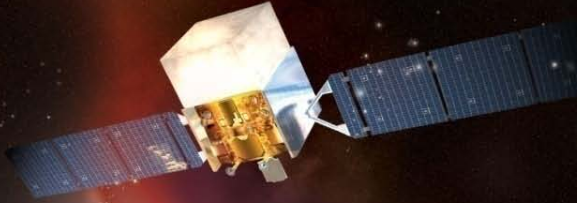




Fermi

Gamma-ray Space Telescope



Fermi

Gamma-ray Space Telescope

International Finance
Committee Meeting

Mission Status Update

J. McEnery

Status Highlights

- **Observatory is operating smoothly, FOT continues to look for ways to improve operations.**
 - **Reaction wheel life test complete**
 - **Teardown/disassembly underway**
 - **Updated spacecraft FSW to handle reduced wheel observation modes - code complete, currently testing.**
- **Level 1 requirements review, May 19. Passed!**
- **Fermi sessions coming up at AAS, AAAS, COSPAR**
- **Press and outreach coordination and planning, recent releases:**
 - **Surprises from PSR B1259-63**
 - **2FGL, Unid**
 - **MSP in globular cluster + >100 LAT pulsars + einstein@home featured in media telecon yesterday**
- **Updates to GI program**
 - **Double Suzaku X-ray allocation for cycle 5 (now)**
 - **In discussion with VERITAS and Arecibo for cycle 6**

Observations summary (since last meeting)

- **Almost exclusively in nominal data taking in survey mode**
 - 50 deg rocking angle from May 27 2009 onwards
- **ARRs (1-2 per month)**
 - Duration of ARR reduced to 2.5 hours (from 5 hours)
- **13 nadir survey mode observations**
 - 3 orbits at nadir (2.75 hours before observation, modify GBM trigger config to reduce chance of false triggers)
- **Pointed mode observation**
 - 3 days at the Sun during high solar activity
 - 2 days at the Galactic center for intensive MW campaign

	Sky Survey	ARR	T00/pointed	Engineering
2008	99.3%	0.4%	0%	0.3%
2009	97%	1.7%	0%	1.3%
2010	97.4%	0.9%	1.6%	0.1%
2011	93%	0.4%	6.2%	0.2%



Note increasing trend

Data/software releases

- **Recent LAT releases**
 - **2FGL - second LAT catalog**
 - **Updated diffuse model**
 - **Pass 7 data + associated sciencetools + IRFs release**
 - **Many thanks to all involved, especially the data processing/handling and documentation folks from ISOC and FSSC**
- **Recent GBM release**
 - **2-year GRB catalog delivered to FSSC**
- **Upcoming plans**
 - **LLE data**
 - **rsp2 files (detector response as function of time), LAT TTE (time tagged event) files with very limited set of variables -300 to + 300s around selected bursts**
 - **Pointlike**
 - **Evaluating possibility for release, likely as user contributed tool**

Fermi Symposia

4th Fermi symposium in Monterey, California in Oct 28-Nov 2 2012.



III Fermi Symposium

The 2011 Fermi Symposium is dedicated to results and prospects for scientific exploration of the Universe with the Fermi Gamma-ray Space Telescope and related studies.

Topics include: blazars and other active galactic nuclei, pulsars, gamma-ray bursts, supernova remnants, diffuse gamma radiation, unidentified gamma-ray sources, and searches for dark matter. Multi-messenger and multi-wavelength contributions to these topics are welcome.

Scientific Organizing Committee

- W. Atwood (GSFC)
- B. Balogh (Liverpool)
- R. Bellazzini (INFN, Pisa)
- A. Breuhaus (Garching)
- K. Bechtold (Berkeley)
- E. Bellini (FISAC)
- P. Carosi (INAF, Rome)
- V. Condonetti (ITA, Houston)
- C. Coburn (JPL)
- S. D'Agostini (INAC)
- A. Di Marco (FISAC)
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- C. Tonry (JPL)
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- V. Vianello (ITA, Rome Tor Vergata)

ROMA

9-12 May, 2011

The Symposium is being held at the Aula Magna, University of Rome "La Sapienza", P.le Aldo Moro, Rome

Contact: fermi_symposium@roma1.infn.it <http://fermi.gsfc.nasa.gov/fermicollab/symposium/2011/>



- **3rd Fermi Symposium - May 9-12, 2011**
 - **309 posters, 83 talks, 399 people**

Two weeks of science and analysis in Lewes

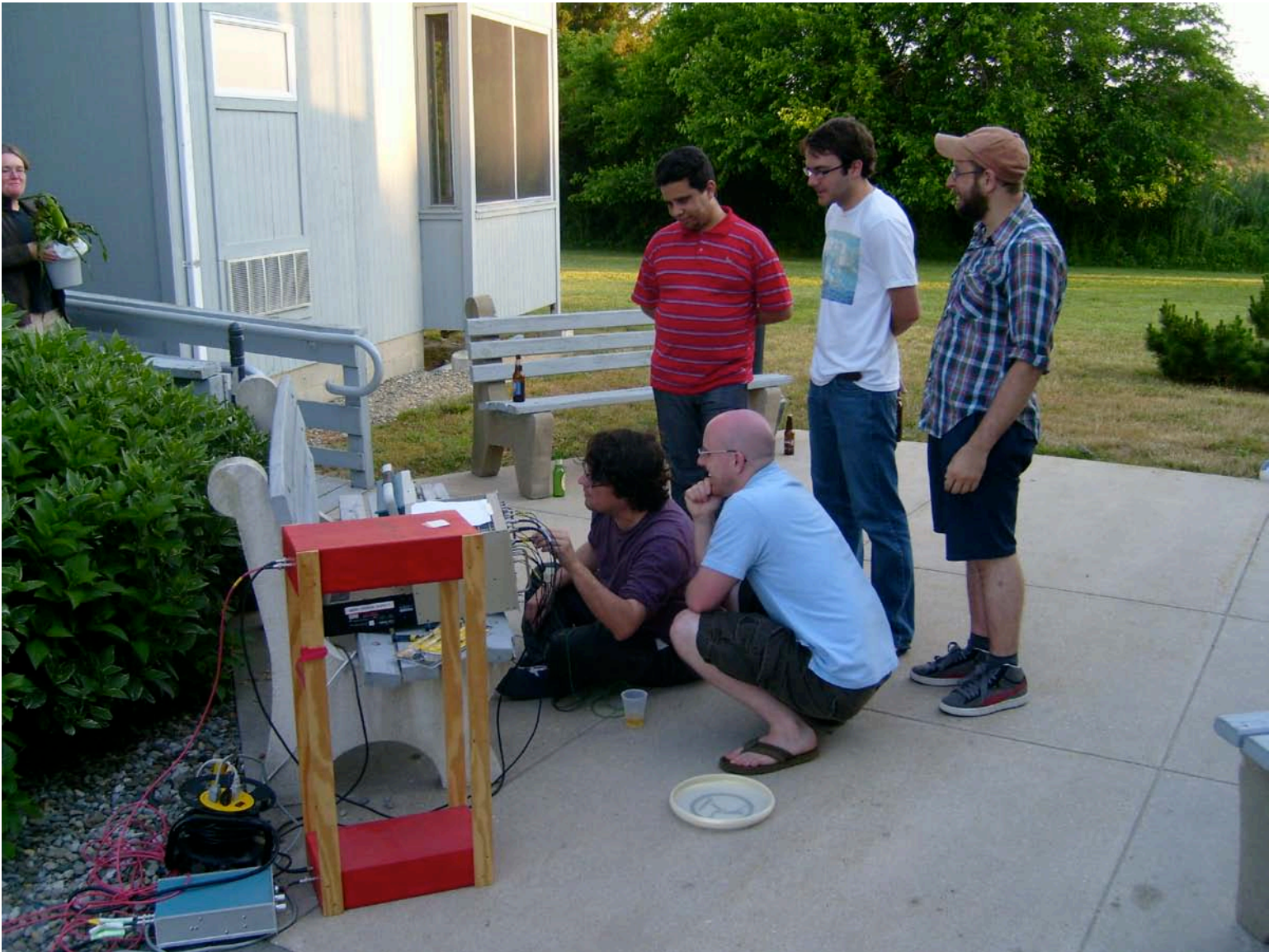


Fermi Summer School 2011 - Lewes, Delaware

People and Activities

- 10 days
- 25 students (grad students and post-docs from 20 US and non-US institutions)
- 5 core instructors
 - Chuck Dermer (fundamentals of HE astro), Benoit Lott (AGN, LAT analysis), Eric Charles (LAT Instrument), Gernot Maier (TeV - Imaging Cherenkov), John Pretz (TeV - Water Cherenkov)
- 11 supplemental instructors and lecturers
 - FSSC tutorials, GeV/TeV astrophysics (pulsars, GRBs, SNR/PWN, binaries, dark matter)
- Afternoons devoted to tutorials and hands-on analysis projects (e.g. LAT science analysis, recreating response for LAT, TeV telescopes)
 - Specialty simulation sets for LAT, air shower generated Cherenkov light and particles on the ground
- Planning for next school is underway, we will keep the same theory/phenomena/instrumental/technique balance, but pick a specific theme for the hands on sessions. Options include:
 - Galactic astrophysics in the Fermi era or Fermi beyond the Galaxy or Fermi beyond standard physics

