



# Fermi

Gamma-ray Space Telescope

## Fermi LAT

### --≡ Gruppo 2 ≡--

**Denis Bastieri**  
**Sara Buson**  
**Graziano Chiaro**  
**Stefano Ciroi**  
**Piero Rafanelli**  
**Riccardo Rando**

# Summary of Fermi LAT science publications

14 July 2014

## Category I and II papers in refereed journals

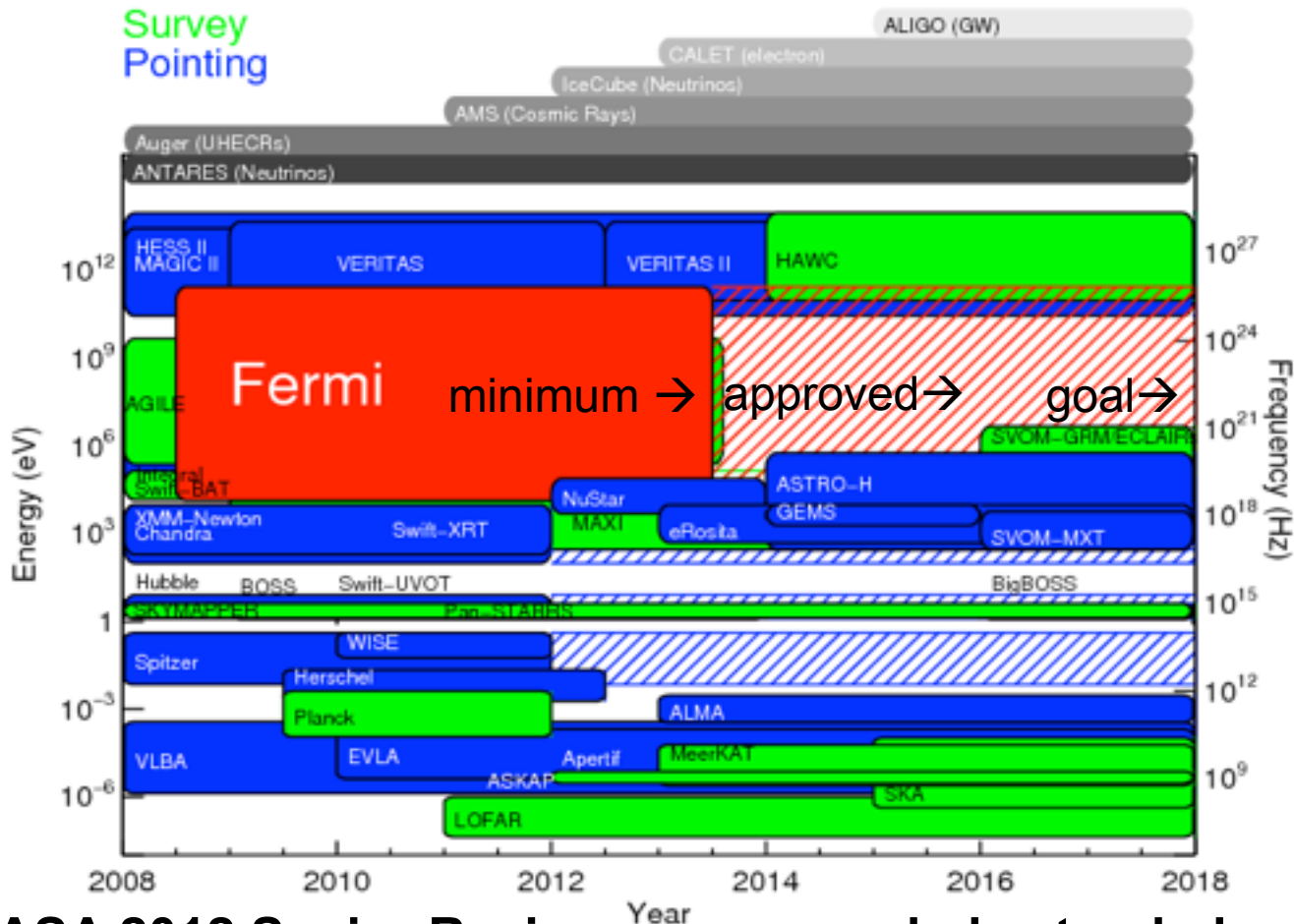


| Journal  | Published          | In press     | Total      |
|--|--------------------|--------------|------------|
| Advances in Space Research                     | 0+1=1              | -            | 1          |
| Astronomy and Astrophysics                     | 6+30=36            | 0+3=3        | 39         |
| Astroparticle Physics                          | 2+6=8              | -            | 8          |
| Astrophysical Journal                          | 81+60=141          | 0+1=1        | 142        |
| Astrophysical Journal Letters                  | 22+20=42           | -            | 42         |
| Astrophysical Journal Supplement               | 8+2=10             | -            | 10         |
| Journal of Cosmology and Astroparticle Physics | 3+4=7              | -            | 7          |
| Journal of Geophysical Research                | 0+1=1              | -            | 1          |
| Monthly Notices of the RAS                     | 0+25=25            | -            | 25         |
| Nature   | 2+1=3              | -            | 3          |
| Nuclear Instruments and Methods                | 0+1=1              | -            | 1          |
| Physical Review D                              | 8+2=10             | -            | 10         |
| Physical Review Letters                        | 7+0=7              | -            | 7          |
| Publications of the ASJ                        | 0+1=1              | -            | 1          |
| Science  | 18+0=18            | 1+0=1        | 19         |
| <b>Total</b>                                   | <b>157+154=311</b> | <b>1+4=5</b> | <b>316</b> |

