Fermi

Gamma-ray Space Telescope

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**Mission Status Update
August 29, 2024**

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Updates from Project Science

The mission continues to be operationally healthy, scientifically productive, and engaged with the community and the public.

- **Mission Status and Plans**
 - **Observatory operations**
 - **Science support activities**
 - **GI Program – see Andrea Prestwich’s presentation**
 - **Forming Fermi Legacy Archiving working group**
 - **Press, social media, and outreach**
 - **Senior Review – see later presentation**

Observatory Status and Updates

- **Observatory operating well**
 - **Monitoring gradual aging of components; no failures since 2018 SADA failure**
 - **Communications – all Fermi communications go through TDRS, planned for phase out in 2030s**
 - **Return of Guam station restored full coverage for alert notifications (DAS) and reduced planning needed to provide coverage for rapid comms through S-band**
 - **Orbit Adjustment Study**
 - **Generated important updates and tuning of maneuver procedures, propulsion system configuration, and flight software**
 - **Thermal study not complete yet**
 - **Planning paused with updated evaluation of the optimal target altitude**
 - **Recent frequency of collision avoidance planning has been low**
 - **Altitude currently decreasing more quickly until solar maximum passes**
 - **Conducted a successful CA maneuver on January 31 that provided data to tune use of propulsion system**

FSSC Personnel and Plans

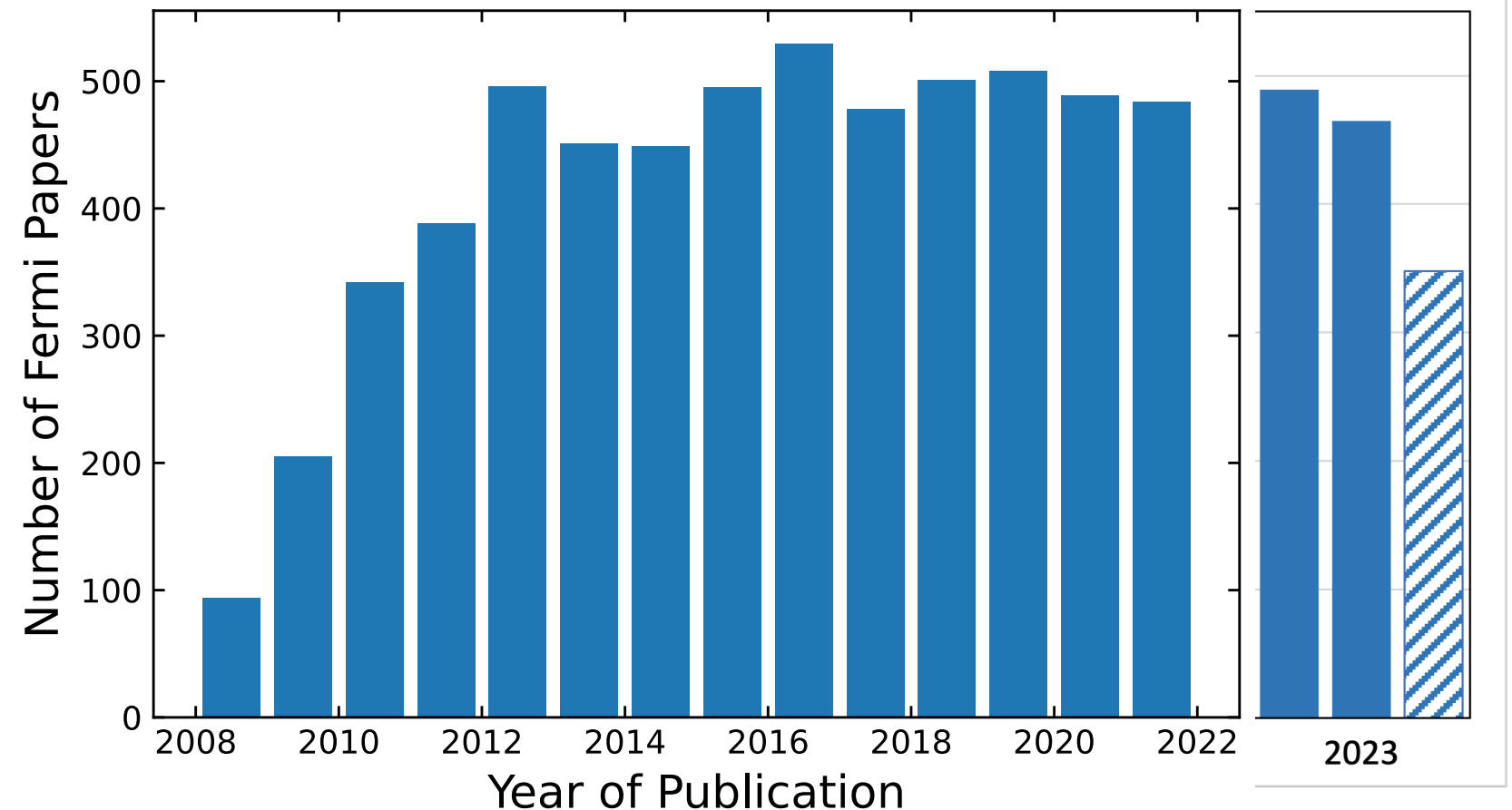
- **FSSC Lead Scientist hired and started in May**
 - **Welcome Andrea Prestwich to the team!**
- **Fermi community software initiative**
 - **New scientific software developer hired in January. Welcome Sheimy Paz!**
 - **FSSC participated in LAT spring collaboration meeting as part of ongoing discussions of governance model and support for fermipy (see LAT presentation)**
- **Data initiatives**
 - **Data server interface updates being tested**
 - **Planning beginning for legacy archiving of data server and analysis tools**
 - **FUG invited to nominate members for Fermi Legacy Archiving working group. Looking for frequent analyzers and power users to support this effort.**
- **Community Events**
 - **FSSC members supporting and attending 11th Fermi Symposium**
 - **Shared booth with Swift, NuSTAR and XRISM at January AAS 245 in National Harbor, MD.**

Fermi Publications

January – June 2024: 348 Fermi papers*

6 mos!