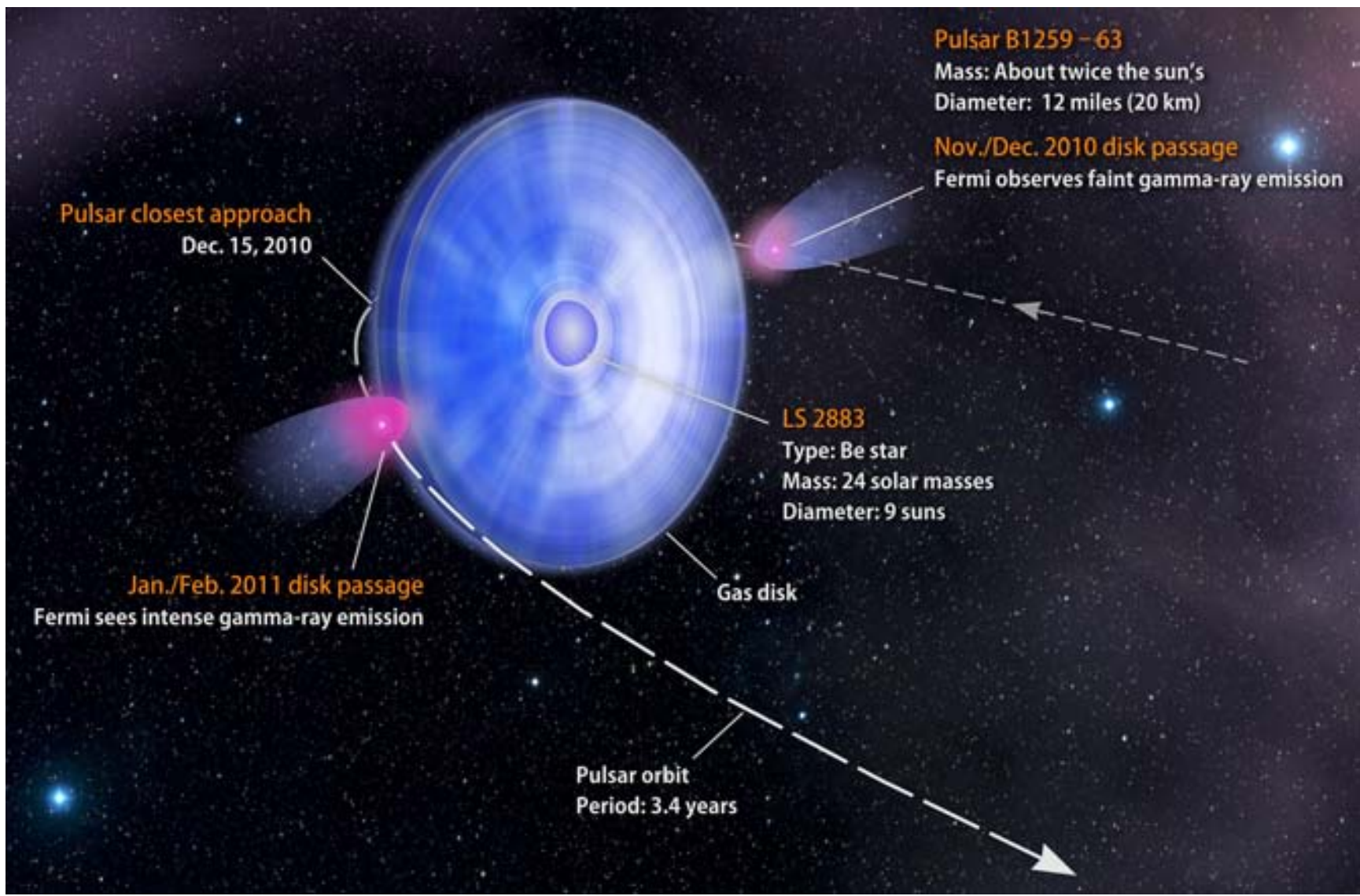
Hardware: Muons



Hardware: Optical & Cherenkov

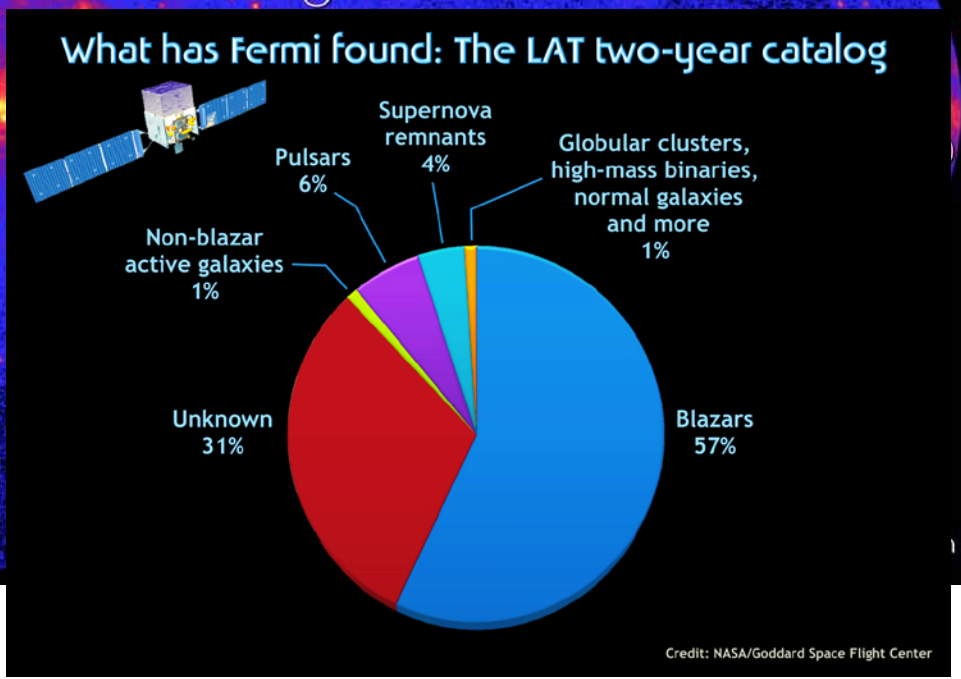
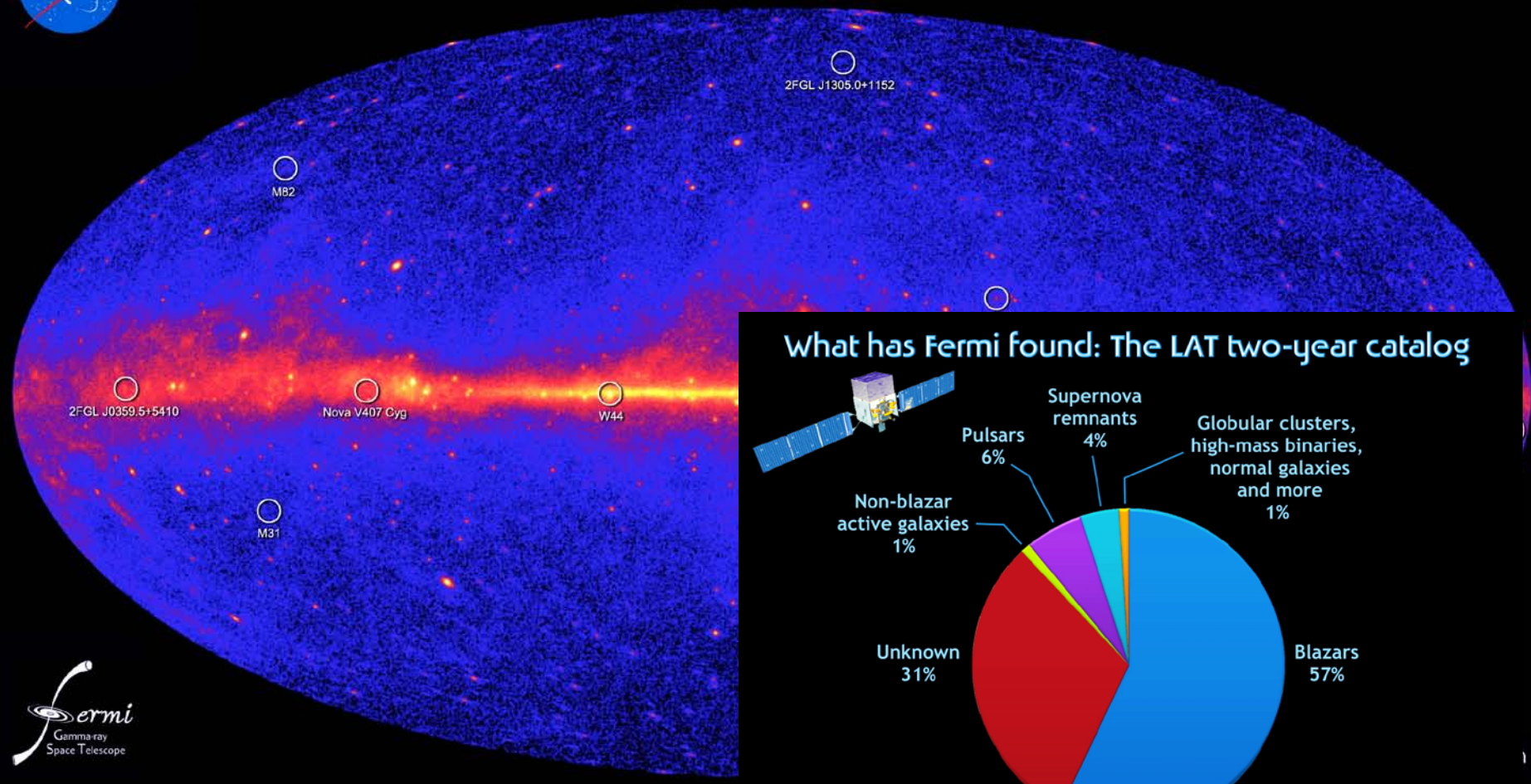


Press releases - PSR B1259-63



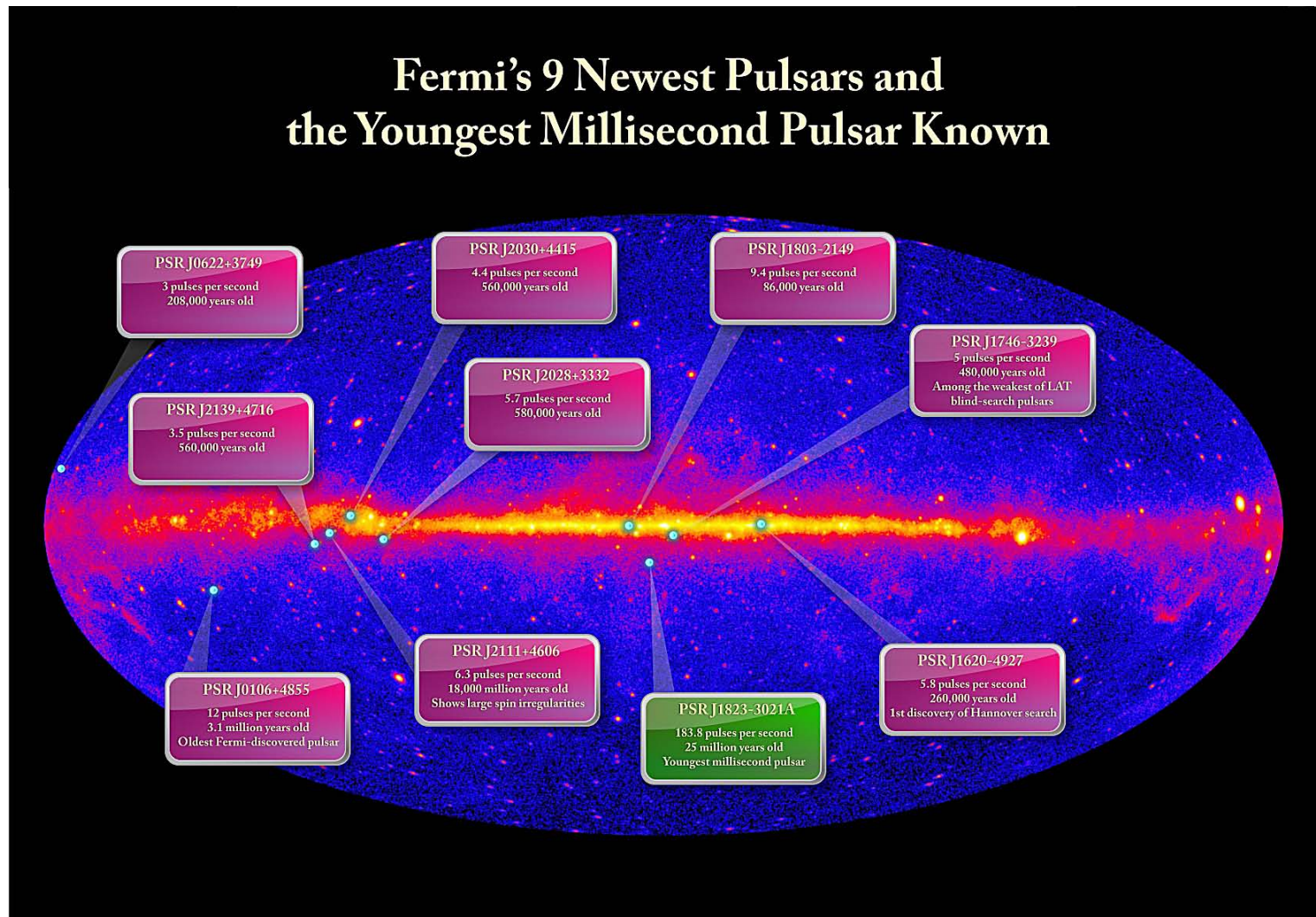


Fermi two-year all-sky map



Press Releases - Pulsars

Fermi's 9 Newest Pulsars and the Youngest Millisecond Pulsar Known



- <http://www.nasa.gov/externalflash/fermipulsar/>

Senior Review Proposal - Goals

- **Strong science case for extended operations**
 - **We want to be ranked highly - ideally first**
 - **Highlight new science opportunities**
 - **Longer baseline/deeper exposure**
 - **New MW opportunities**
 - **Operations/analysis initiatives**

Proposal timeline

- LAT/GBM collaboration provide science inputs and ops/analysis ideas on confluence pages (done)
- Selected science topics written up in short documents by section writers (done)
- Small core group of proposal writers (Julie, Dave Thompson, Judy Racusin and Seth Digel). With all the science inputs, we have:
 - Defined some broader science themes and lay out the structure of the proposal
 - solicited additional input/help, as needed
 - Produced first draft of the science section of the senior review proposal this week (now start iterating...)
- Review by LAT/GBM team, users group, red team review
- Proposals due January 18.
- Presentation Feb 28 - March 1


