

OSSR final workshop

Partner report : MGP-MPIK

Q. Remy, A. Donath

December 1st, 2022

Tasks performed

Task 3.2 : “open science tools and software packages for astroparticle physics that work on high-level CTA data formats.”

- development of gammapy, a python package for gamma-ray astronomy (selected as CTA science tools)
- involved in the development of the data format for gamma-ray astronomy GADF, doi.org/10.3390/universe7100374

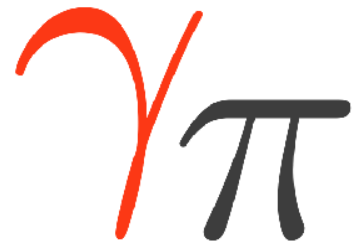
Task 3.1 : “Organize training activities to provide a consistent level of knowledge amongst the partners.”

- gammapy meetings :
 - coding sprint (in person) or co-working week (remote) twice per year
 - user calls and user testing events
- tutorial sessions at ESCAPE summer school and CTA consortium meetings
- PYGAMMA workshops every 4 years, next in 2023

Task 3.3 : “providing interfaces between the python-based frameworks of CTA and KM3NeT”

- possible with gammapy if KM3NeT data and IRFs are exported following GADF conventions
- Joint analysis of CTA and KM3NET simulated data, by Lars Mohrmann and Tim Unbehaun from ECAP ([slides](#))

Gammapy onboarded on OSSR and tutorials on ESAP



November 21, 2022 (00.10.03) Software Open Access View

gLike

Rico, Javier; Nigro, Cosimo; Kerszberg, Daniel; Miener, Tjark;

gLike is a general-purpose ROOT-based code framework for the numerical maximization of joint likelihood functions. The joint likelihood function has one free parameter (named g) and as many nuisance parameters as wanted, which will be profiled in the maximization process.

Uploaded on November 21, 2022

7 more version(s) exist for this record

November 17, 2022 (0.3.0) Software Open Access View

agnpy

Nigro, Cosimo; Sitarek, Julian; Gliwny, Pawel; Sanchez, David; Craig, Matthew; Vuillaume, Thomas; Viale, Ilaria; Maniadakis, Dimitrios;

agnpy is a python package focusing on the computation of the radiative processes of relativistic particles accelerated in the jets of Active Galactic Nuclei (AGN). It includes classes describing the galaxy components responsible for line and thermal emission and calculates the absorption due to gamm

Uploaded on November 17, 2022

15 more version(s) exist for this record

November 10, 2022 (1.0) Software Open Access View

Gammapy: Python toolbox for gamma-ray astronomy

Acero, Fabio; Aguasca-Cabot, Arnau; Buchner, Johannes; Carreto Fidalgo, David; Chen, Andrew; Chromey, Alisha; Contreras Gonzalez, José Luis; de Bony de Lavergne, Mathieu; de Miranda Cardoso, José Vinícius; Deil, Christoph; Donath, Axel; Giunti, Luca; Hinton, James; Jouvin, Léa; Khélifi, Bruno; King, Johannes; Lefaucheur, Julien; Lenain, Jean-Philippe; Linhoff, Maximilian; López-Coto, Rubén; Mohrmann, Lars; Morcuende, Daniel; Nakashima, Kaori; Nigro, Cosimo; Olivera-Nieto, Laura; Owen, Ellis; Panny, Sebastian; Papadopoulos Orfanos, Dimitri; Paz Arribas, Manuel; Pintore, Fabio; Poon, Helen; Remy, Quentin; Ruiz, José Enrique; Siejkowski, Hubert; Sinha, Atreyee; Sipócz, Brigitta M; Spir-Jacob, Marion; Terrier, Régis; Tibaldo, Luigi; Unbehaun, Tim; van Eldik, Christopher; Vuillaume, Thomas; Weinstein, Amanda; Wood, Matthew;

Gammapy analyzes gamma-ray data and creates sky images, spectra and lightcurves, from event lists and instrument response information; it can also determine the position, morphology and spectra of gamma-ray sources. It is used to analyze data from H.E.S.S., Fermi-LAT, HAWC, and the Cherenkov Telesco



ESCAPE 2020

ESCAPE aims to address the Open Science challenges shared by ESFRI facilities (CTA, ELT, EST, FAIR, HL-LHC, KM3NeT, SKA) as well as other pan-European research infrastructures (CERN, ESO, JIVE-ERIC, EGO-Virgo) in astronomy and particle physics research domains.

