

gamma-sky.net: Portal to the Gamma-Ray Sky

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Abstract. gamma-sky.net is a novel interactive website designed for exploring the gamma-ray sky, targeting both practitioners of astronomy and the general public alike. Our poster displays the content of our online portal, featuring high-energy survey images and catalog information using data from the Fermi Large Area Telescope (Fermi-LAT). Users can interact with the archive through a pan-and-zoom feature and powerful search tools. As the field of gamma-ray astronomy develops, we plan on expanding the website with more publicly available gamma-ray data, including High Energy Spectroscopic System (H.E.S.S.) Galactic Plane Survey maps (upon their public release) and survey images from the Planck satellite. Along with enriching our database, we also aim to make available to the user additional engaging and resourceful tools, such as a display of spectral information. The website is being developed as an open-source, open-data project at <https://github.com/gammipy/gamma-sky>. Feedback and contributions are very welcome!

TODO update abstract?

Introduction

- Evolution of VHE gamma-ray astronomy - increasing number of detections, novel Cherenkov telescope arrays (especially CTA)
- Upcoming surveys like HGPS (by MPIK) - clearer resolution than our current surveys
- Because of an increasing interest in the field, there is a need for a hub of VHE data (GeV, TeV) across many different catalogs. This is what gamma-sky.net was created for.

Idea

- Interactive website designed for exploring the gamma-ray sky
- Survey images of different frequency bands (mainly all-sky) overlaid onto a three-dimensional map. Gamma-ray sources from catalog data are pinpointed onto the map.
- The website facilitates both quick browsing and deep investigation of sources
- Understand the context of sources by viewing them on the map
- Easily compare sources from different catalogs
- Website targets professional astronomers, but also the general public through a user-friendly interface and the easily understandable layout of sources plotted over a map.
- Open source, open data - allows for 1. users to download any data from our website, and 2. for other developers to contribute to the code.

Features

(Should we present this information in a bullet list or in paragraphs?)

1. Map View - easy navigation and quick browsing
 - Pan and zoom the sky map by dragging and scrolling
 - Toggle and view specific catalog layers and multi-wavelength survey images

- Pop-ups over each source for basic information
 - Powerful search tools - locate objects by name, association, or coordinate position
 - Export and share a specific view of the sky map via PNG
2. Catalog View - deeply investigate a specific source
 - Search tool to find a source in its respective catalog by source name
 - Basic info, extension info, spectral info, distance info
 - Light curves, emission spectra (currently only for 3FGL catalog)
 - References to which telescope detected the source and links to where our data came from
 3. Further analysis of our data with tools like Gammapy (generate specific plots, etc.)
 4. Mention again that all data is openly available for download

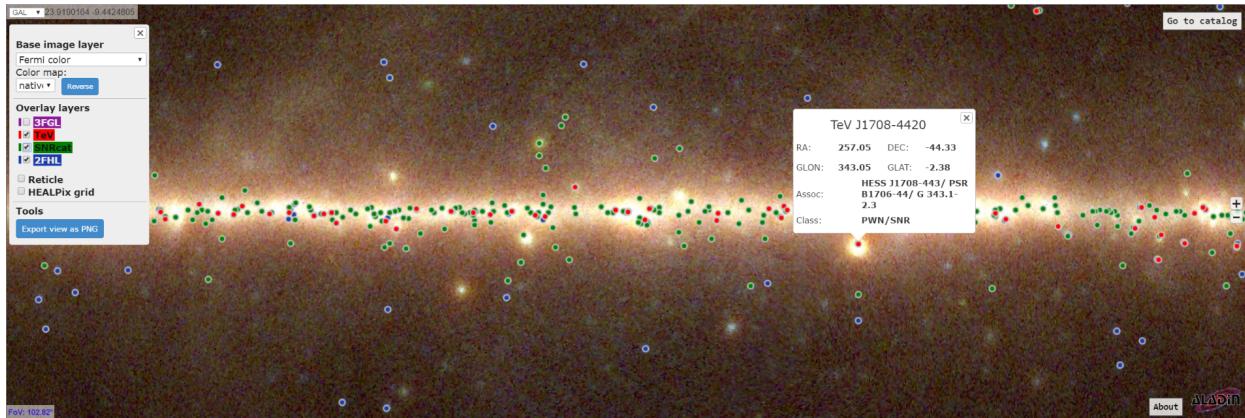


FIGURE 1. Map View.