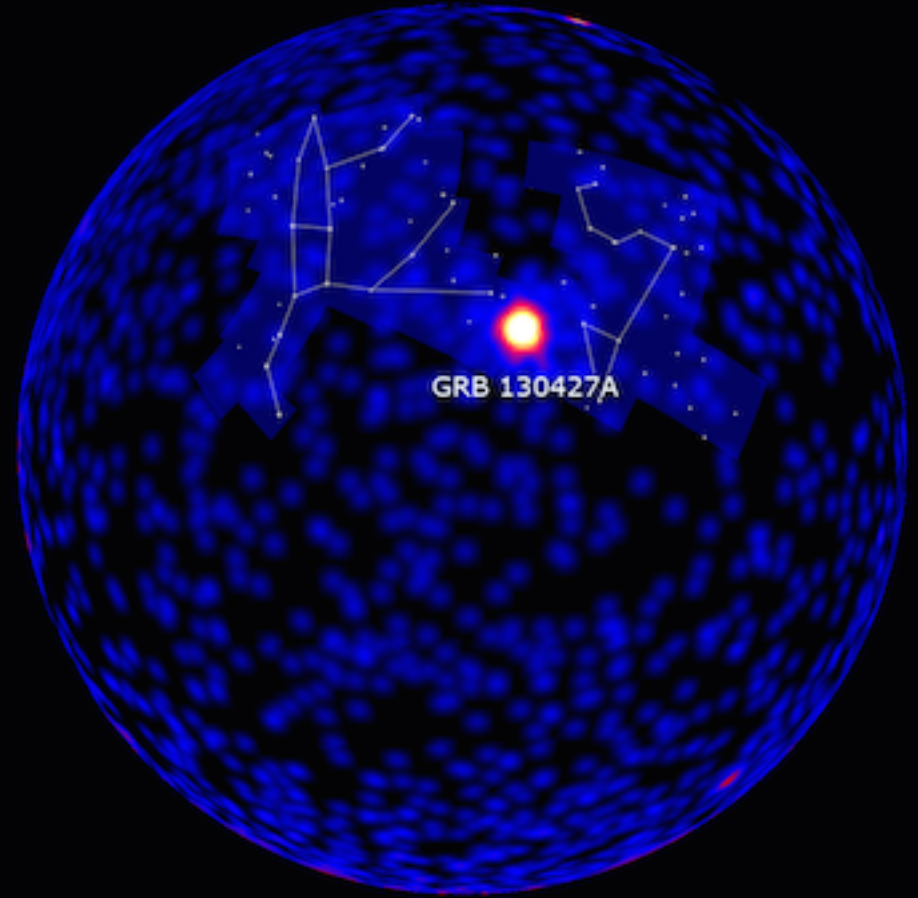
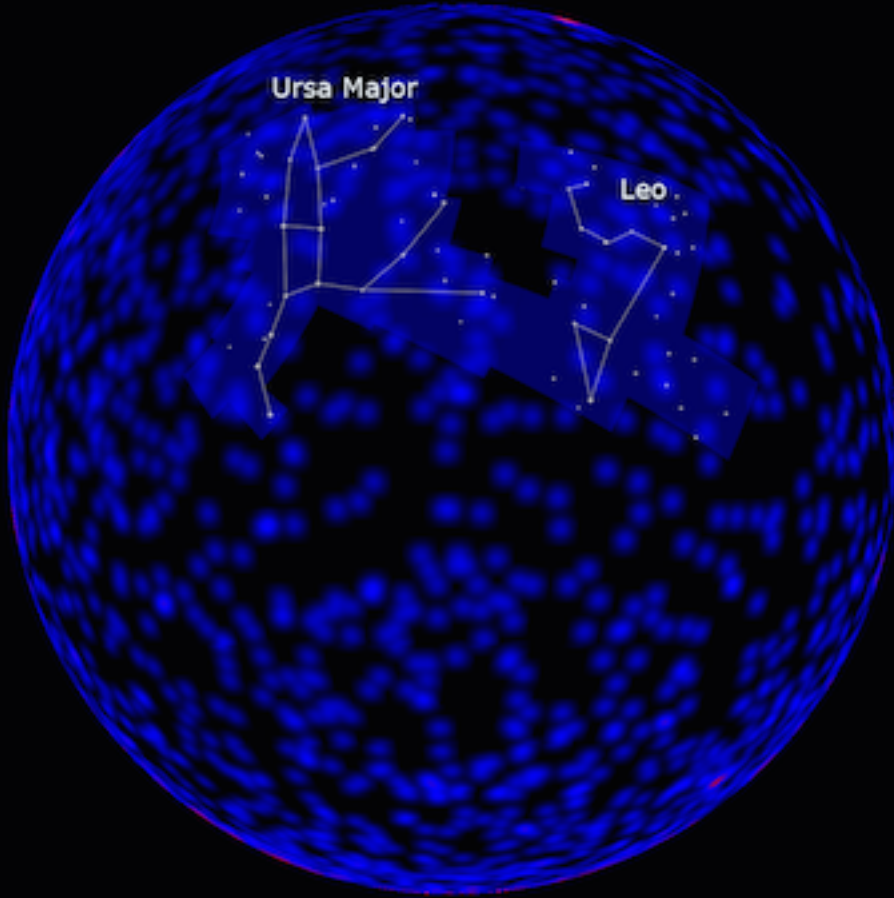
Total citations: 13,902