ESCAPE has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 824064.

[Read more](#)

Curated by:

thomas_vuillaume

Curation policy:

All participations must be open-source.

For Software and Dataset, records must meet our requirements and follow an onboarding procedure as defined by [our policies](#).

The ESCAPE Zenodo community welcomes entries that support the software and service projects in the OSSR, it also encourages the archival of documents and material that disseminate and support the goals of ESCAPE.

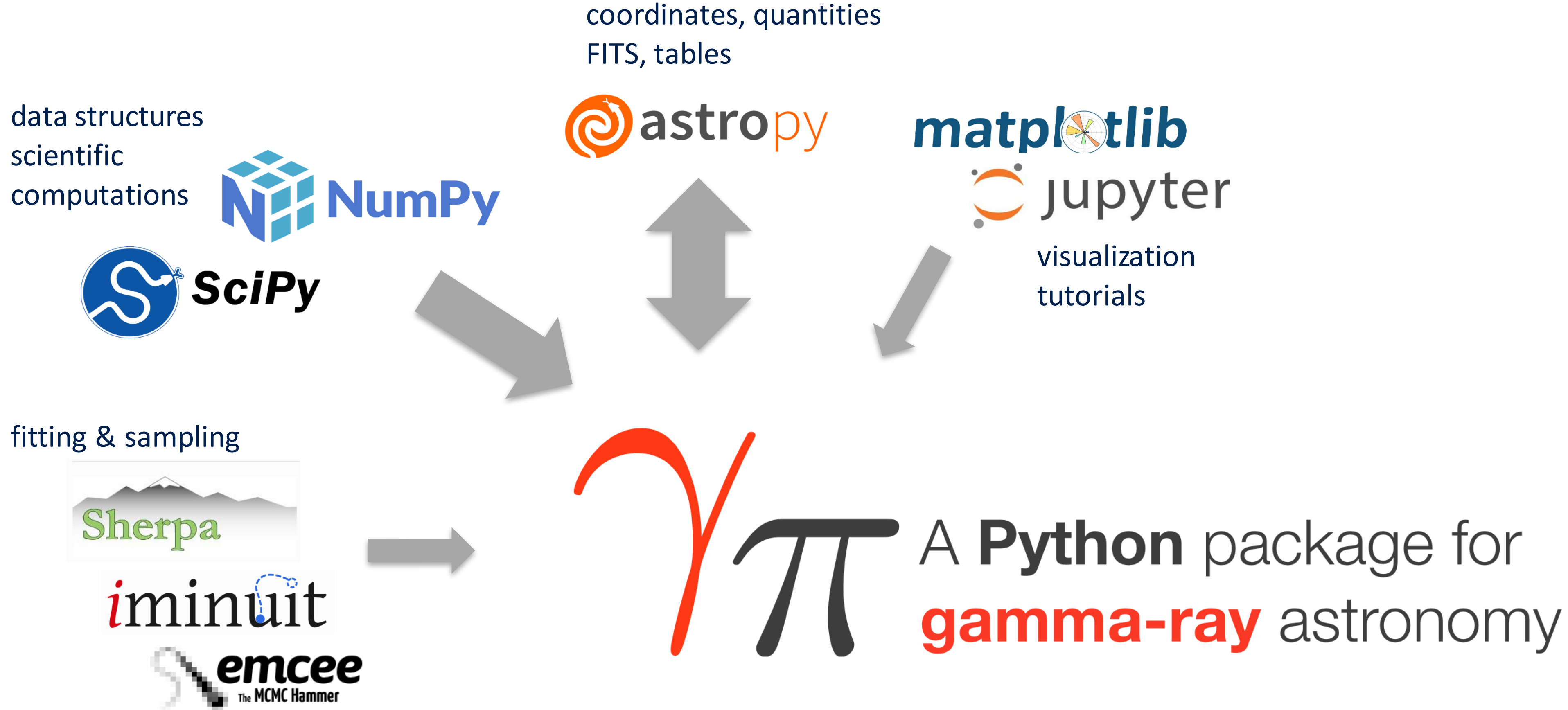
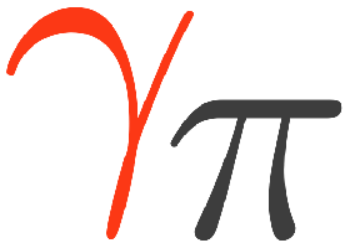
The screenshot shows a Jupyter Notebook titled "Tutorial: fitting a BL Lac broad-band SED using agnpy and Gammapy". The notebook is