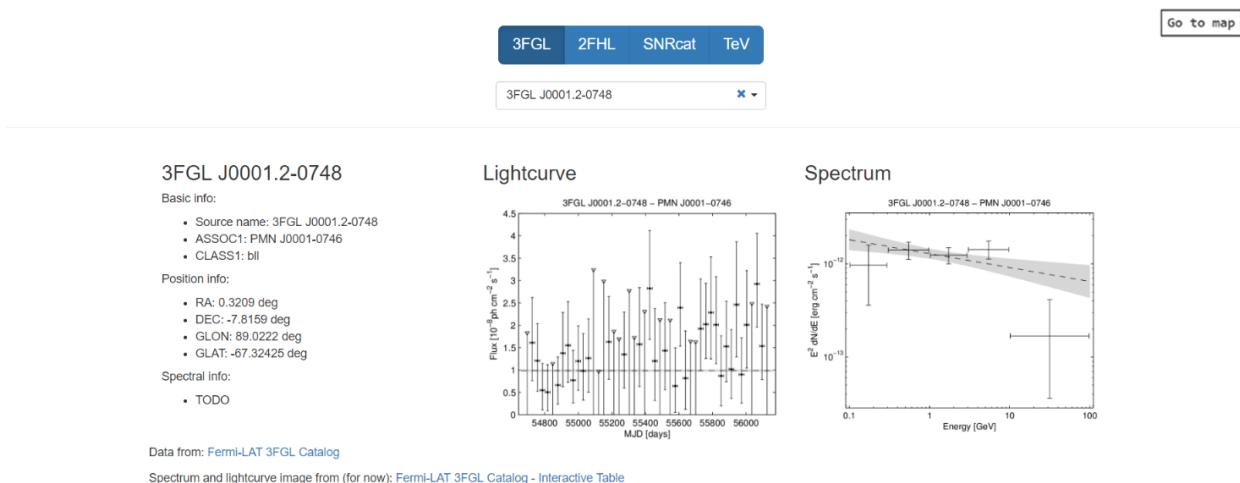


FIGURE 2. Catalog View.

Data

1. Survey images

- Default: Fermi color image. Mention other survey options
 - HiPS file format and HEALPix projection for the map
 - Our images came from CDS' HiPS database of 300+ images
2. Catalog images
- Fermi-LAT - 3FGL and 2FHL
 - SNRcat
 - GeTeV Catalogue

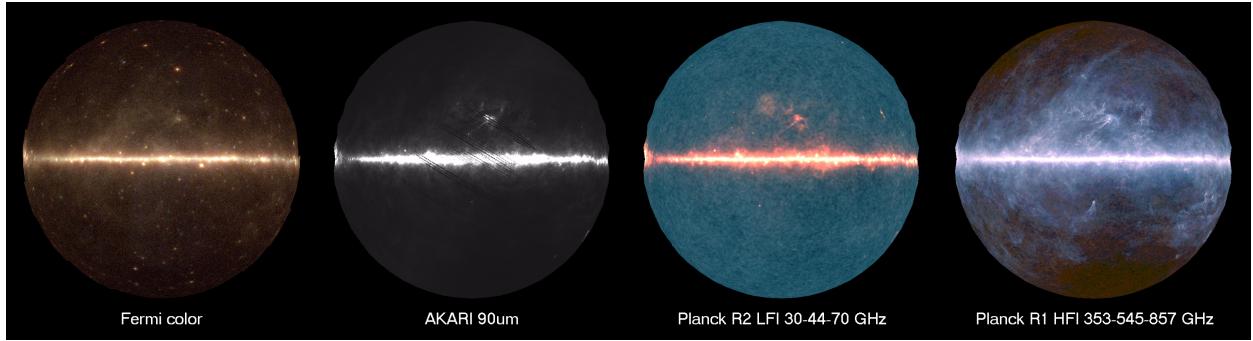


FIGURE 3. Survey images (left to right): Fermi color, AKARI 90um, Planck LFI, Planck HFI.

TABLE 1. Catalog information.

Catalog	Sources	Update	Description
3FGL	3034	fixed	Third Fermi-LAT point source catalog
2FHL	360	fixed	Second Fermi-LAT Catalog of High-Energy Sources
SNRcat	378	continuous	A census of high-energy observations of Galactic supernova remnants
TeV	155	continuous	The TeGeV Catalogue @ ASDC

TABLE 2. Image information.

