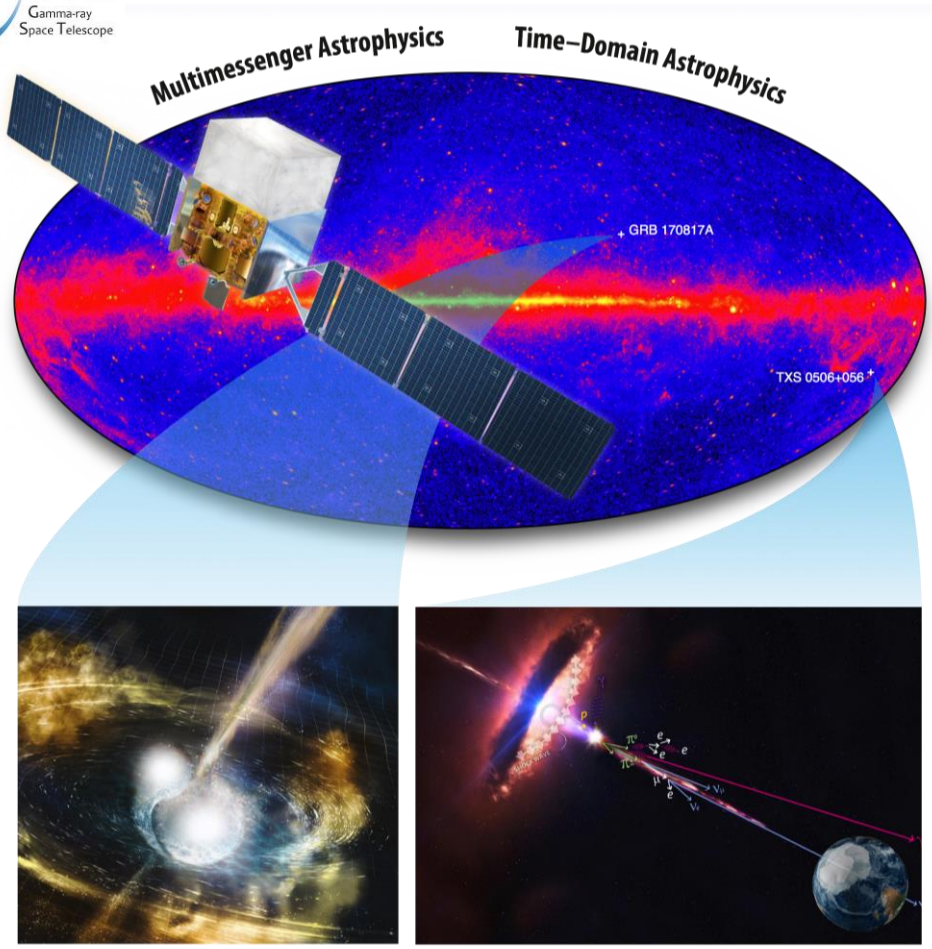


Highlights from *Fermi*

Liz Hays

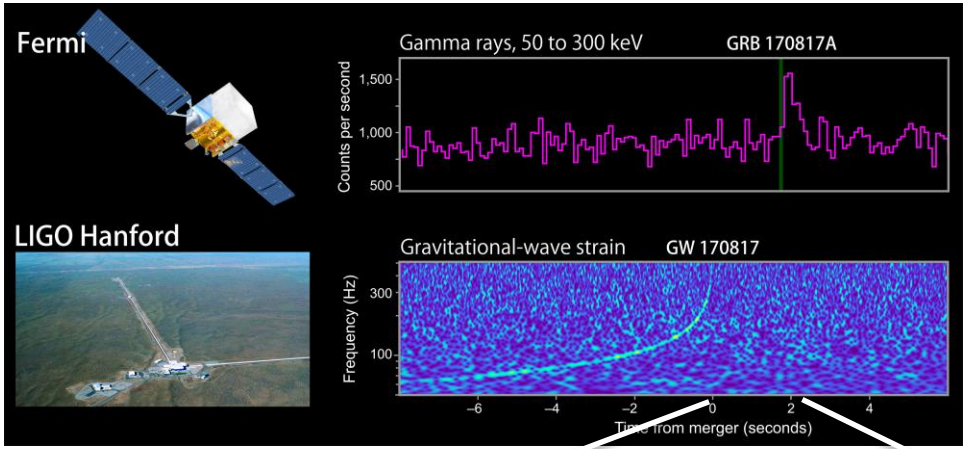
GammaSIG @ AAS 235

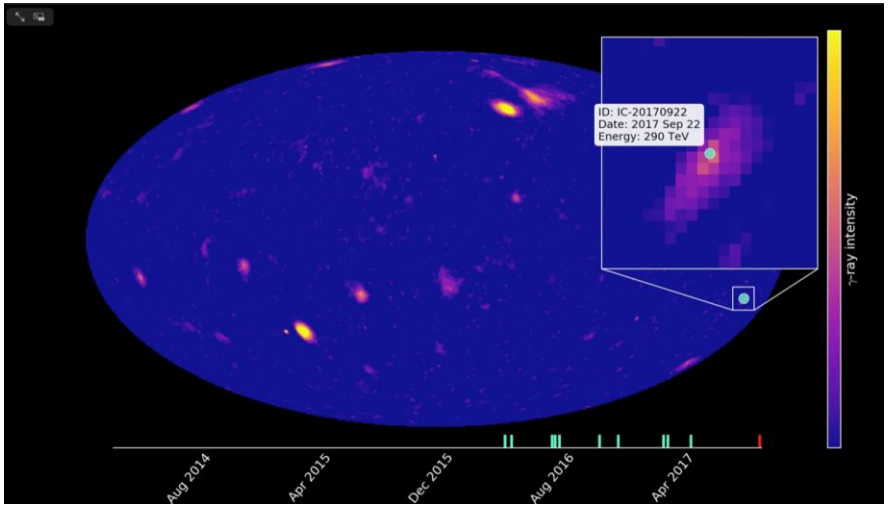
Mission Status

- ***Fermi* Mission extended** by 2019 NASA Senior Review of operating missions and invited to next review in 2022. Extension continues the all-sky survey, enhances the GI program and will expand products available for time domain studies.
- LAT Collaboration completed release of the 8-year catalog (4FGL) and interstellar emission model with companion AGN catalog (4LAC). Incremental updates planned.
- GBM team implemented updated transient search pipelines for LIGO O3 and has continued coordinated searches with LIGO/Virgo to generate public alerts.
- Instrument teams have continued to generate catalogs and data products to meet the changing needs of the community – Let us know what you need to do your science!
- Next ***Fermi* Summer School** May 26 to June 5 in Lewes, Delaware. https://fermi.gsfc.nasa.gov/science/mtgs/summerschool/
- Get funding to do *Fermi* science: **GI Cycle-13 deadline Feb. 19th.** https://fermi.gsfc.nasa.gov/ssc/proposals/

https://fermi.gsfc.nasa.gov

Eyes on the Multimessenger Sky