- Very wide range of topics
 - New sources – all categories
 - Populations
 - Source classification
 - Techniques
 - Project science is Looking at use of AI/ML with Fermi data
 - Multiwavelength,
 - Theory and modeling
- Significant number of publications from community beyond GI programs, LAT and GBM teams



[Fermi Bibliography Page](#)

* *Refereed publications that present analysis of Fermi data, refer to Fermi results, make predictions for Fermi results, or present technical aspects of the Fermi mission, instruments and data.*

Fermi Press Highlights

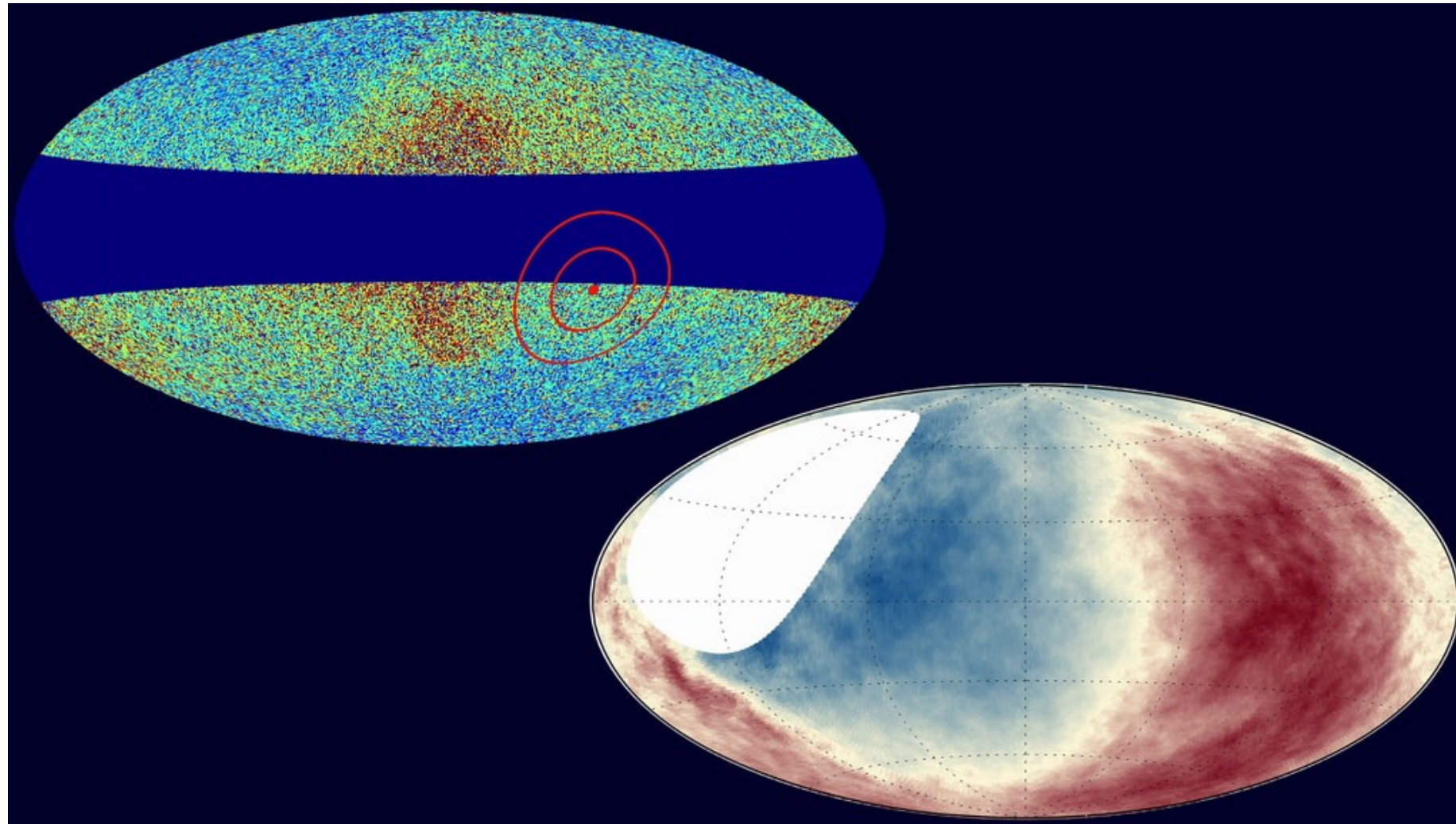
- [NASA's Fermi Finds New Feature in Brightest Gamma-Ray Burst Yet Seen – Jul 2024](#)
- [Explore the Universe with the First E-Book from NASA's Fermi – Apr 2024](#)
- [NASA's Fermi Mission Sees No Gamma Rays from Nearby Supernova – Apr 2024](#)
- [NASA's Fermi Detects Surprise Gamma-Ray Feature Beyond Our Galaxy – Jan 2024](#)
- [NASA's Fermi Mission Creates 14-Year Time-Lapse of the Gamma-Ray Sky – Dec 2024](#)
- [NASA Fermi Mission Nets 300 Gamma-ray Pulsars...and Counting – Nov 2023](#)
- [NASA Looks Back at 50 Years of Gamma-ray Burst Science – Jun 2023](#)



Exciting Fermi result? Let us know!
Contact Judy or Liz.

Credits: A. Simonnet (Sonoma State Univ.) and NASA's Goddard Space Flight Center

Unexplained feature in the diffuse gamma-ray emission



The Cosmic Microwave Background is about 0.12% hotter toward the constellation Leo and colder in the opposite direction. It is thought to be the motion of our solar system relative to the CMB. Gamma rays are expected to show a related signal.