open in a browser window with the file name "ssc_gammapy_fit.ipynb". The interface includes a menu bar (File, Edit, View, Run, Kernel, Tabs, Settings, Help) and a toolbar with various icons. The main content area displays the tutorial text and a code cell. The code cell contains the following Python code:

```
[1]: # import numpy, astropy and matplotlib for basic functionalities
import numpy as np
import astropy.units as u
import matplotlib.pyplot as plt
import pkg_resources

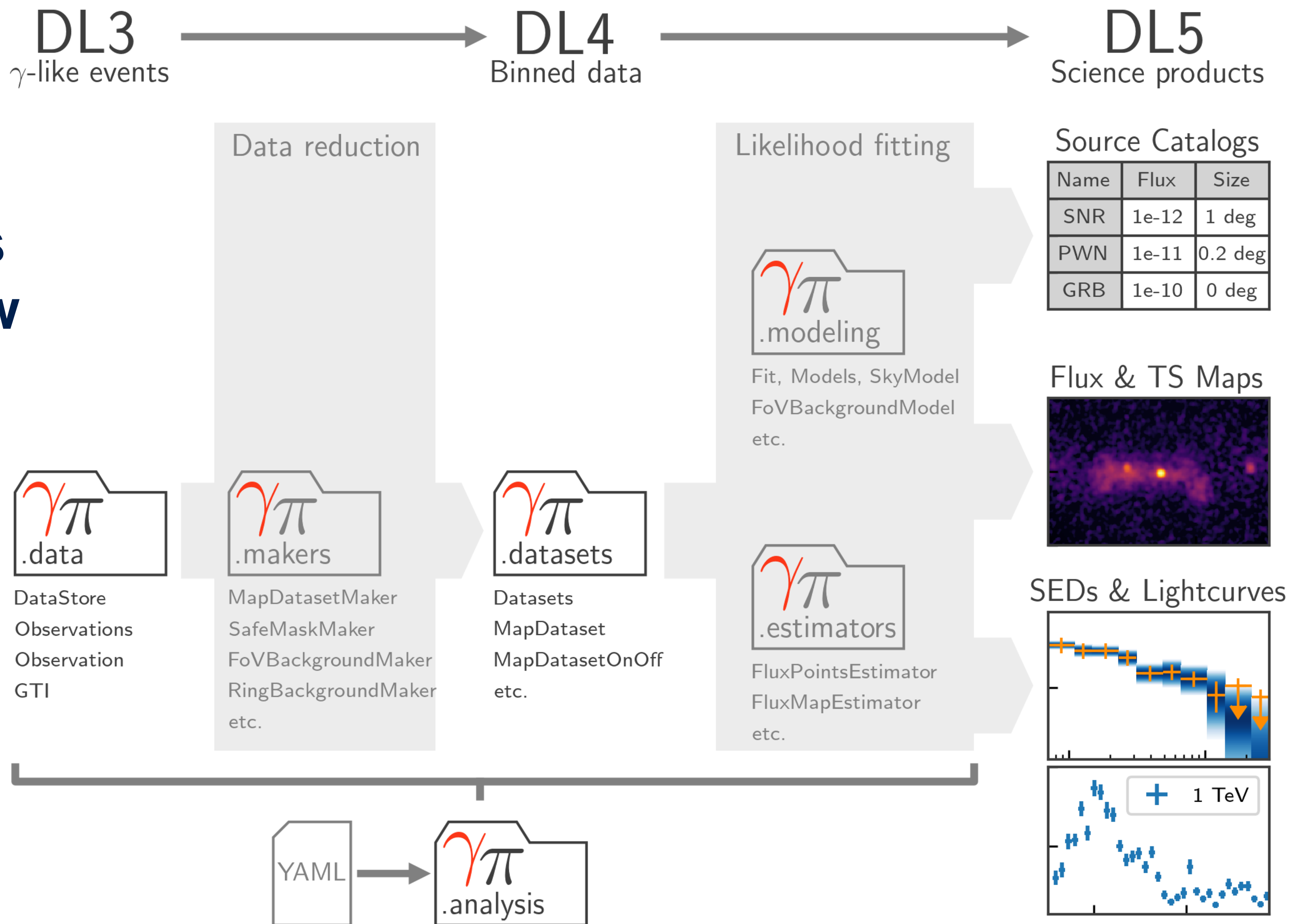
# import agnpy classes
from agnpy.spectra import BrokenPowerLaw
from agnpy.fit import SynchrotronSelfComptonModel, load_gammapy_flux_points
from agnpy.utils.plot import load_mpl_rc, sed_y_label

load_mpl_rc()
```