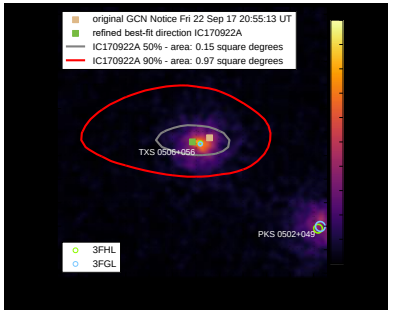




An important 2 seconds

Senior Review recognized *Fermi's*

- Uniqueness as an all-sky monitor in an important energy band not covered by other missions.
- Role in multimessenger and time-domain astronomy and synergies with NASA portfolio and with GW, neutrino, and VHE observatories.



Fermi Transient Searches

Transients Timescale Pipelines

Pipeline
Method
Timescale
Distribution
Status

LAT Transient Factor (LTF)
Likelihood Around GBM/BAT triggers
seconds to orbits
LAT Team - Results in GCNs
Triggered + Blind Search

***Fermi* All-sky Variability Analysis (FAVA)**
Counts Map Aperture Photometry
3 day (coming soon), 1 week
ATels, FAV catalogs
http://fermi.gsfc.nasa.gov/ssc/data/access/lat/FAVA/

LAT Burst Advocate Tool
Likelihood Around GBM/BAT triggers
100 s, 1000 s
LAT Team - Results in GCNs

GBM Targeted Search
ground search
ms - s
Temporal/Spatial Input

GBM Untargeted Search
ground search
ms - s
GCN Notices

GBM Onboard Triggers
rate triggers
16 ms - minutes
GCN Notices

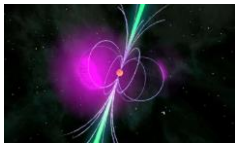
LAT Automated Science Processing (ASP) + Flare Advocates
Likelihood
6 & 24 hour
ATels, GCN notices (on AGN)