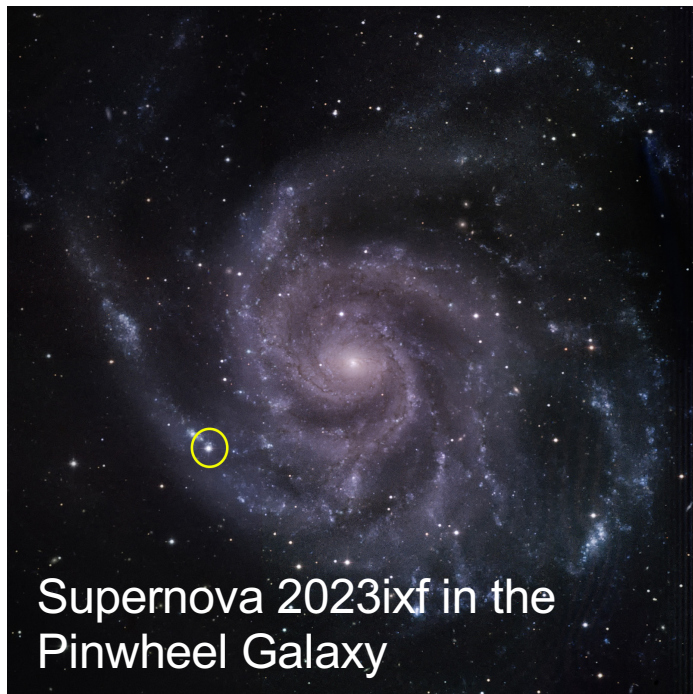
[NASA feature link](#)

A study of Fermi LAT data by [Kashlinsky et al.](#) found a dipole signal, but it is in a different orientation and appears much stronger than the expected CMB signal. Ultra-high-energy cosmic rays, an unknown background, or something new?

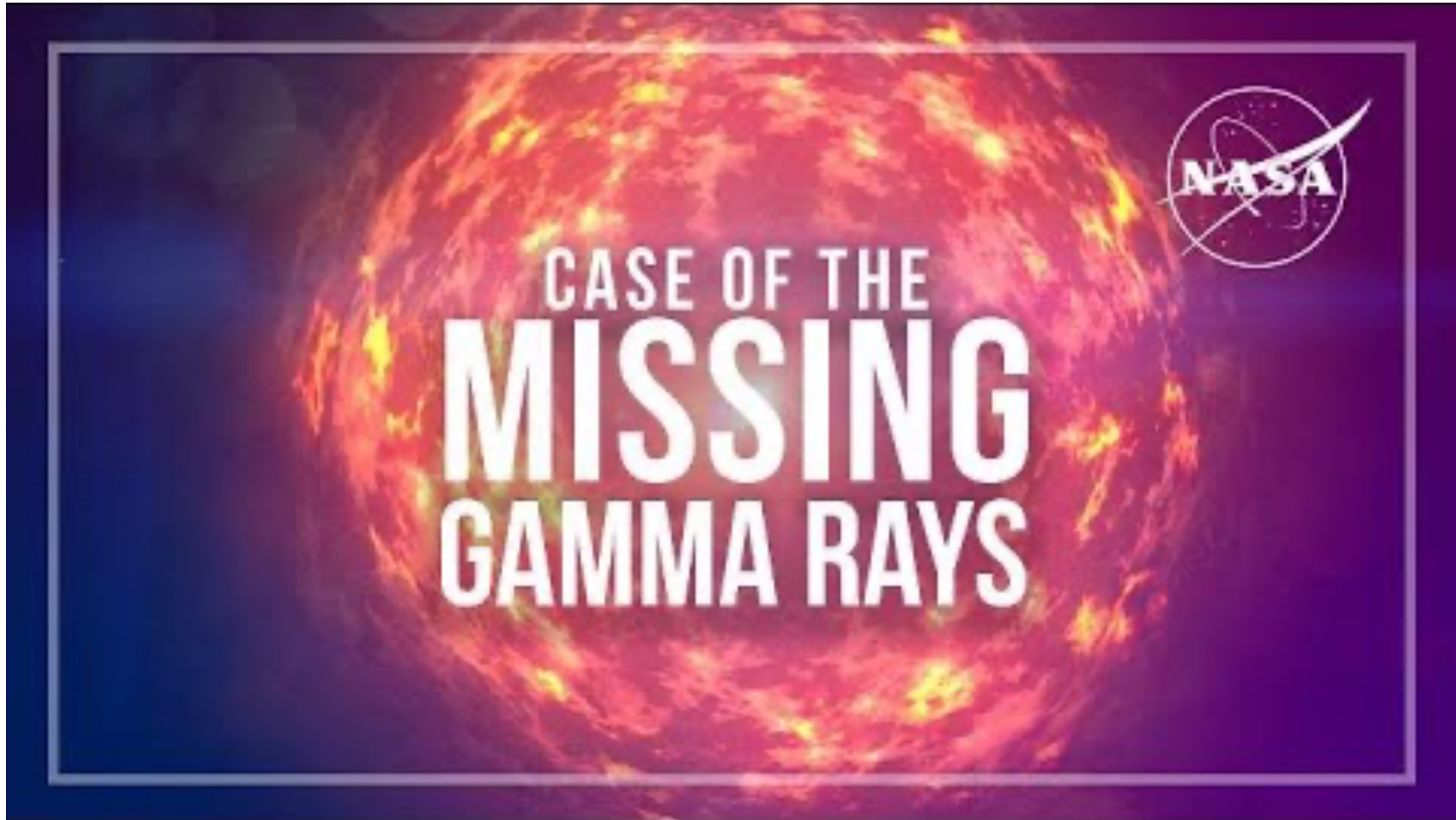
Nearby supernova 2023ixf underproduced gamma rays

Accelerated cosmic rays from a core-collapse SN could produce a detectable gamma-ray signal at 7 Mpc, but did not.