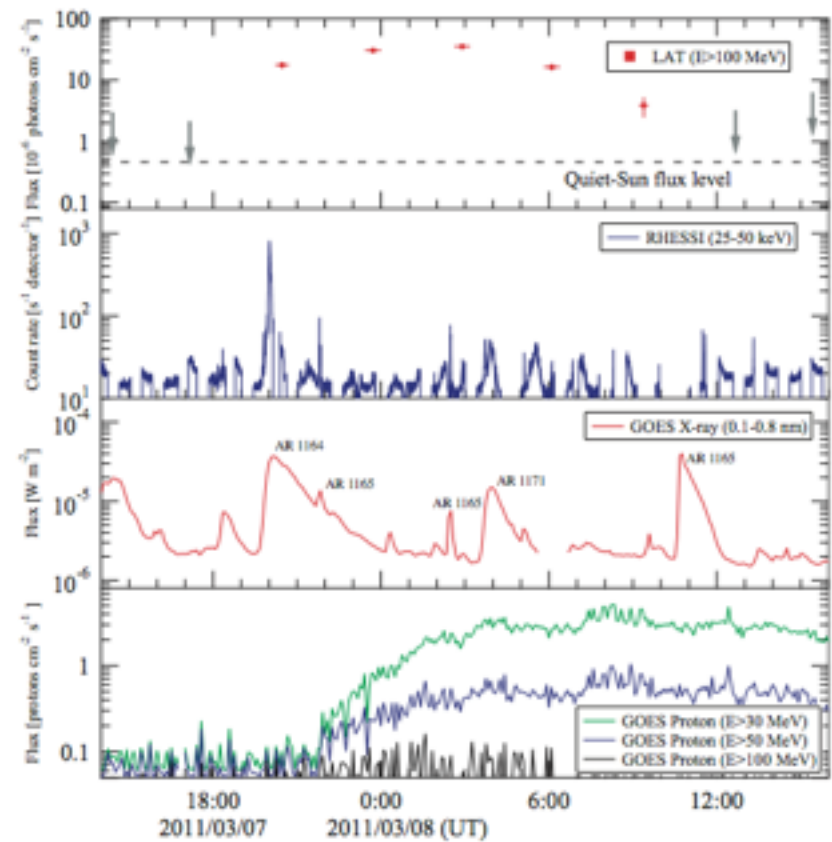
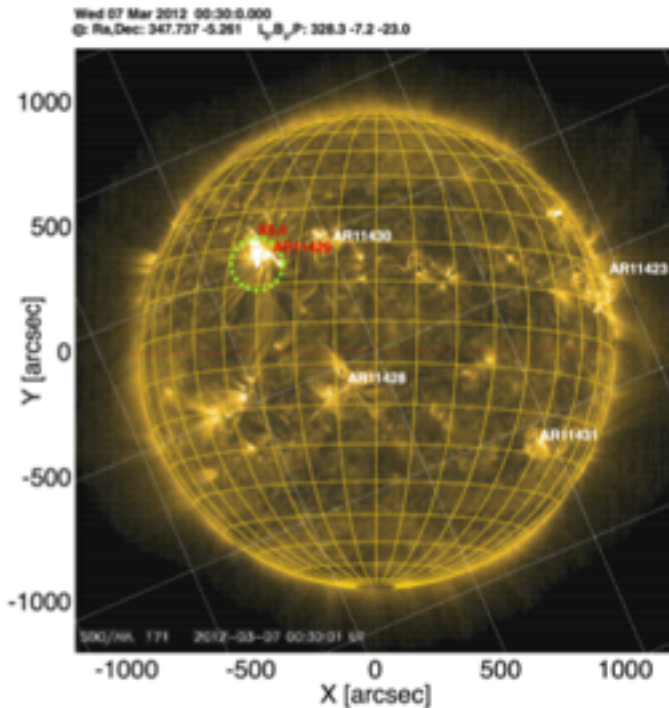
- “The Large Area Telescope on the Fermi Gamma-Ray Space Telescope Mission” (06/2009) **1034**
- “Measurement of the Cosmic Ray  $e^+e^-$  Spectrum from 20 GeV to 1 TeV with the Fermi Large Area Telescope” (05/2009) **730**
- “Fermi Large Area Telescope First Source Catalog” (06/2010) **470**
- “Constraining Dark Matter Models from a Combined Analysis of Milky Way Satellites with the Fermi Large Area Telescope” (08/2011) **335**
- “Spectrum of the Isotropic Diffuse Gamma-Ray Emission Derived from First-Year Fermi Large Area Telescope Data” (11/2010) **332**
- “Fermi Observations of High-Energy Gamma-Ray Emission from GRB 080916C” (03/2009) **312**
- “The First Fermi Large Area Telescope Catalog of Gamma-ray Pulsars” (07/2009) **310**
- “Fermi Large Area Telescope Bright Gamma-ray Source List” (02/2009) **291**