LAT Catalogs
Likelihood, associations
FGL, FHL, LAC, FLE, PSR
http://fermi.gsfc.nasa.gov/ssc/data/access/

μs ***ms*** ***s*** ***minutes*** ***hours*** ***days*** ***months*** ***years***

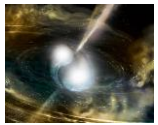
Photon Timing

Pulsars



Terrestrial γ-ray Flashes

GRBs

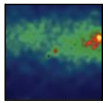


Magnetar Flares

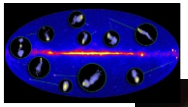
Solar Flares

All Sky Cadence

Novae

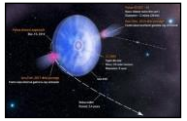


Blazar Flares



Crab Flares

γ-ray Binaries

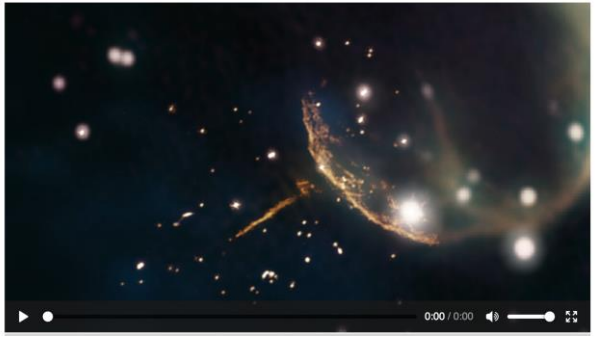


Not to scale

Recent Science Highlights

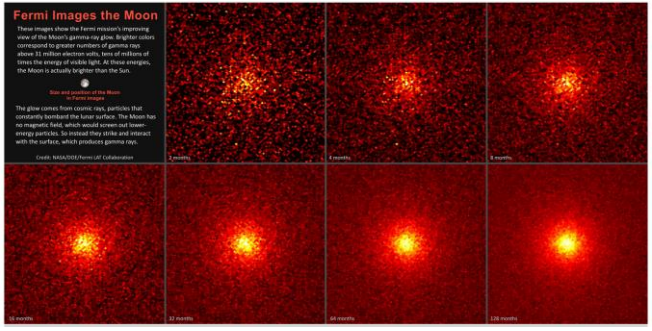
NASA's Fermi Satellite Clocks a 'Cannonball' Pulsar