[Martí-Devesa et al. 2024](#)



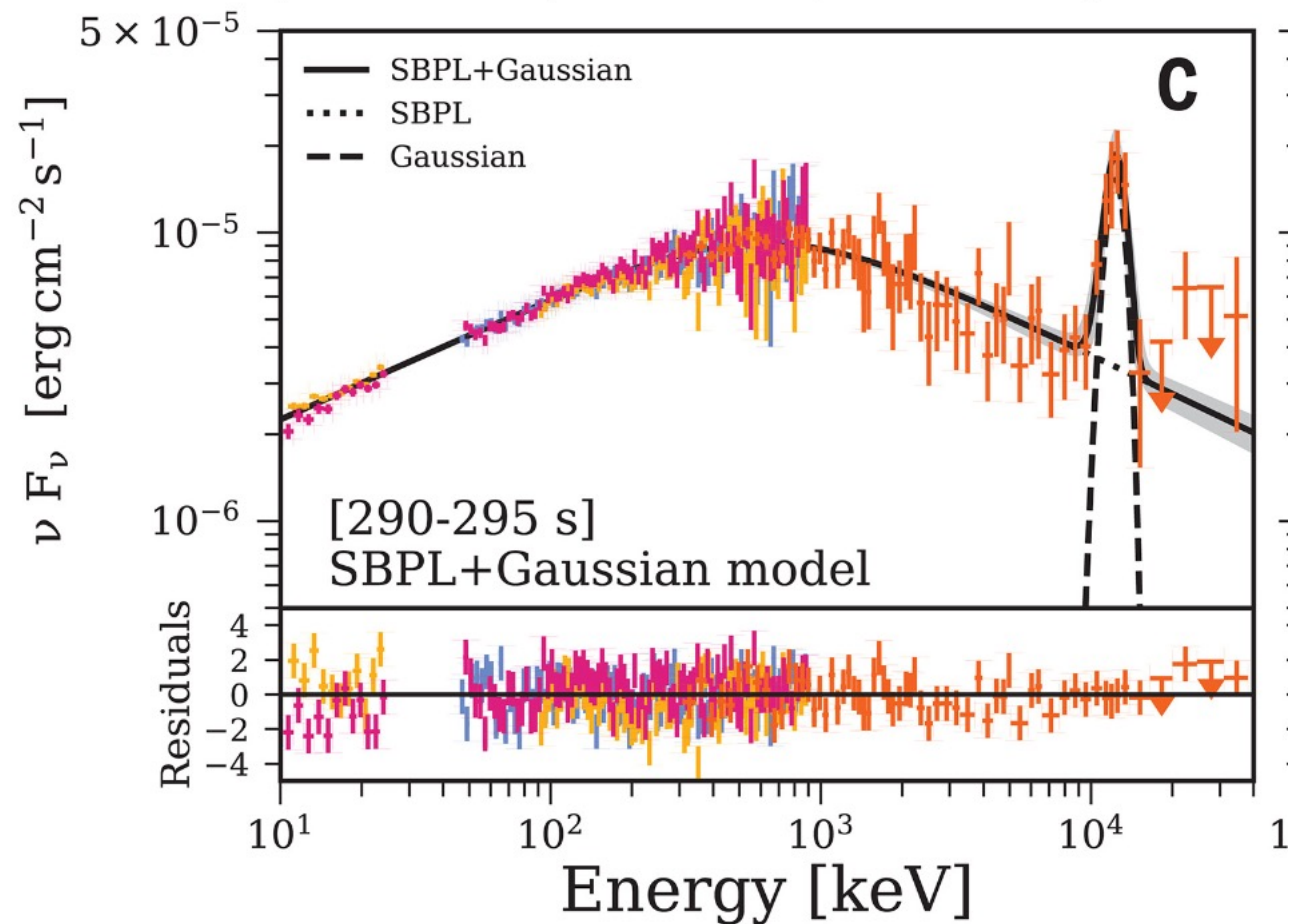
Most luminous nearby supernova discovered since Fermi launched.



[NASA feature link](#)