- NASA 2012 Senior Review recommended extended operations
  - <http://science.nasa.gov/astrophysics/2012-senior-review/>
- NASA HQ will extend the mission to at least 2016



Before and after Fermi LAT views of GRB 130427A, centered on the north galactic pole



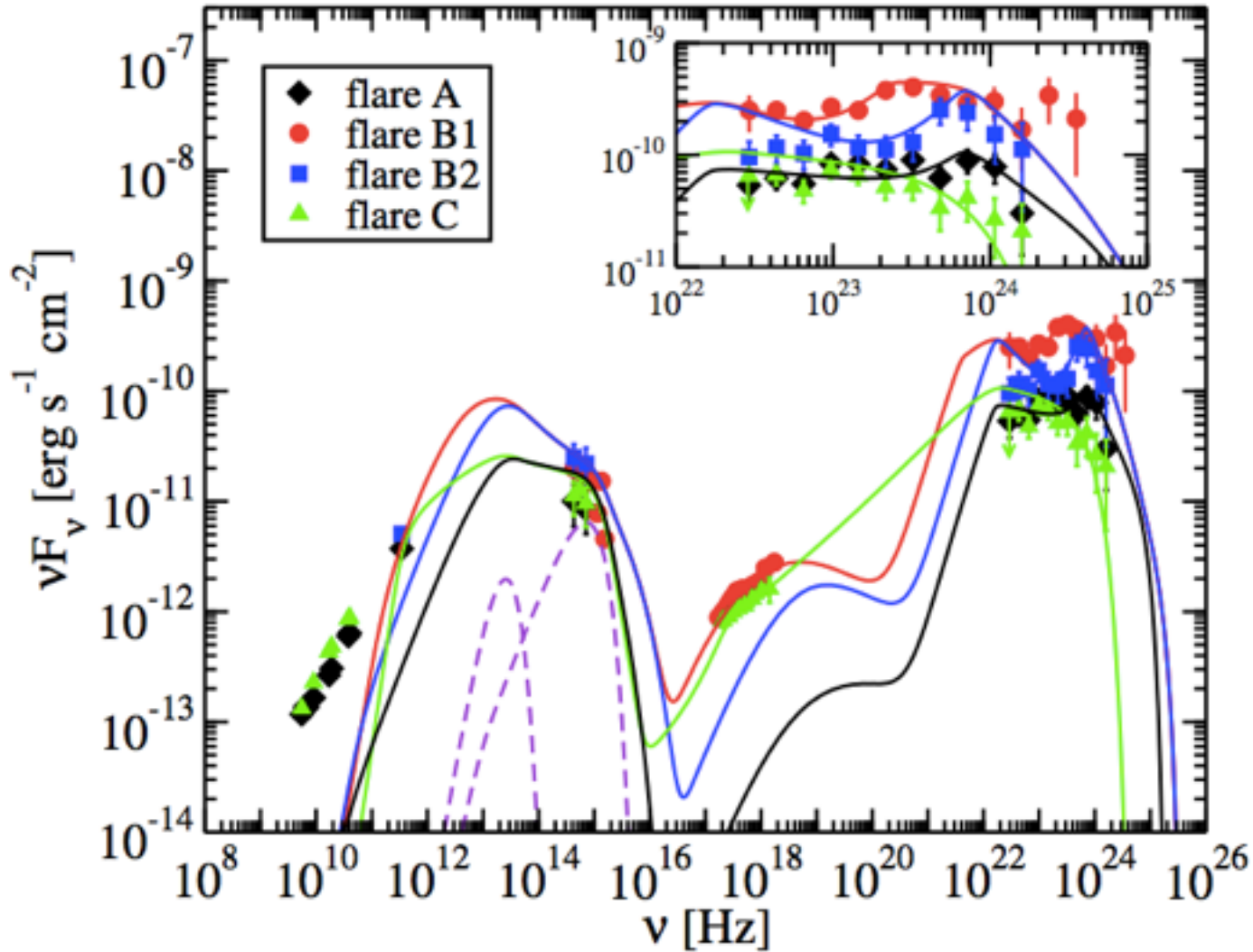
- Full list of LAT solar flares
  - 16 in total
  - analysis of bright long flares
    - $\gamma$ -rays localized on x-ray emission region for 1<sup>st</sup> time