Image	Resolution (arcsec)	Type	Color?	Description
Fermi color	51.53	gamma-ray	color	Fermi-LAT
AKARI 90um	51.53	infrared	grayscale	AKARI
CGPS-VGPS CONT	51.53	radio	grayscale	
Spitzer GLIMPSE360	1.2	infrared	color	Spitzer
Haslam 408	51.53	radio	grayscale	408 MHz
IRIS Band 4-100um	51.53	infrared	grayscale	IRIS
Planck R2 LFI Color 30-44-70 GHz	51.53	microwave	color	Planck 30-44-70 GHz
Planck R1 + R2 HFI Color 353-545-857 GHz	51.53	microwave	color	Planck 353-545-857 GHz

Implementation

- Gammapy, Astropy used to generate catalog data (and map data)
- Data consumed with JS and HTML
- Website architecture built with Angular 2 as a single-page app
- Sphere interface and maps overlay by Aladin Lite tool

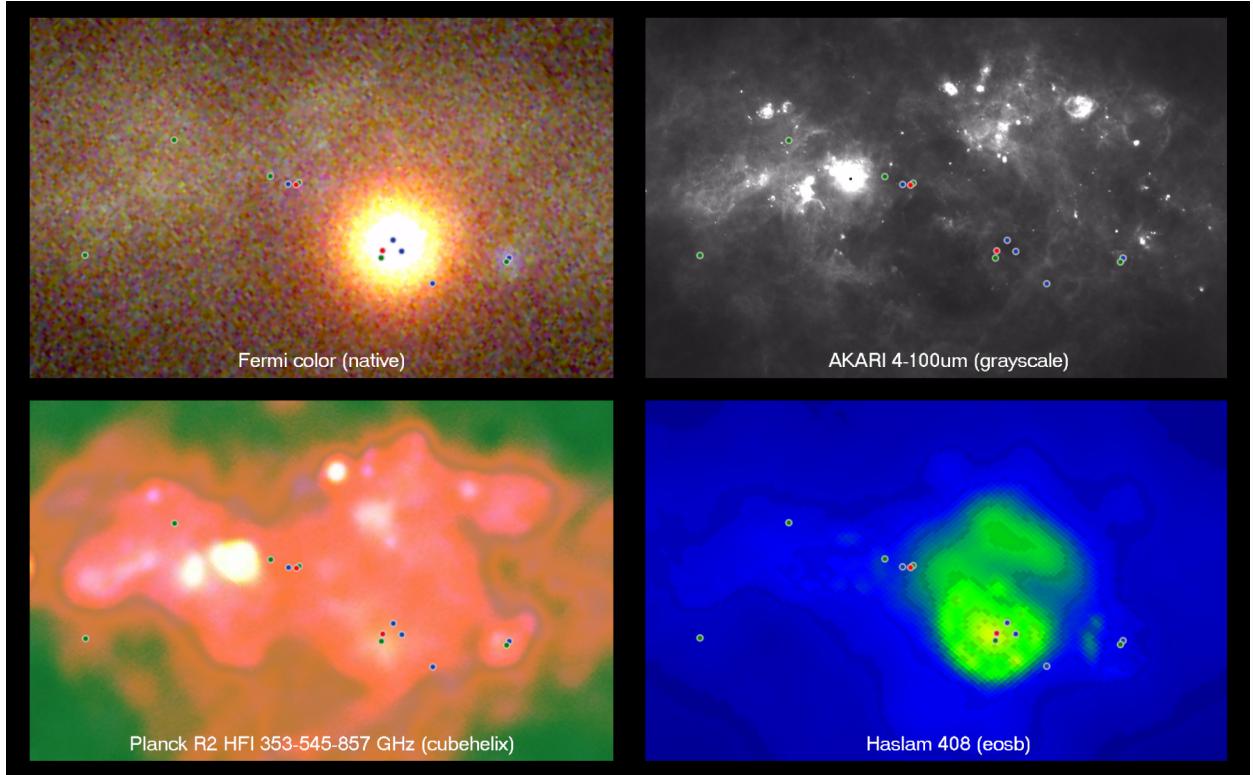


FIGURE 4. The Vela Region in various survey images and color maps.

Status and Outlook

- Website published in early June 2016
- Mini-summary of the website's current state
- Future plans for data - add HGPS, HAWC survey, upcoming Fermi catalogs, etc.
- Future plans for features

Acknowledgements

- CDS
- SNRcat
- GeTeV Catalogue
- Dan's 3FGL interactive table
- GitHub Pages?

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