Significant spectral line found in GRB 221009A

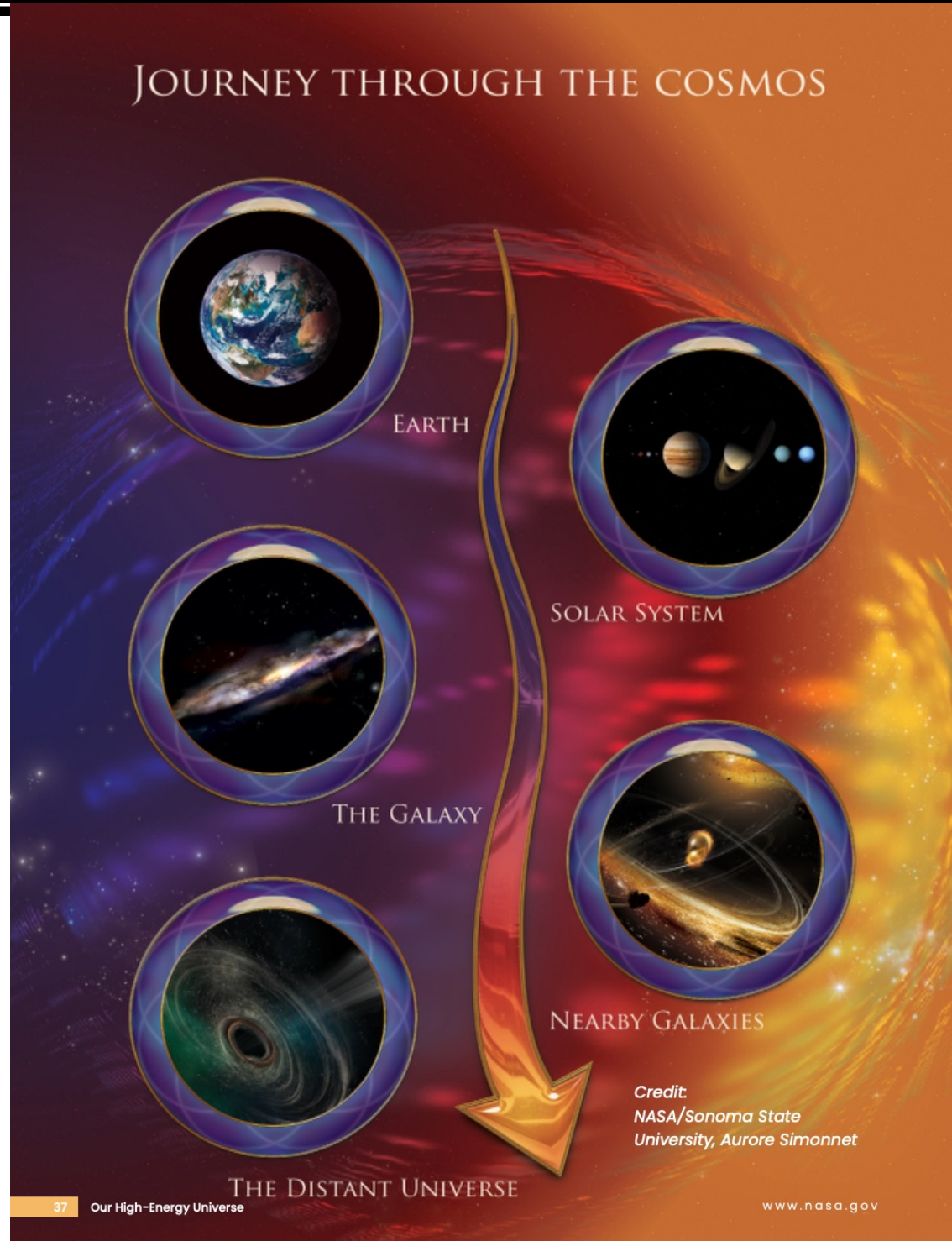
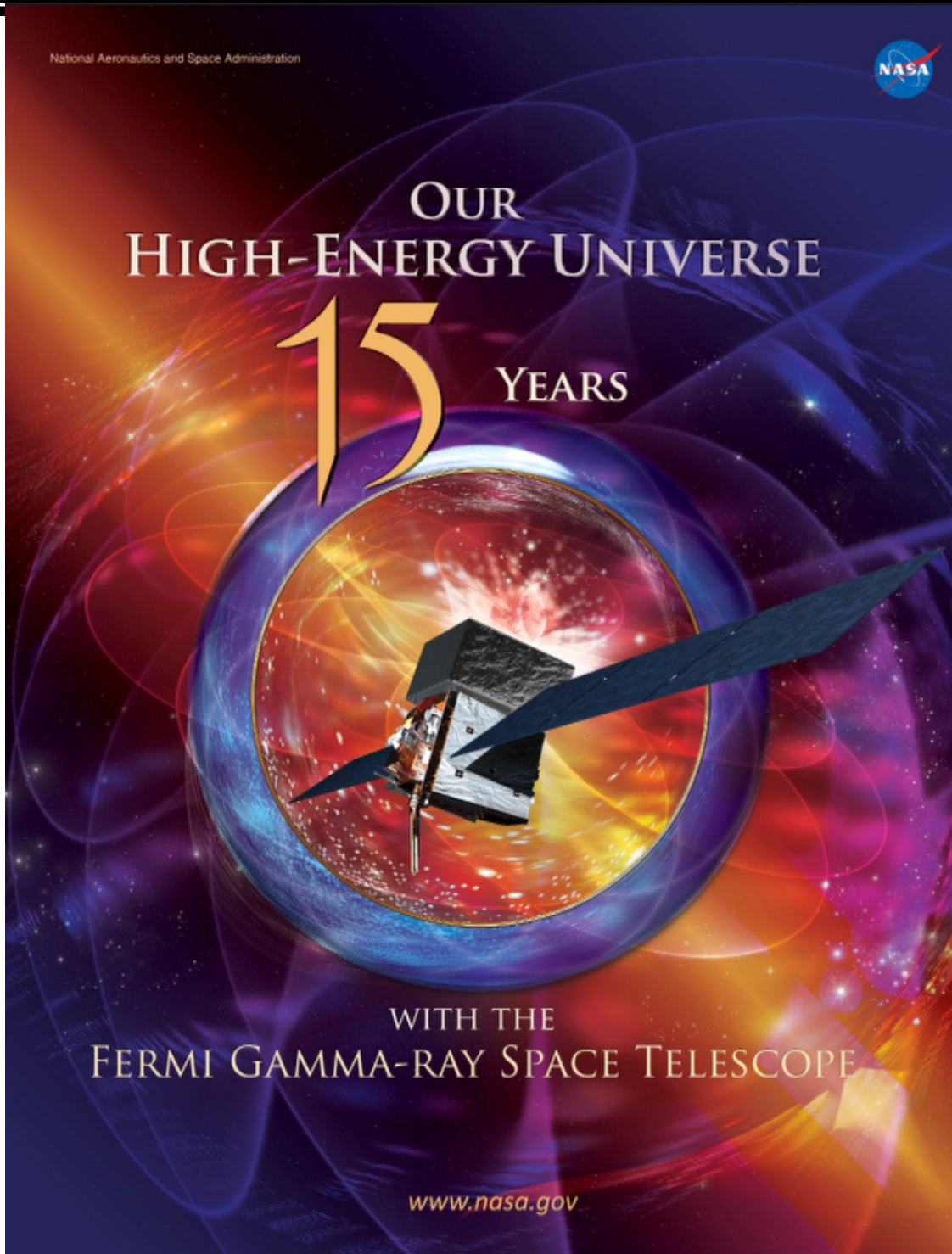
The spectral line at 280 sec into the burst is interpreted as annihilation of electron-positron pairs within the jet. The blueshift gives a Lorentz factor of ~ 20 . This is lower than other estimates (> 100) and suggests a regional or geometric effect.