- ★ **AGN and multiwavelength campaigns:**
  - Sara Buson & Denis Bastieri
- ★ **Criterio BFlap:**
  - Graziano Chiaro & Denis Bastieri
- ★ **AGN and extragalactic sources (coordinator):**
  - Denis Bastieri
- ★ **Toward Pass8:**
  - Riccardo Rando
- ★ **Flare Advocate/Gamma-ray Sky Watcher:**
  - Denis Bastieri (sw) & Sara Buson (analysis)
- ★ **Gravitational lensing**
  - Denis Bastieri (B0218+35)
  - Sara Buson (PKS 1830-211)



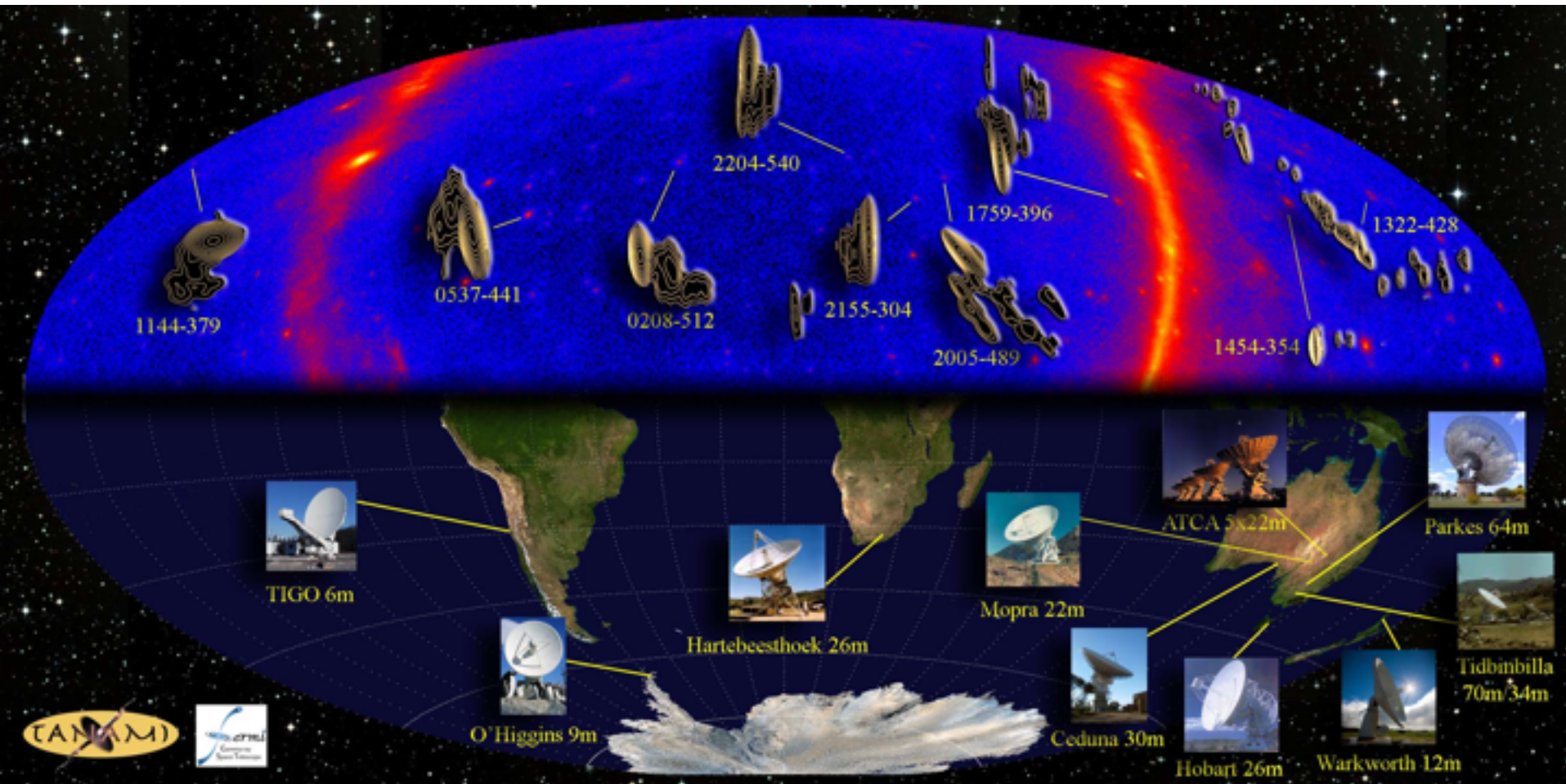
S. Buson et al.: Flaring Activity in PKS 1424-418 During 2008-2011