Section Writers/study groups

- **AGN** - Alan Marscher, Stefan Wagner, Anita Reimer, Lukasz Stawarz
- **SNR/PWN** - Don Ellison, Yasunobu Uchiyama, Jack Hewitt
- **EBL/EGB/IGMF** - Chuck Dermer, Marco Ajello
- **Magnetars** - Anna Watts, Chryssa Kouveliotou, Matthew Baring
- **GRB** - Soeb Razzaque, Peter Meszaros, Nicola Omodei
- **Dark Matter & New Physics** - Elliott Bloom, Savvas Koushiappas, Steve Ritz
- **Galaxies/diffuse** - Seth Digel, Andy Strong, Jurgen Knodelseder
- **Solar studies** - Gerry Share, Brian Dennis
- **Pulsars** - Alice Harding, Paul Ray, Scott Ransom
- **GBM and LIGO Synergy** - Imre Bartos, Lindy Blackburn, Jordan Camp, Valerie Connaughton, Peter Shawhan, Nora Troja, Michel Was

Proposal Outline

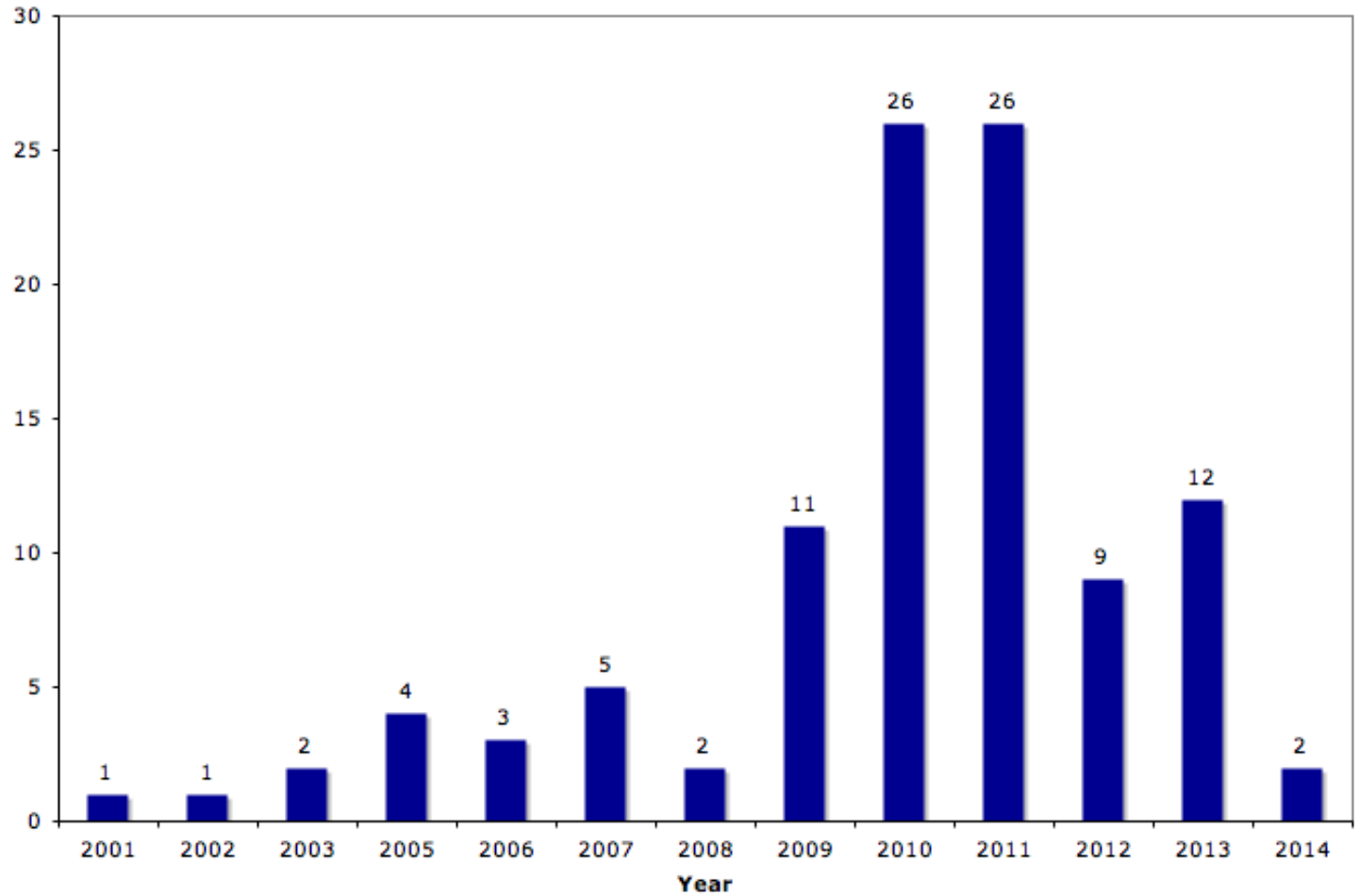
FSR_proposal.pdf

Comment Share

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Metrics on Fermi's impact

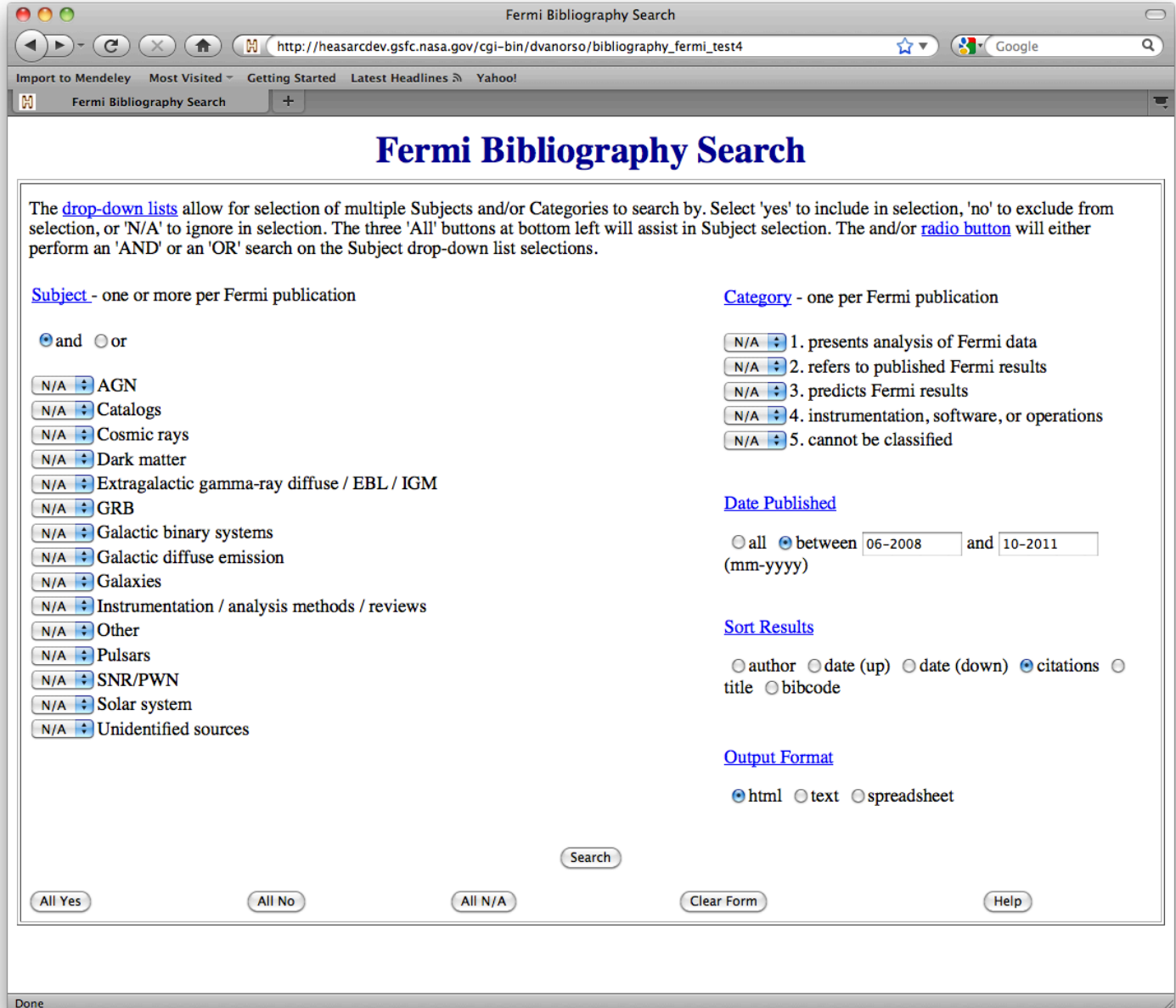
Student theses per year



Fermi Bibliography

1071 papers
in total

838 papers
6/2008-
9/2011



The [drop-down lists](#) allow for selection of multiple Subjects and/or Categories to search by. Select 'yes' to include in selection, 'no' to exclude from selection, or 'N/A' to ignore in selection. The three 'All' buttons at bottom left will assist in Subject selection. The and/or [radio button](#) will either perform an 'AND' or an 'OR' search on the Subject drop-down list selections.