<https://youtu.be/9hSf7UgeKvg?si=1v1pjwzTuL92hJk7>

[Ravisio et al., *Science*, July 2024](#)

Fermi 15-year E-Book released in April



[Link](#)

Outreach and Social Media

- @NASAUniverse on X, Facebook and Instagram
- Social media posts using #FermiFriday for special days, interesting results, press releases, and #FermiPeople
- Mission milestones, e.g. Fermi@15
- Suggestions for future social media content are welcome
 - Contact Judith.racusin@nasa.gov or @jracusin on Slack



In honor of #InternationalWomensDay ♀, meet some of the women from institutions around the world who work with our Fermi telescope! These scientists, engineers, and other specialists keep Fermi running, make discoveries with its data, and more. #FermiFriday #WomensHistoryMonth ♀



#InternationalWomensDay2024

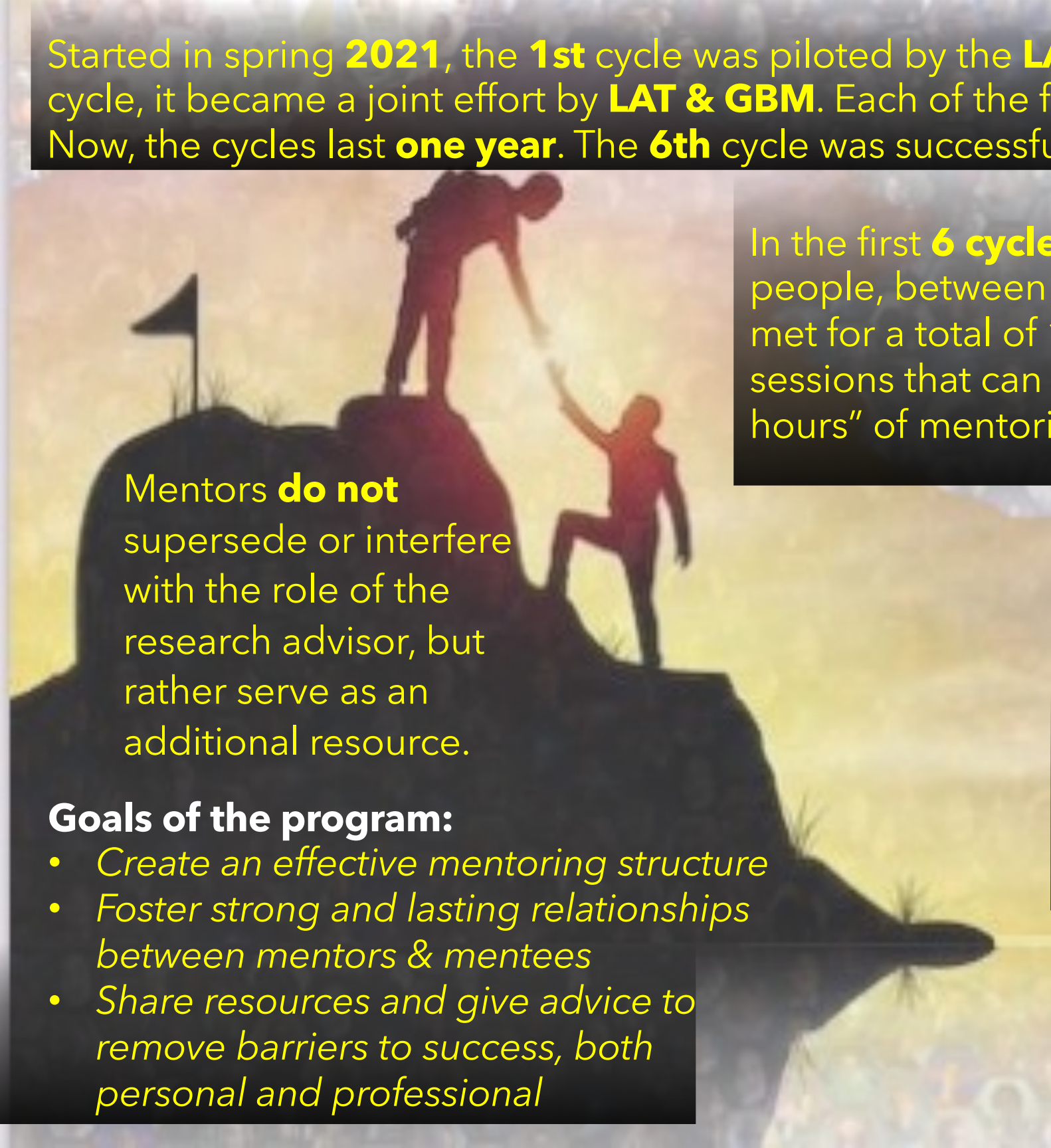
Fermi Inclusion Activity Highlights

- **Mission continues to evaluate inclusion across activities**
 - **Communication is key!**
 - **Recent examples**
 - **FSSC**
 - **Studied participation in panel review and use of additional literature tool to check for potentially overlooked subject matter experts**
 - **hiring and onboarding practices reviewed; transition plans developed in support of recent hires (following a long period of static staffing)**
 - **Starting a study of Fermi School participation outcomes and exit surveys**
 - **Planning a review of support for Fermi users and new proposers**
 - **GBM worked on orientation for new team members**
 - **LAT developed of series of DEIA forums for collaboration members to engage and learn about topics to support inclusive practices**
 - **Both teams continue support for the joint mentoring program (next slide)**
 - **Project science supporting FOT participation in 11th Fermi Symposium**

Started in spring **2021**, the **1st** cycle was piloted by the **LAT**. Beginning with the **2nd** cycle, it became a joint effort by **LAT & GBM**. Each of the first 4 cycles lasted **6 months**. Now, the cycles last **one year**. The **6th** cycle was successfully launched in **April**.



In the first **6 cycles** of the *Fermi* MP, **110** people, between mentors and mentees, have met for a total of **196** hours of mentoring sessions that can be seen as **392** "people hours" of mentoring time.

A background image showing silhouettes of three people climbing a mountain. One person is at the peak, another is halfway up, and a third is at the base. A flag is planted on the peak. The scene is set against a bright, hazy sky.

Mentors **do not** supersede or interfere with the role of the research advisor, but rather serve as an additional resource.

Goals of the program:

- *Create an effective mentoring structure*
- *Foster strong and lasting relationships between mentors & mentees*
- *Share resources and give advice to remove barriers to success, both personal and professional*

Mentees: Graduate students within the LAT & GBM Collaborations (e.g. masters' students, PhD students, etc.)

Mentors: LAT & GBM PhD-holders (e.g. postdocs, faculty members, research scientists, etc.).

All mentors and mentees undergo a dedicated training workshop prior to each mentoring cycle

MP Org. Committee:

Responsible for overseeing the MP. In charge of mentor-mentee **matching** and **training**. Mediates in case of misunderstandings.