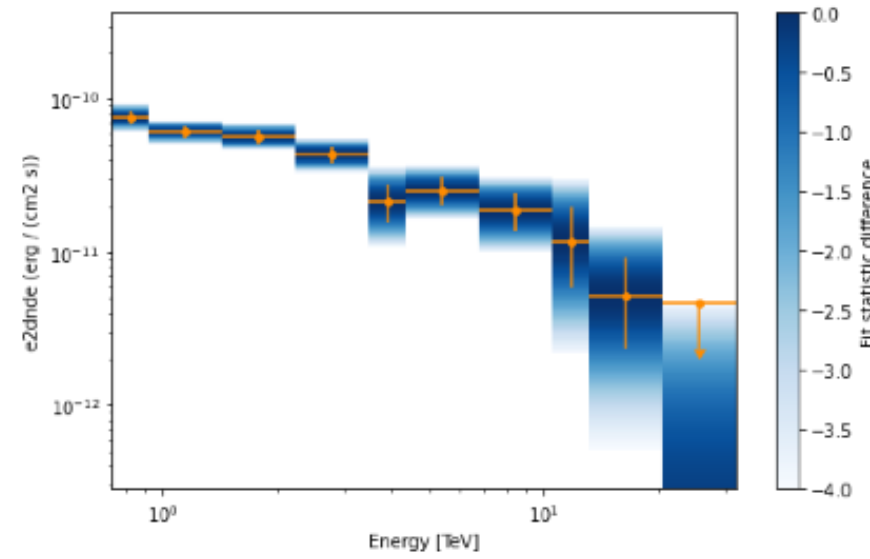
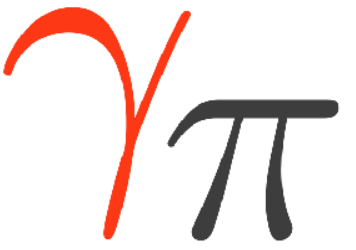
Gammapy overview