Released on March 19, 2019



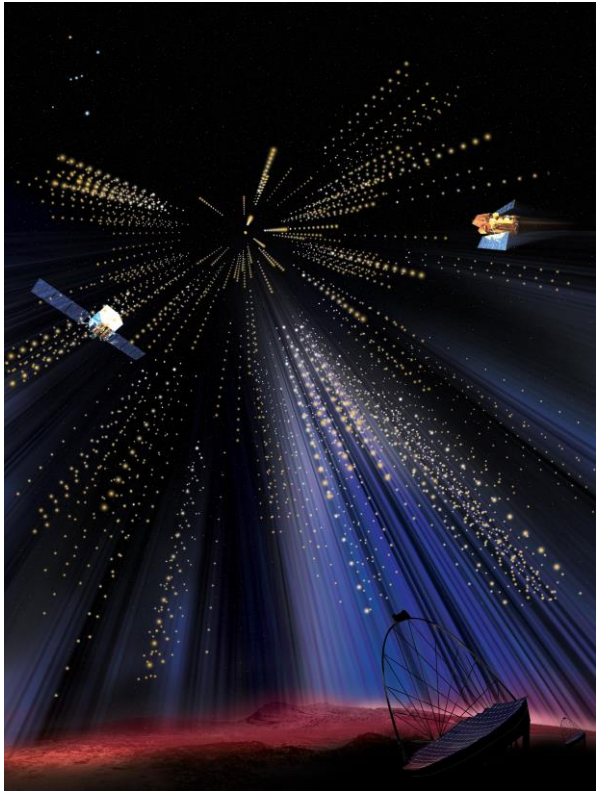
Fermi Sees the Moon in Gamma Rays

Released on August 15, 2019



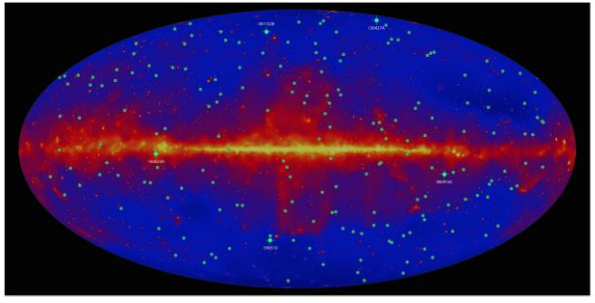
A New Era in Gamma-ray Science

Released on November 20, 2019



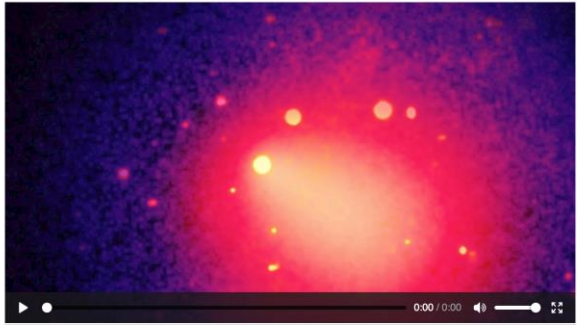
Ten Years of High-Energy Gamma-ray Bursts

Released on June 13, 2019



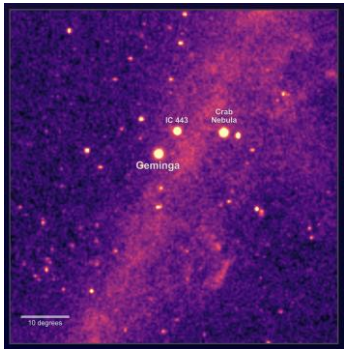
NASA's Fermi Finds Vast 'Halo' Around Nearby Pulsar

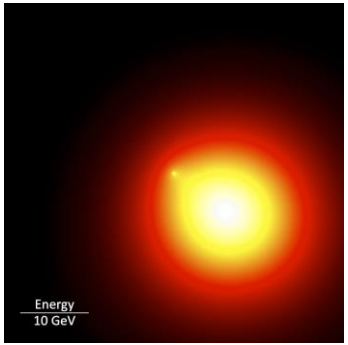
Released on December 19, 2019



Pulsar wind nebulae contribute to the positron excess

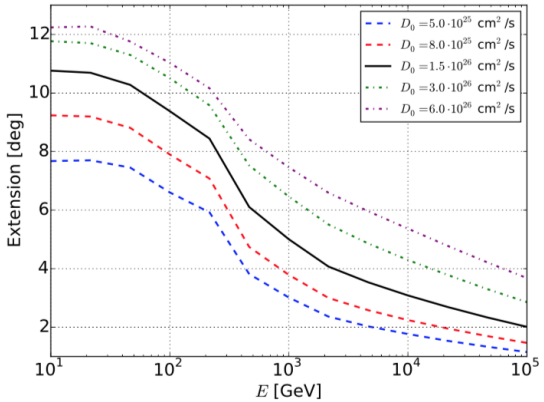
Geminga is a bright and nearby gamma-ray pulsar discovered in 1972 by SAS 2 and identified as a pulsar by ROSAT in 1991.



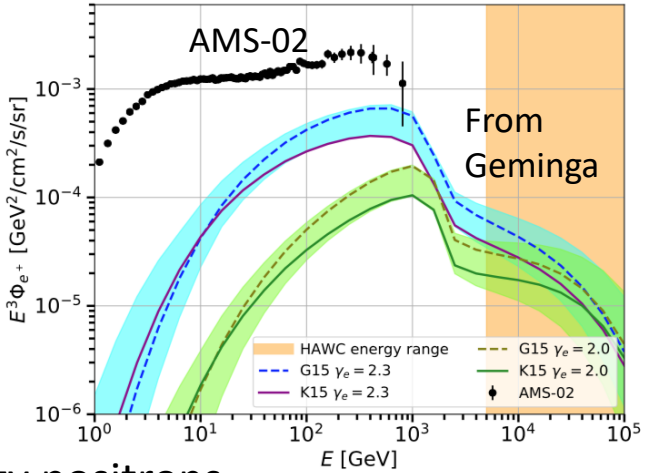


Di Mauro +, 2019, PRD

Calculated Inverse Compton extension



Positrons at Earth



Geminga could produce as much as 20% of the high-energy positrons.

https://www.nasa.gov/feature/goddard/2019/nasa-s-fermi-mission-links-nearby-pulsar-s-gamma-ray-halo-to-antimatter-puzzle/

9th International *Fermi* Symposium

Mar. 29 – Apr. 3, 2020
Johannesburg, South Africa

Late Registration deadline: Jan. 23
Poster submission still open

https://fermi.gsfc.nasa.gov/science/mtgs/symposia/2020/

Printed posters available at the Fermi Booth

2704 *Fermi* GBM GRBs