Fermi Summer School 2024

Registration for 2025 opens in Dec.
Dates: May 27 – June 6, 2025



24 graduate students and postdocs from 13 countries for 10 days of gamma-ray science and analysis

Concluding update from the Project

The mission continues to be operationally healthy, scientifically productive, and engaged with the community and the public.

- **Observatory operations**
 - **Maintenance and issue support activities supplemented by long-term efforts to make future operations reliable and sustainable**
 - **Orbit adjustment paused.**
- **Science support activities**
 - **New personnel will help strengthen strategic areas for community support**
 - **Community science output remains prolific and high impact**
- **Social media, press and outreach continue to make results available to the public**
- **Lots of great science to do! We are ready for Senior Review 2025!**

EXTRAS

Fermi Mission Overview

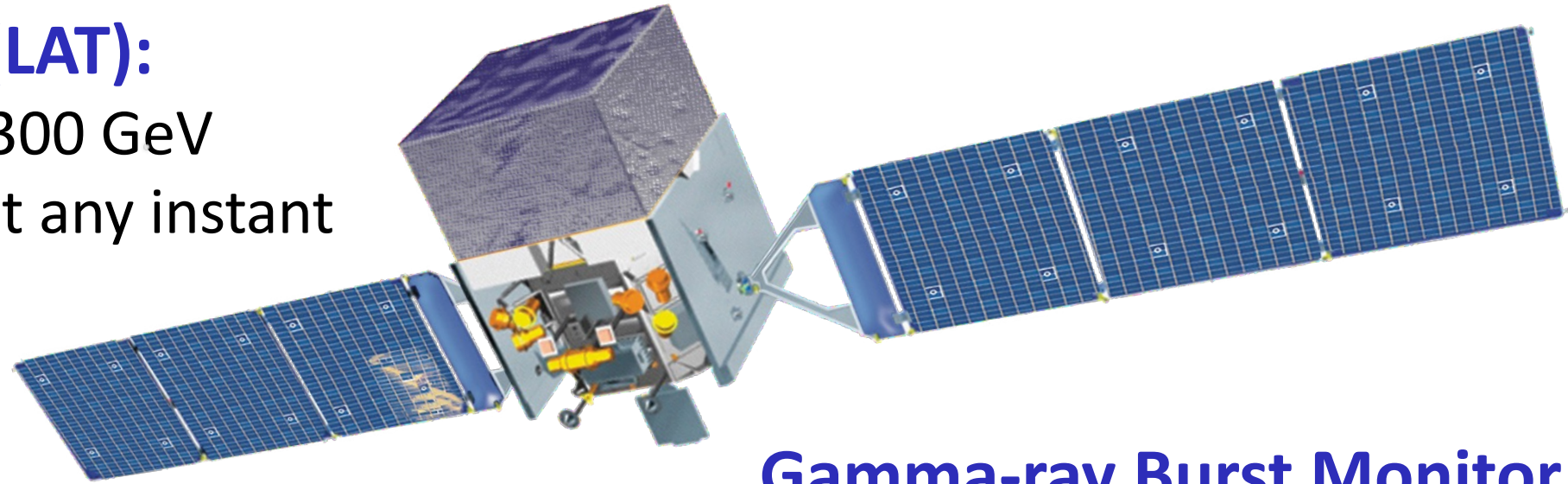
Probe class mission to study the extreme high-energy Universe

Large Area Telescope (LAT):

20 MeV to more than 300 GeV

Views 20% of the sky at any instant

Entire sky in ~3 hrs



International and interagency collaboration between NASA and DOE in the US and agencies in France, Germany, Italy, Japan and Sweden

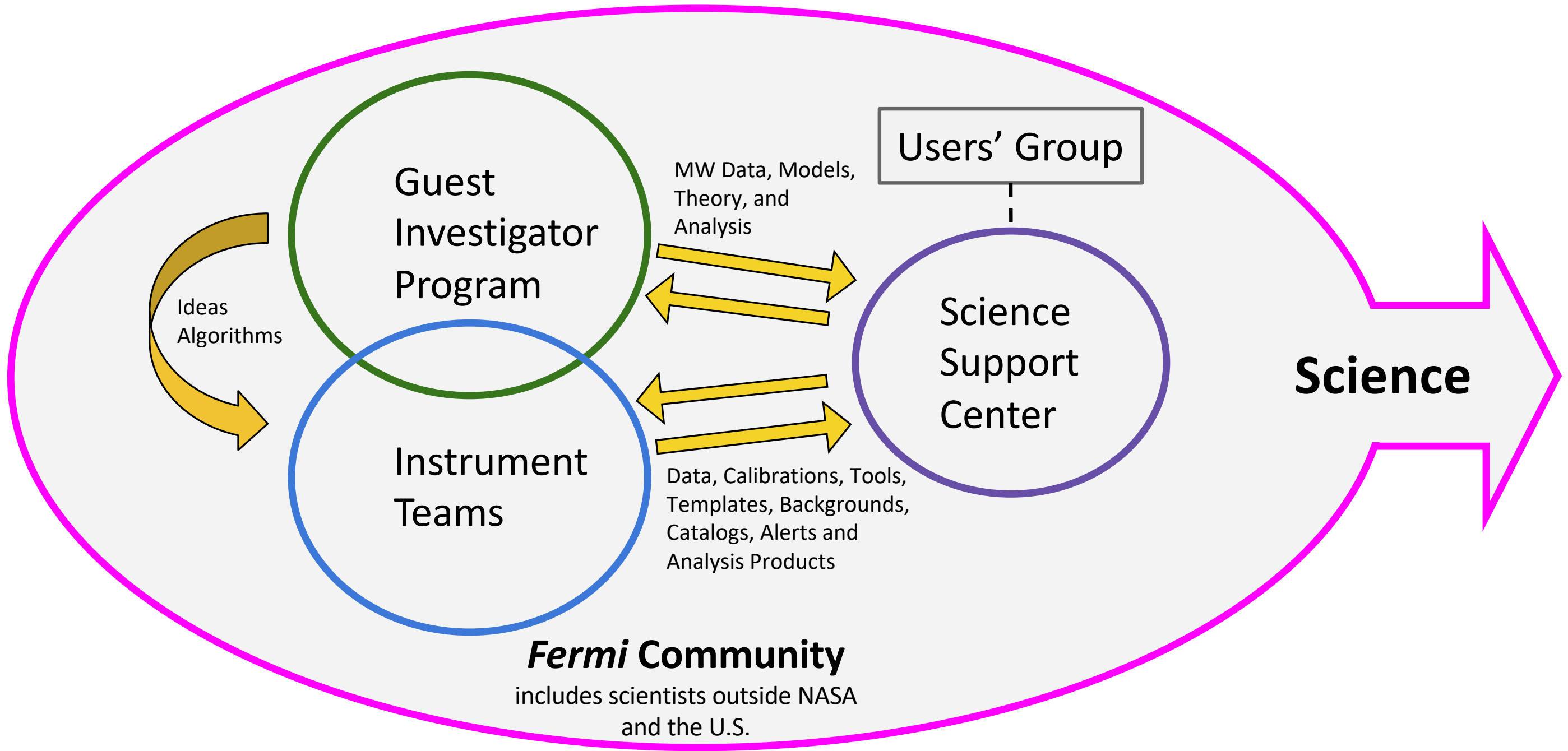
Gamma-ray Burst Monitor (GBM):