Analysis workflow



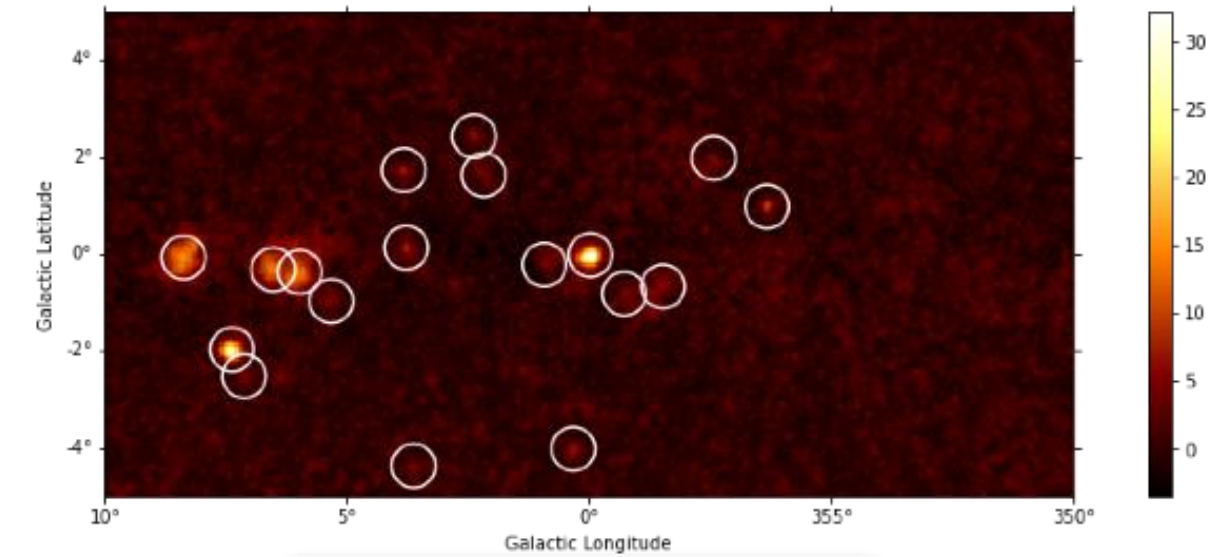
Typical analysis use cases



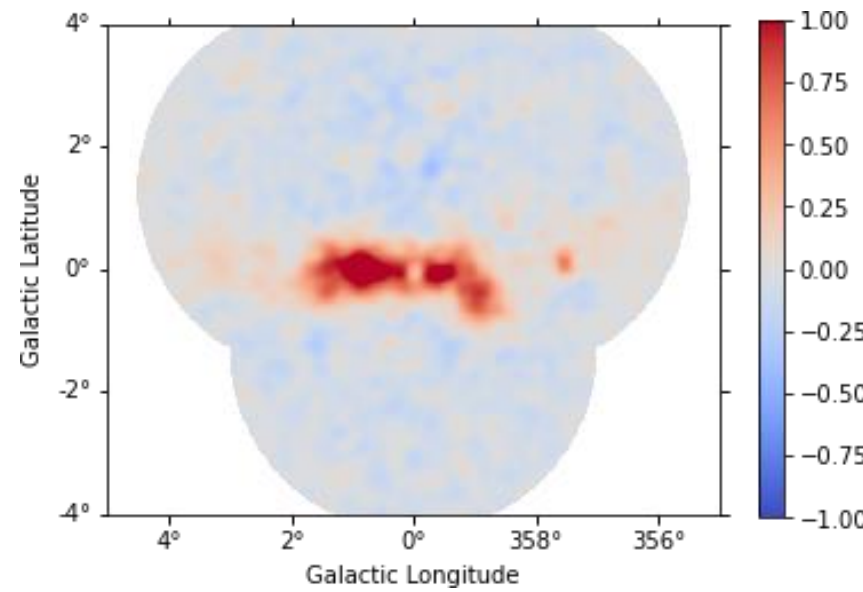
1D spectral analysis

- support for two analysis workflows:
- config-driven high-level interface
 - user library API