[Subject](#) - one or more per Fermi publication

and or

- AGN
- Catalogs
- Cosmic rays
- Dark matter
- Extragalactic gamma-ray diffuse / EBL / IGM
- GRB
- Galactic binary systems
- Galactic diffuse emission
- Galaxies
- Instrumentation / analysis methods / reviews
- Other
- Pulsars
- SNR/PWN
- Solar system
- Unidentified sources

[Category](#) - one per Fermi publication

- 1. presents analysis of Fermi data
- 2. refers to published Fermi results
- 3. predicts Fermi results
- 4. instrumentation, software, or operations
- 5. cannot be classified

[Date Published](#)

all between and
(mm-yyyy)

[Sort Results](#)

author date (up) date (down) citations title bibcode

[Output Format](#)

html text spreadsheet

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Papers sorted by Citation Count

Search Results

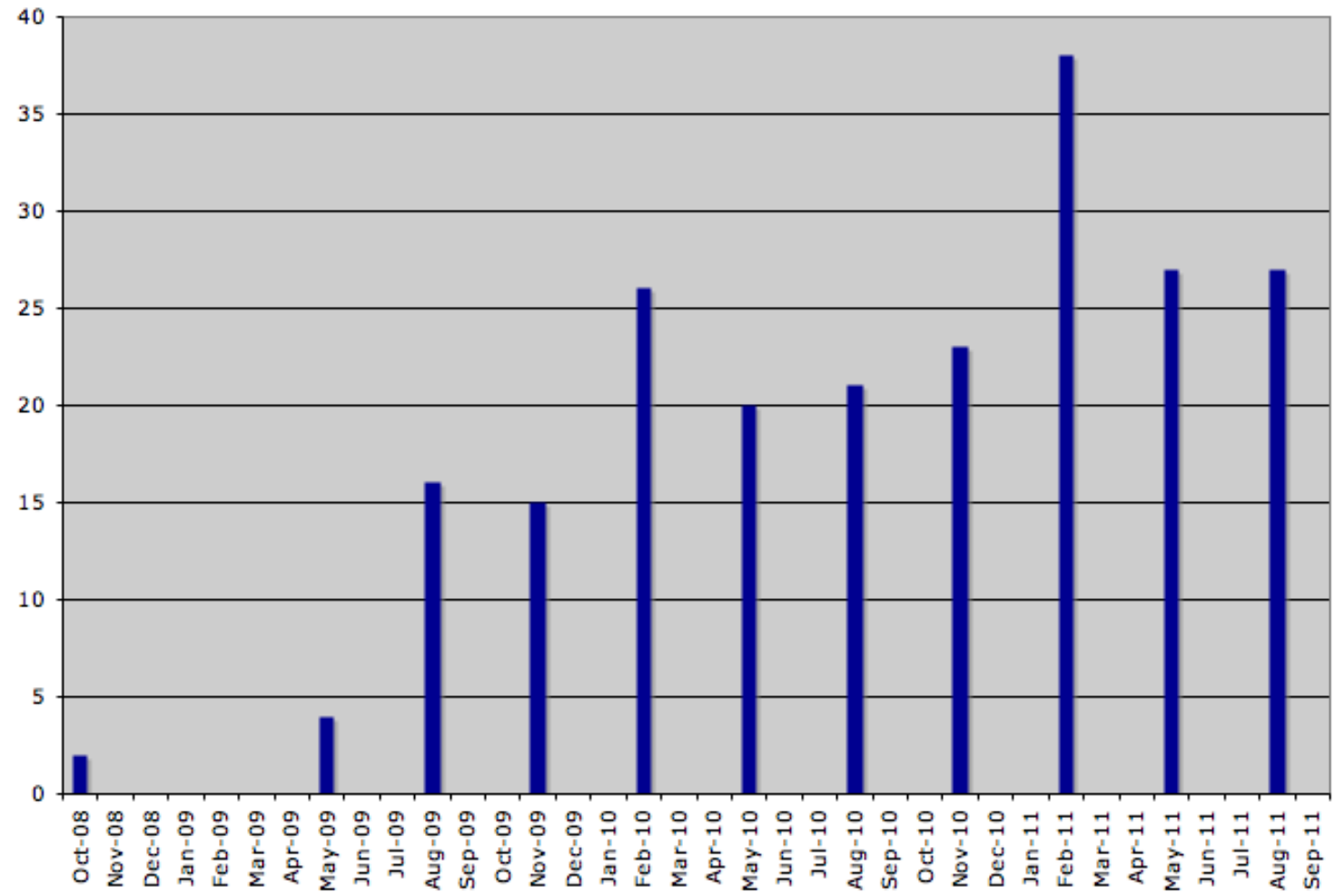
http://heasarcdev.gsfc.nasa.gov/cgi-bin/dvanorso/bibliography_fermi_test4

Import to Mendeley Most Visited Getting Started Latest Headlines Yahoo!