8 keV to 40 MeV

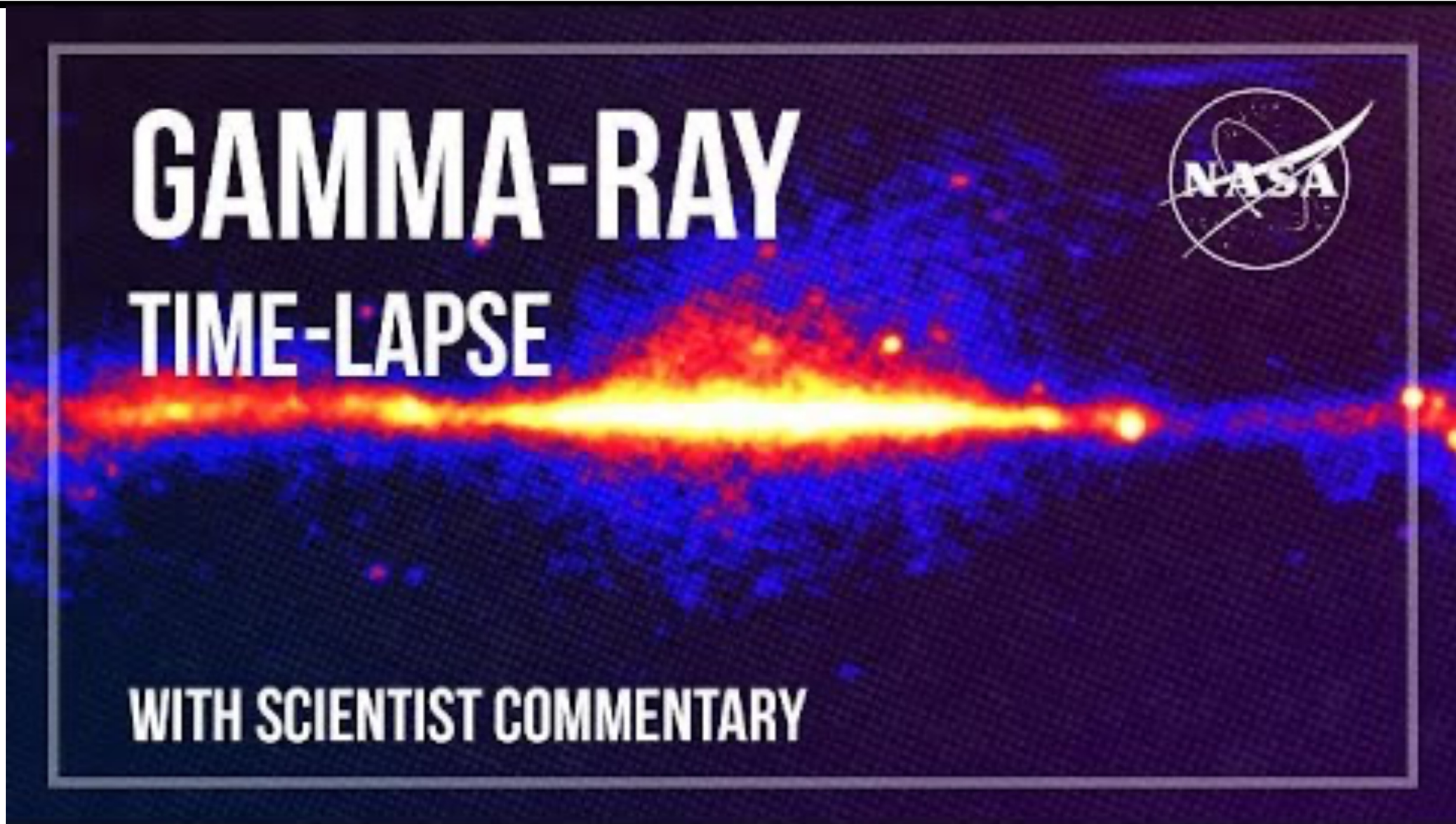
Views unocculted sky

- Community involvement is central to the mission
 - Guest Investigator program supports NASA-funded *Fermi* science
 - Data available publicly immediately after processing
- Science operations rely on integrated effort from instruments (LAT: SLAC/Stanford/NRL/ GSFC; GBM: MSFC/UAH), *Fermi* Science Support Center (FSSC; GSFC), and Flight Operations Team (FOT; GSFC)

Fermi Community Organization



14-years of gamma-ray observations in 6 minutes



<https://youtu.be/hYrpkYgcmHI?si=mBedSzp9OH-B6Lq8>

Fermi fireplace available here: <https://svs.gsfc.nasa.gov/14399>