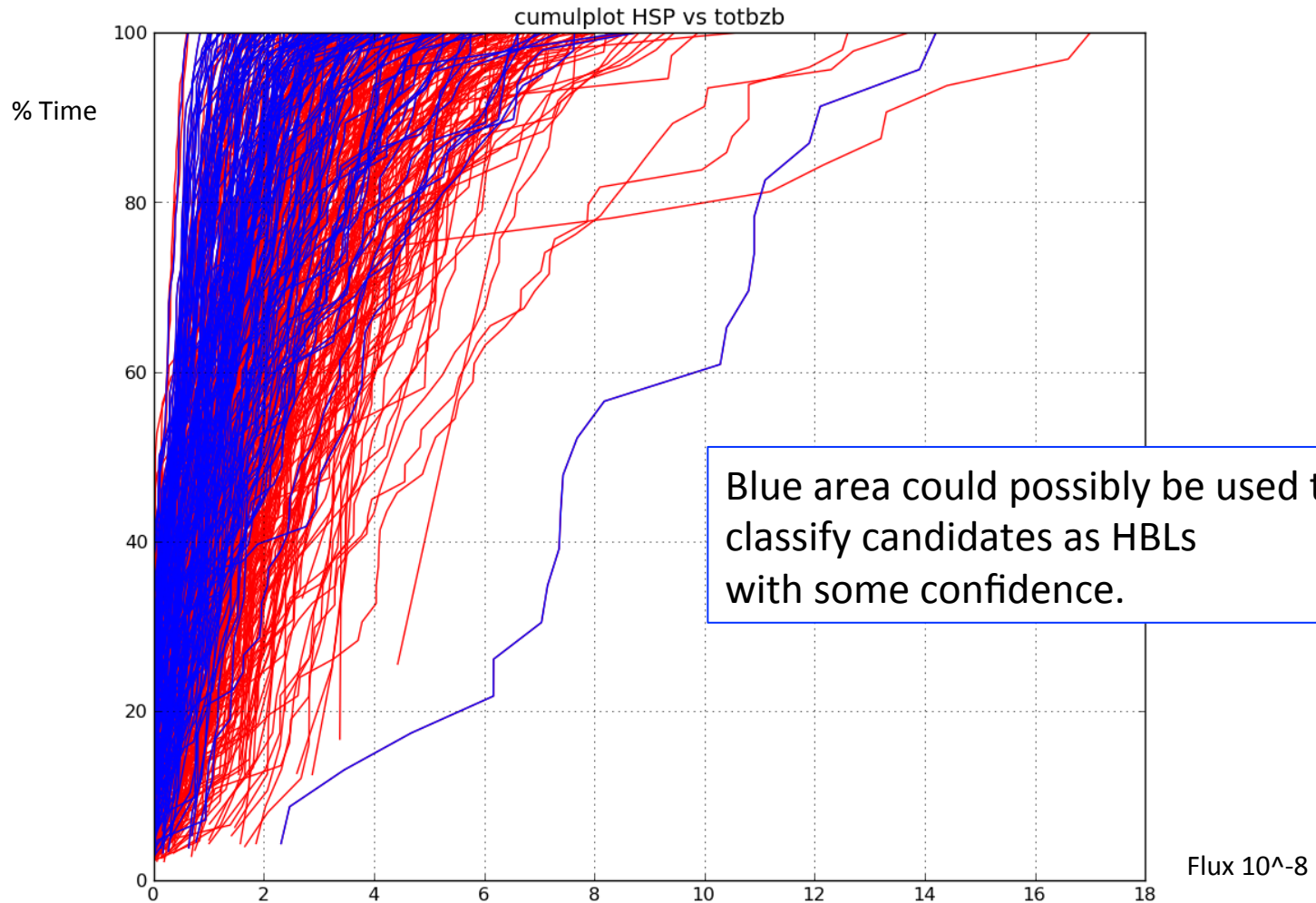


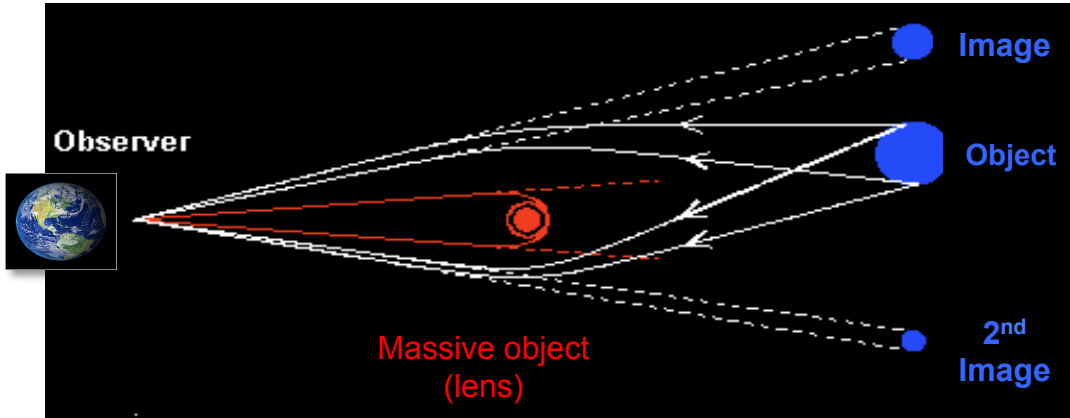
## Tracking **AGN** with **A**ustral **M**illiarcsecond **I**nterferometry