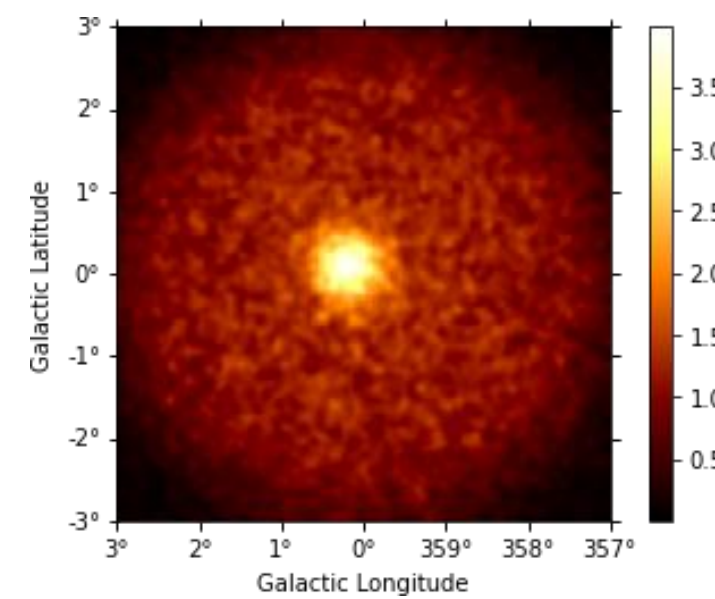
docs.gammapy.org/1.0/



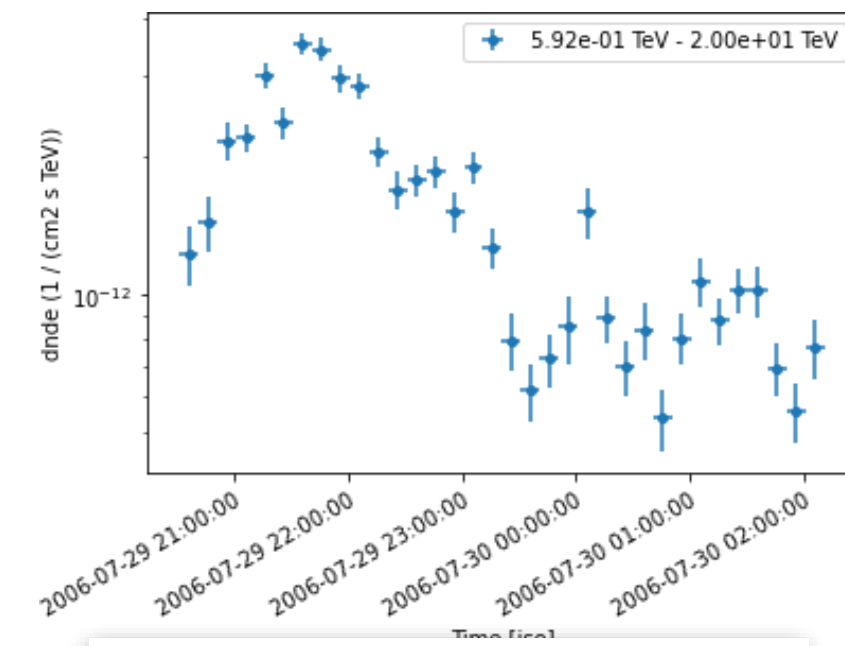
Source detection



3D analysis

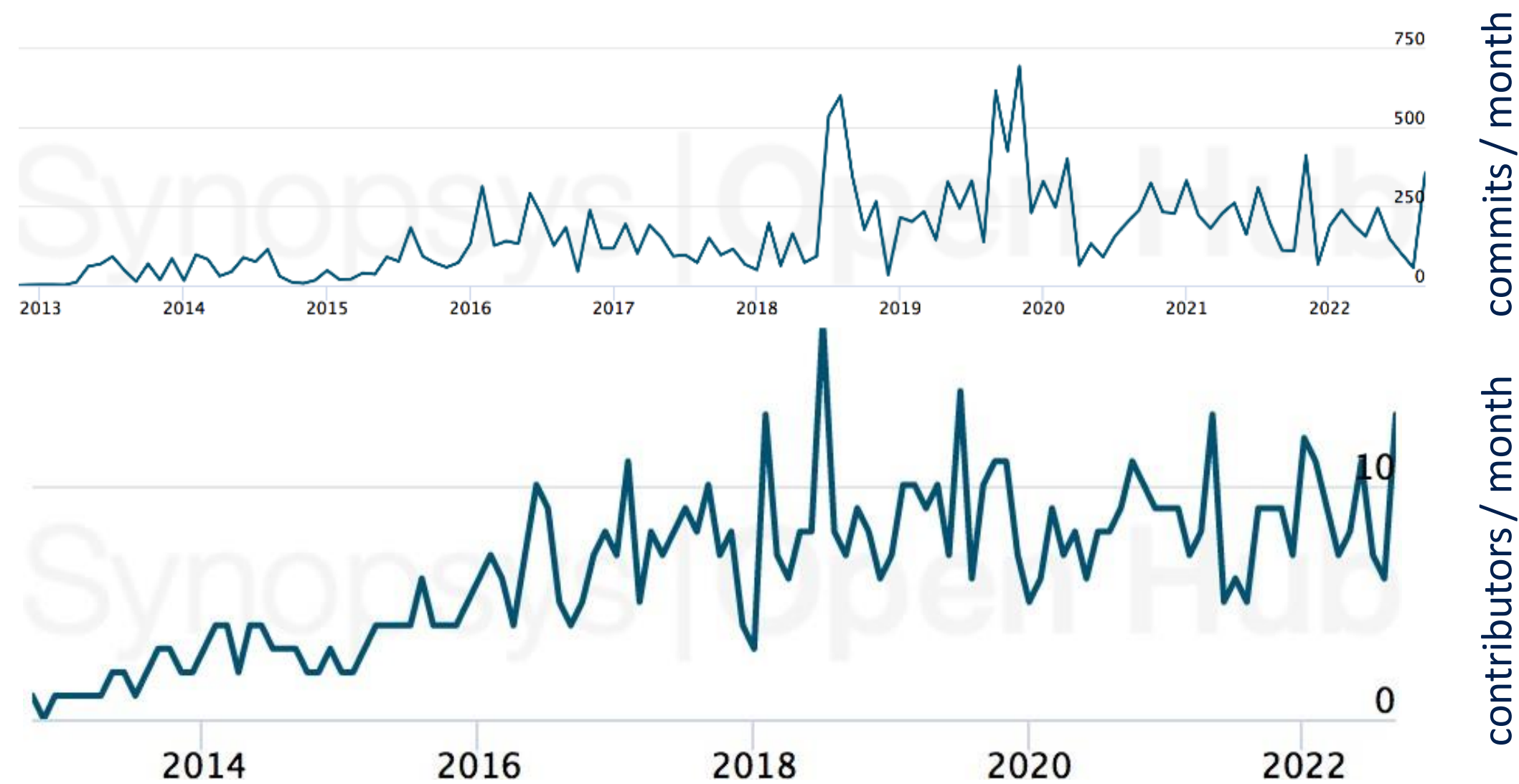


observation simulation



light-curve extraction

Gammapy v1.0 (LTS) release



- After 19000 commits from more than 90 contributors
- After 10 coding-sprints and 6 co-working weeks
- After 20 minor releases
- **Gammapy v1.0 has been released on Nov 10**

- **Roadmap for v2.0 in preparation**
- Next [coding sprint](#) :
 - December 5th - 9th (Paris - hybrid)
- If you would like to contribute, contact us:
 - [gammapy.slack](#) #dev channel
 - [GitHub discussions](#) & [issues](#)
 - present feature prototype during dev call.

- **On going developments and plans**
 - Extend likelihood to support nuisance parameters & priors
 - Un-binned analysis
 - Develop time domain, e.g. improved pulsar analysis
 - Implement support for new data formats and format versions (e.g. support for event types/classes)
 - Metadata handling (minimal provenance)
 - Improved & more configurable high level analysis
 - Performance and distributed computing