Search Results

Title	Author	Date Published	Bibcode with link to the ADS	Subjects	Category	No. of Citations
Measurement of the Cosmic Ray $e^+ + e^-$ Spectrum from 20GeV to 1TeV with the Fermi Large Area Telescope	Abdo, A. A.	May 2009	2009PhRvL.102r1101A	Instrumentation / analysis methods / reviews; Dark matter;	Presents analysis of Fermi data	512
The Large Area Telescope on the Fermi Gamma-Ray Space Telescope Mission	Atwood, W. B.	Jun 2009	2009ApJ...697.1071A	Other;	Instrumentation, software, or operations	509
Model-independent implications of the e, p - cosmic ray spectra on properties of Dark Matter	Cirelli, M.	May 2009	2009NuPhB.813....1C	Dark matter;	Predicts Fermi results	297
Fermi Large Area Telescope First Source Catalog	Abdo, A.A., et al.	Jun 2010	2010ApJS..188..405A	AGN; Catalogs; Galactic binary systems; Galaxies; Pulsars; SNR/PWN;	Presents analysis of Fermi data	264
Fermi/Large Area Telescope Bright Gamma-Ray Source List	Abdo, A. A.	Jul 2009	2009ApJS..183..46A	Catalogs;	Presents analysis of Fermi data	256
Pulsars as the sources of high energy cosmic ray positrons	Hooper, Dan	Jan 2009	2009JCAP...01..025H	Dark matter; Pulsars;	Predicts Fermi results	238
Bright Active Galactic Nuclei Source List from the First Three Months of the Fermi Large Area Telescope All-Sky Survey	Abdo, A. A.	Jul 2009	2009ApJ...700..597A	AGN; Catalogs;	Presents analysis of Fermi data	231
Fermi Observations of High-Energy Gamma-Ray Emission from GRB 080916C	Abdo, A. A.	Mar 2009	2009Sci...323.1688A	Gamma-ray bursts;	Presents analysis of Fermi data	221
The First Fermi Large Area Telescope Catalog of Gamma-ray Pulsars	Abdo, A.A., et al.	Apr 2010	2010ApJS..187..460A	Catalogs; Pulsars;	Presents analysis of Fermi data	175
A limit on the variation of the speed of light arising from quantum gravity effects	Abdo, A. A.	Nov 2009	2009Natur.462..331A	Gamma-ray bursts;	Presents analysis of Fermi data	141
Spectrum of the Isotropic Diffuse Gamma-Ray Emission Derived from First-Year Fermi Large Area Telescope Data	Abdo, A.A., et al.	Mar 2010	2010PhRvL.104j1101A	Extragalactic gamma-ray diffuse / EBL / IGM;	Presents analysis of Fermi data	141
The First Catalog of Active Galactic Nuclei Detected by the Fermi Large Area Telescope	Abdo, A.A., et al.	May 2010	2010ApJ...715..429A	AGN; Catalogs;	Presents analysis of Fermi data	140
On possible interpretations of the high energy electron-positron spectrum measured by the Fermi Large Area Telescope	Grasso, D.	Sep 2009	2009APh...32..140G	Dark matter; Pulsars; Cosmic rays;	Refers to published Fermi results	134
Case for a 700+GeV WIMP: Cosmic ray spectra from PAMELA, Fermi, and ATIC	Cholis, I., et al.	Dec 2009	2009PhRvD..80l3518C	Dark matter; Cosmic rays;	Refers to published Fermi results	124
Fermi Observations of GRB 090902B: A Distinct Spectral Component in the Prompt and Delayed Emission	Abdo, A. A.	Nov 2009	2009ApJ...706L.138A	Gamma-ray bursts;	Presents analysis of Fermi data	109
Pre-launch estimates for GLAST sensitivity to dark matter annihilation signals	Baltz, E.A., et al.	Jul 2008	2008JCAP...07..013B	Dark matter; Galactic diffuse emission;	Predicts Fermi results	108
Can the WIMP annihilation boost factor be boosted by the Sommerfeld enhancement?	Lattanzi, Massimiliano	Apr 2009	2009PhRvD..79h3523L	Dark matter; Galactic diffuse emission;	Predicts Fermi results	103
Dark Matter Interpretation of Recent Electron and Positron Data	Bergström, Lars	Jul 2009	2009PhRvL.103c1103B	Dark matter; Cosmic rays;	Presents analysis of Fermi data	89
Observations of Milky Way Dwarf Spheroidal Galaxies with the Fermi-Large Area Telescope Detector and Constraints on Dark Matter Models	Abdo, A.A., et al.	Mar 2010	2010ApJ...712..147A	Dark matter; Galaxies;	Presents analysis of Fermi data	88

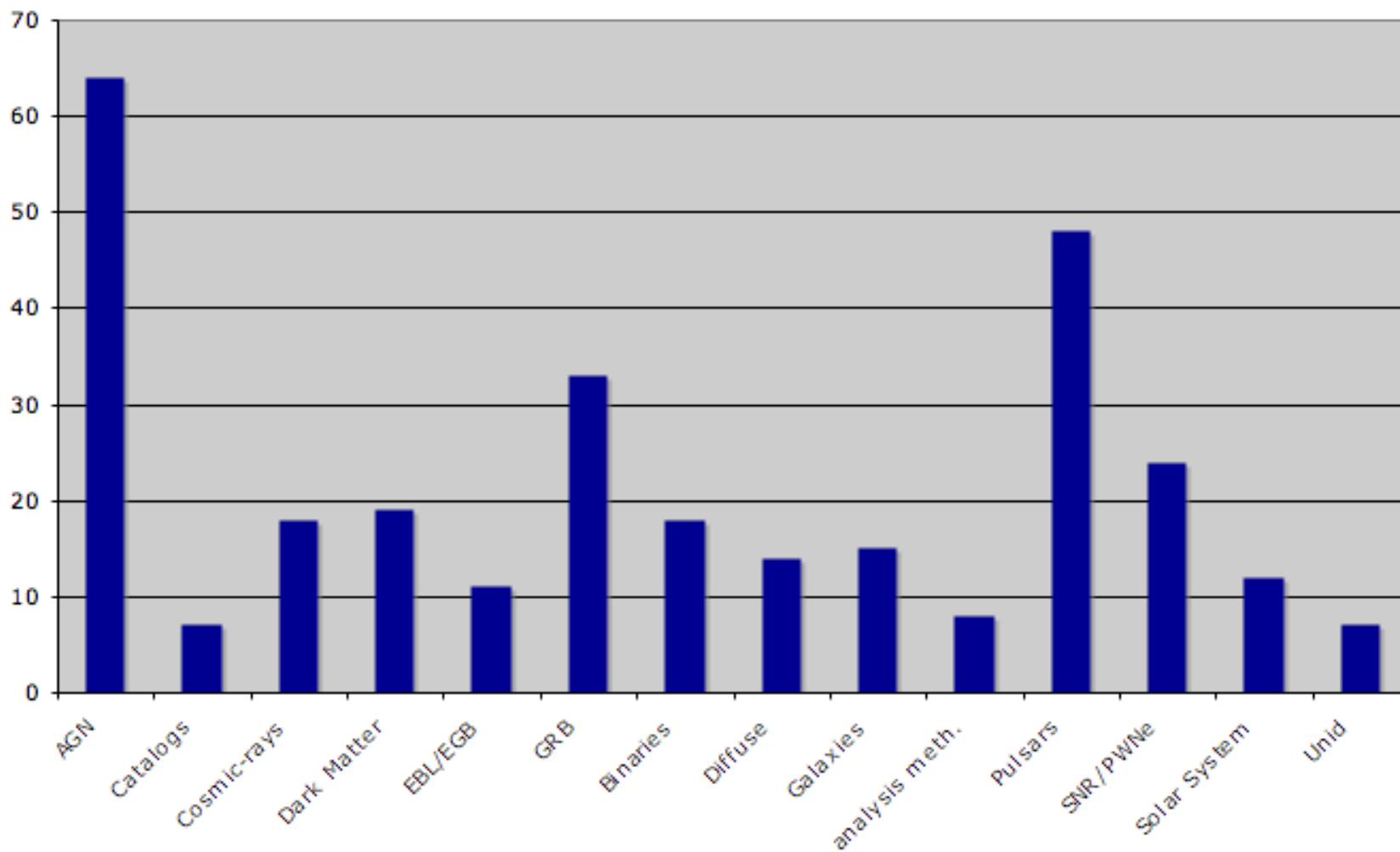
Papers presenting a new analysis



3 month bins, people are clearly productive during and just after Christmas!