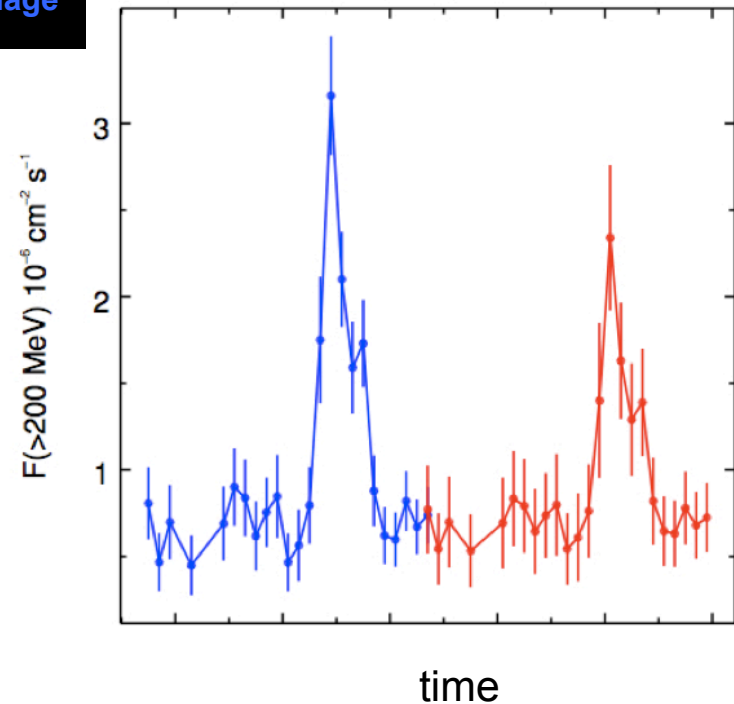
## HSP / BL Lac





Expected to have the same variability pattern

Gamma rays (Fermi-LAT) can not resolve the two images but can **estimate the time delay** between components of lensed variable source





## PKS1830-211

### ATel #2943

**Fermi LAT detection of an intense GeV flare from the high-redshift and gravitationally lensed blazar PKS 1830-211**

ATel #2943; *S. Ciprini (Perugia Univ. / ASI-INAF, Italy), on behalf of the Fermi Large Area Telescope Collaboration*  
on 15 Oct 2010; 16:52 UT  
Distributed as an Instant Email Notice Request For Observer  
Credential Certification: Stefano Ciprini (stefano.ciprini@p

### ATel #4343

**Fermi LAT detection of a GeV flare from the gravitationally lensed blazar S3 0218+35**

ATel #4343; *S. Ciprini (ASI ASDC & INAF OAR, Rome), on behalf of the Fermi Large Area Telescope Collaboration*  
on 28 Aug 2012; 20:45 UT  
Credential Certification: Stefano Ciprini (stefan

### ATel #4158

**Fermi LAT detection of renewed GeV gamma-ray activity from the gravitationally lensed blazar PKS 1830-211**

ATel #4158; *Stefano Ciprini (ASI Science Data Center and INAF Rome, Italy), on behalf of the Fermi Large Area Telescope Collaboration*  
on 7 Jun 2012; 21:53 UT  
Credential Certification: Stefano Ciprini (stefano.ciprini@asdc.asi.it)

Subjects: Gamma Ray, >GeV, Request for Observations  
Referred to by ATel #: 2950, 4158

Subjects: Gamma Ray, >GeV, Request for Observations, AGN, Blazar, Quasar

### ATel #4361

**Fermi LAT Detection of Gamma-ray Flaring from Gravitationally Lensed Blazar B0218+35**

ATel #4361; *M. Giroletti (INAF-IRA Bologna), M. Orienti (Univ. Bologna - INAF-IRA Bologna), C. C. Cheung (NRL/NRL) on behalf of the Fermi Large Area Telescope Collaboration*  
on 8 Sep 2012; 09:10 UT  
Credential Certification: Marcello Giroletti (giroletti@ira.inaf...

### ATel #4371

**Fermi LAT detection of a potential echo gamma-ray flare from gravitational lens S3 0218+35**

ATel #4371; *M. Giroletti (INAF-IRA Bologna), M. Orienti (Univ. Bologna, INAF-IRA Bologna), C. C. Cheung (NRC/NRL); on behalf of the Fermi Large Area Telescope Collaboration*  
on 11 Sep 2012; 20:42 UT  
Credential Certification: Teddy Cheung (ccheung@

### ATel #4411

**Fermi LAT Detection of New Gamma-ray Flaring from Gravitationally Lensed Blazar S3 0218+35 and Scheduled Fermi Pointed Observations from 2012 September 24 - October 1**

ATel #4411; *C. C. Cheung (NRC/NRL), R. Ojha (NASA/GSFC), M. Orienti (Univ. Bologna, INAF-IRA Bologna), D. L. Wood (Praxis/NRL); on behalf of the Fermi Large Area Telescope Collaboration*  
on 22 Sep 2012; 03:01 UT  
Credential Certification: Teddy Cheung (ccheung@milkyway.gsfc.nasa.gov)