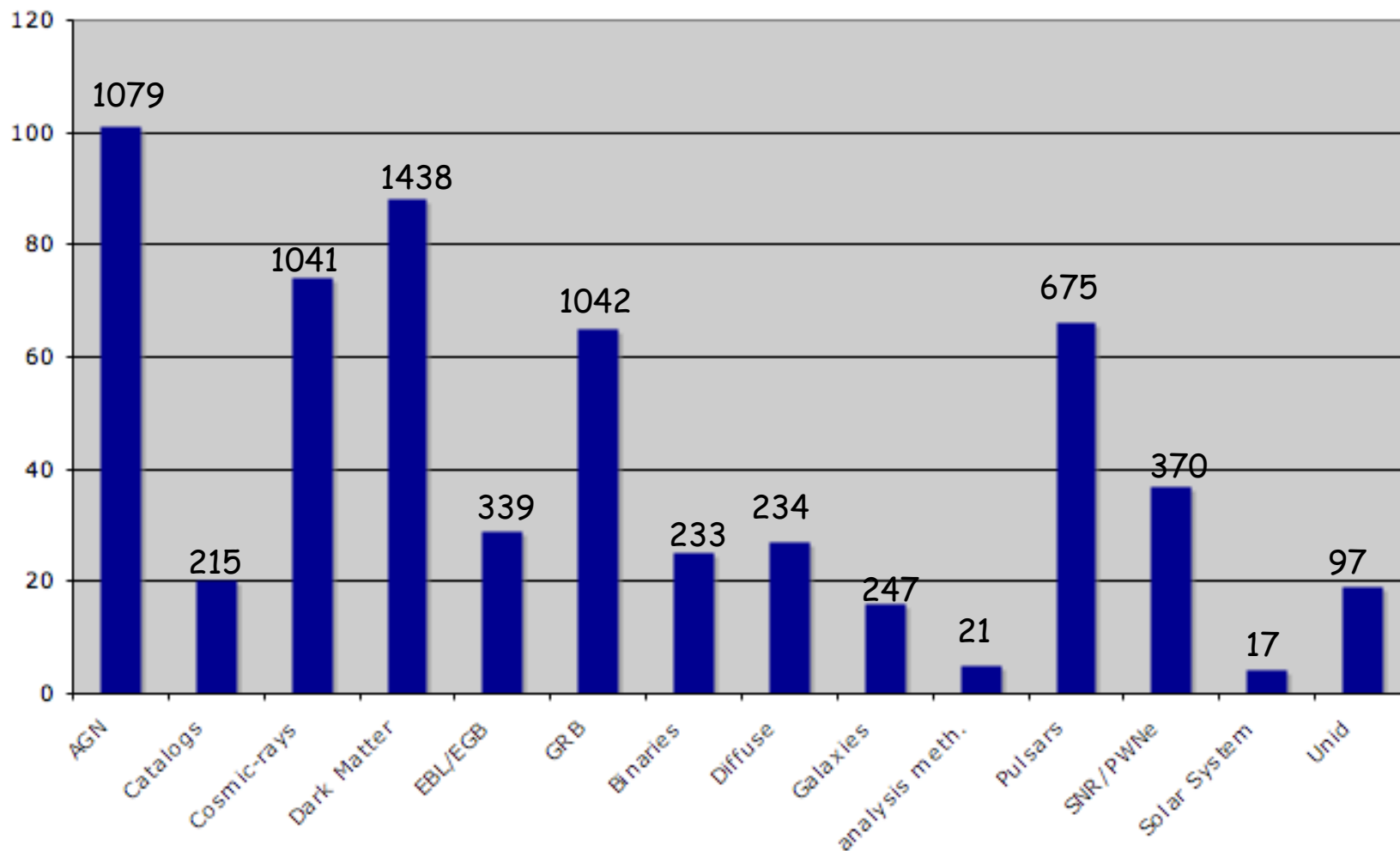
Topics - new analysis

Topics for Papers Presenting New Analysis of Fermi Data



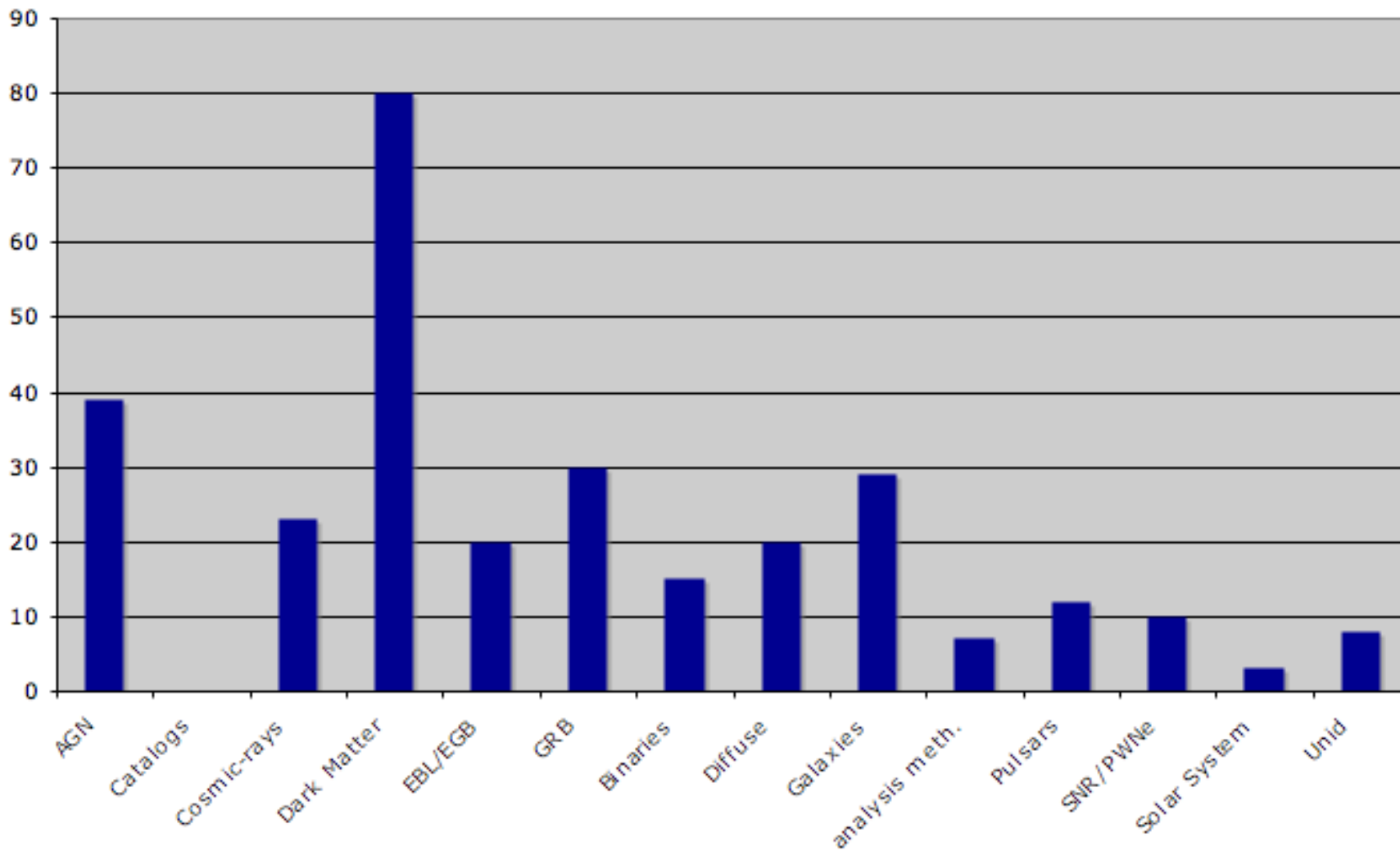
Topics - interpretation/MW follow up

Topics for Papers referring to Fermi Results



Topics - Predictions

Topics for Papers that Predict Fermi Results



Summary

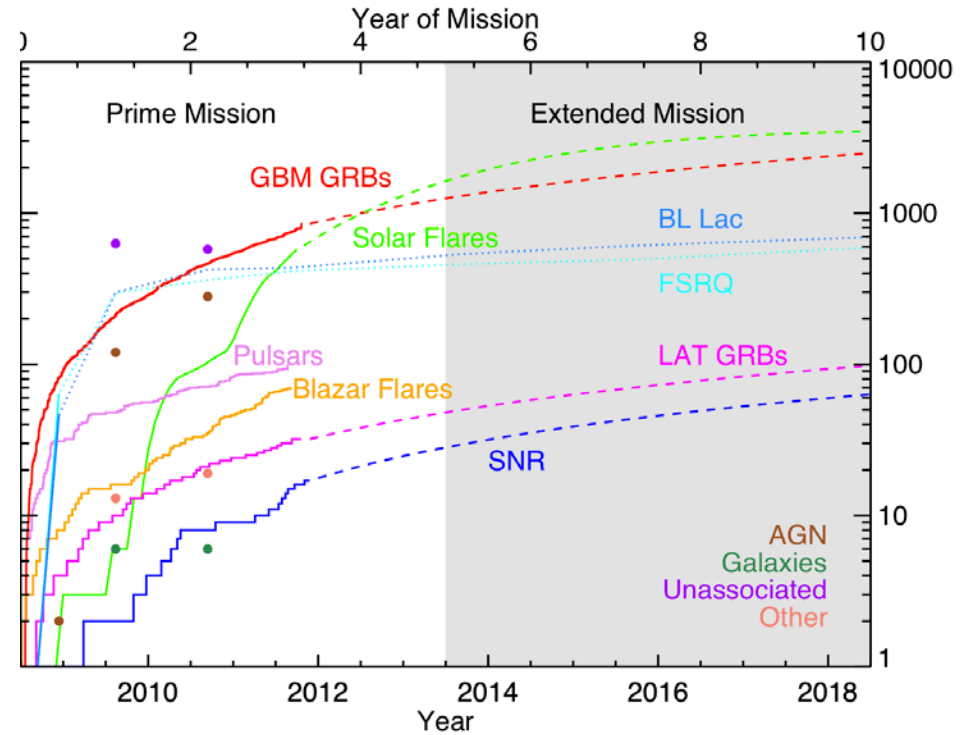
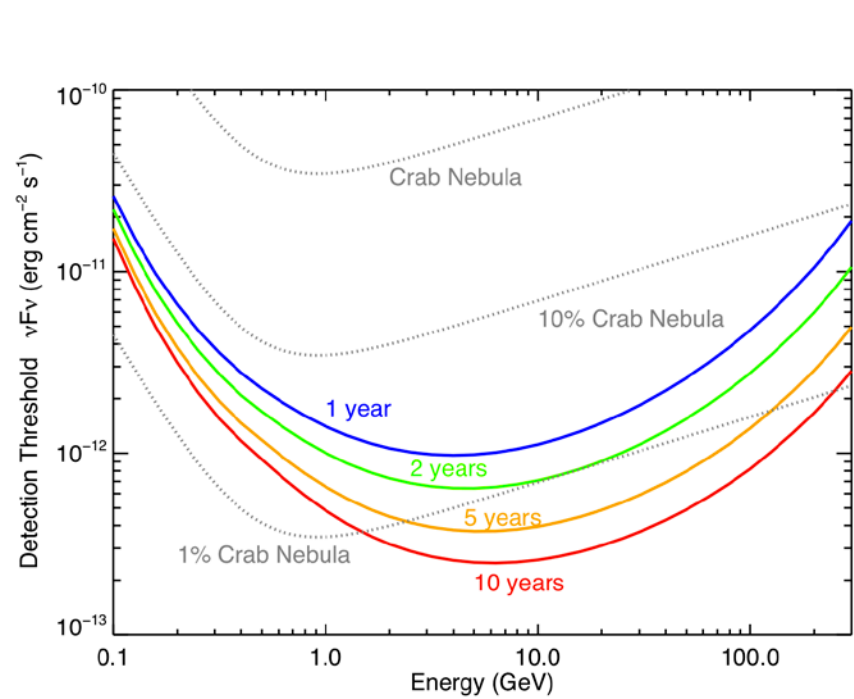
- **Observatory is operating smoothly**
- **Continuing to expand our connections with other missions/observatories through the GI program**
- **All metrics point to a rising trend in science output (papers, PhD theses etc)**
- **Questions?**

Hands-On Sessions



Increased exposure -> Improved sensitivity

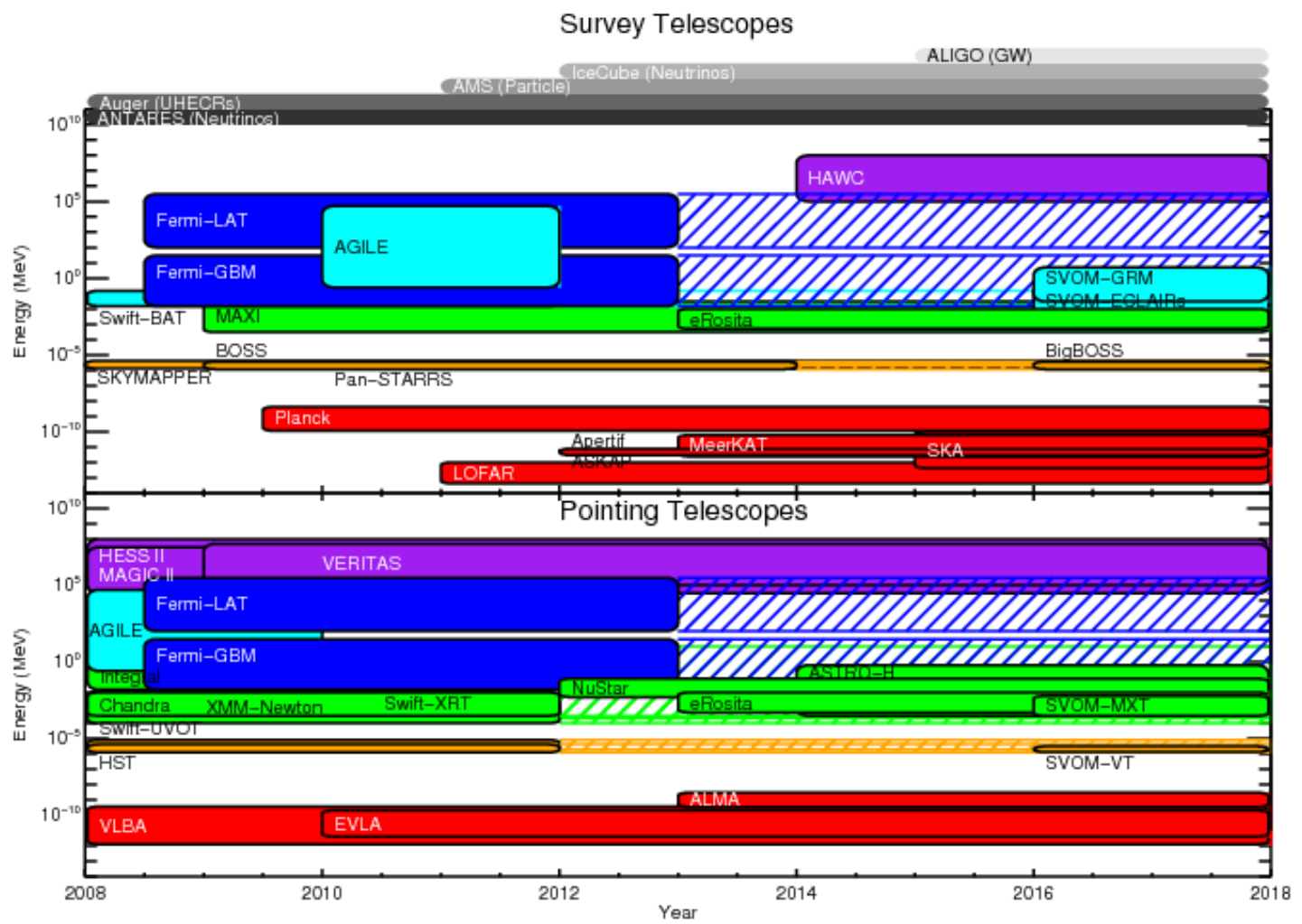
- **New source classes**
 - Galaxy clusters, dark matter...
- **Population studies**
 - Improved population studies of extragalactic sources allow a better calculation of the contributions to the EGB and thus better constraints on diffuse contributions (dark matter etc)
 - Pulsar populations
 - ***lots* more ideas here**



Synergies with other Observatories

- **Advanced LIGO**
 - **GBM most prolific detector for GRB (especially short GRB)**
 - **Significantly improve ALIGO sensitivity (by providing trigger time, localisation) - need to quantify this; and quantify the rate of short GRB within LIGO FoV**
 - **Huge science breakthrough with joint GW, EM observations of GRB**
- **Wide field survey instruments (Fermi is a wide field instrument ready to join with the upcoming bonanza of wide-field field instruments)**
 - **SKA/LOFAR - science case?**
 - **Pan-STARS, SKYMAPPER, LSST - science case?**
 - **SVOM, Swift BAT**
 - **HAWC**
- **TeV Observatories (H.E.S.S. II, MAGIC II, CTA, VERITAS)**
- **Operating observatories**
 - **Unique spot in the EM spectrum (only GeV instrument for the foreseeable future),**
 - **Role of Fermi within the portfolio of current missions and observatories - Chandra, HST, Swift, VLBA etc (what new things can we do in the future?)**

Multiwavelength Opportunities



Some ops/analysis ideas

- **Publication quality ASP/RSP lightcurves**
- **Rapid release of LLE lightcurves during solar flares**
- **Improvements in GRB blind search algs -> More (and quicker) detections**

- **Limb observations to improve positron studies**

- **Stare at galactic center or LMC for pulsar searches**
 - **Look for pulsar around Sgr A***
- **Observation strategies/alg development for intermediate duration transients**

- **Pass 8**
- **Error ellipses on sky - localization + spatial study improvements**