Subjects: Gamma Ray, >GeV, AGN, Blazar

## B0218+35



**B0218+35**

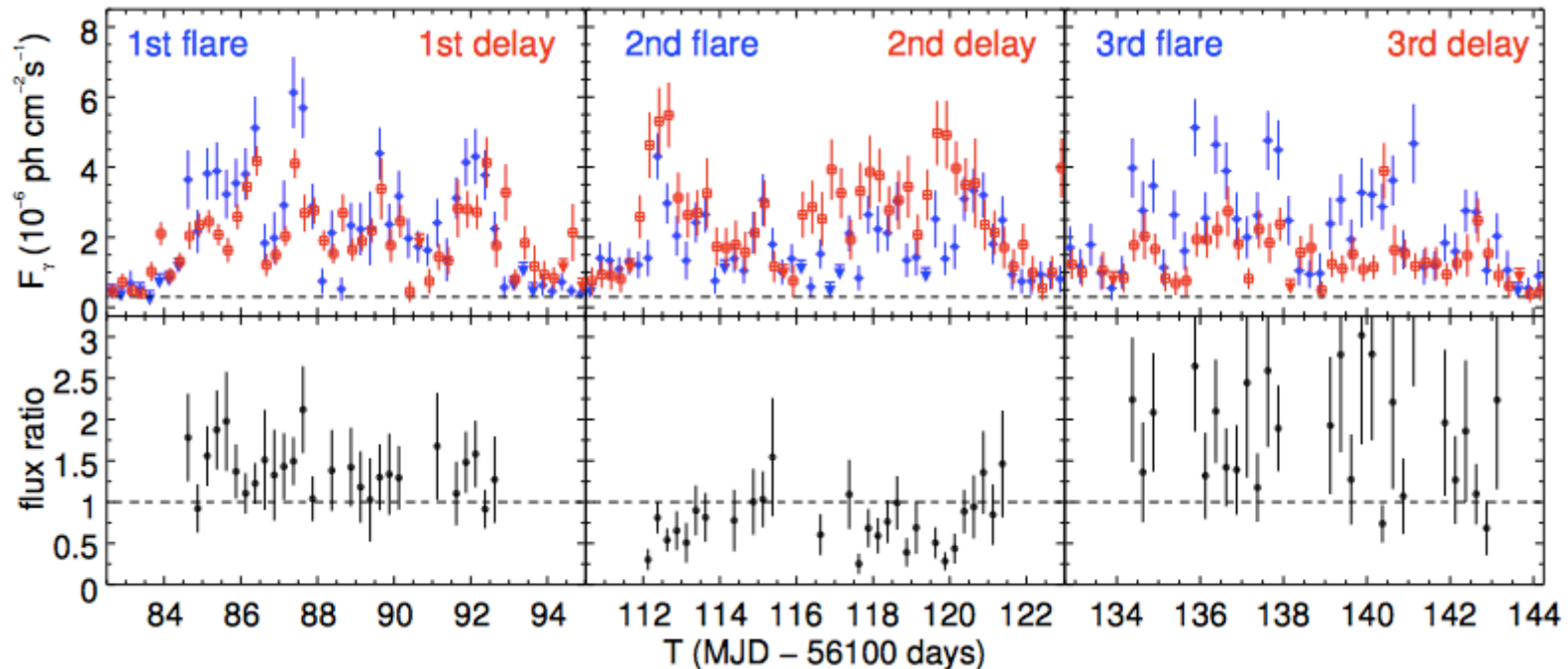
**Delay estimated = 11.46 +/- 0.16 days**

**Flux ratio = 1.16 +/- 0.07**

**Magnification ratio = 1.32 +/- 0.09**

Cheung+ 2014,  
ApJL, 782, L14

Flare emission divided by the observed flux ratio of 1.16 and shifted by +11.46 days to match the delayed emission





|                 |            |                |
|-----------------|------------|----------------|
| Denis Bastieri  | RU         | 80%            |
| Sara Buson      | Assegnista | 70%            |
| Stefano Ciroi   | RU         | 80%            |
| Piero Rafanelli | PO         | 80%            |
| Riccardo Rando  | RU         | 60%            |
| <b>TOTALE</b>   | <b>5</b>   | <b>3.7 FTE</b> |



- **Missioni Estere**
  - **Attività ISOC (1m/u)** 8 k€
  - **Riunioni Analysis/Science Working Group (3 missioni da 7 gg)** 9 k€
  - **Collab. Meeting (6 missioni da 7 gg)** 18 k€
- **Missioni Interne**
  - **riunioni software + Collab. italiana** 5 k€
  - **riunioni resp locale con referees e/o CSN2** 2 k€
- **Materiale di Consumo (metabolismo)** 3 k€
- **Totale** 45 k€
  
- **Servizio calcolo: ordinaria manutenzione < 1 mese/uomo**