

## Gammapy – A prototype for the CTA science tools

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Gammapy is a Python package for high-level gamma-ray data analysis, written in Python and built on Numpy, Scipy and Astropy. Starting with event lists and instrument response information, it is possible to analyse gamma-ray data and to create for example sky images, spectra and lightcurves, and to determine the position, morphology and spectra of gamma-ray sources.

So far Gammapy has mostly been used to analyse data from H.E.S.S. and Fermi-LAT, and now it is being used for the simulation and analysis of observations from the Cherenkov Telescope Array (CTA). We have proposed Gammapy as a prototype for the CTA science tools. This contribution will give an overview of the Gammapy package and show analysis application examples with simulated CTA data.

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## 1. Introduction

TODO: write me!

Astropy [1], Sherpa [?], pyfact [2]

## 2. Gammapy

TODO: write me!

TODO: add figure with dependencies.

## 3. Code example

TODO: show and explain the events fill into sky image or cube code example and explain.

Message: Gammapy is high-level Python, data in Numpy arrays, others have written C and Python wrappers already (WCSLib, CFITSIO, SOFA/ERFA).

## 4. Application example

TODO: add a CTA analysis example (probably only an image, no spectrum or lightcurve yet).

See [https://nbviewer.jupyter.org/github/gammapy/gammapy-extra/blob/master/notebooks/cta\\_data\\_analysis.ipynb](https://nbviewer.jupyter.org/github/gammapy/gammapy-extra/blob/master/notebooks/cta_data_analysis.ipynb) or if CTA-DC becomes available, a TS image from the Galactic plane survey would be nice.

## 5. Conclusions

TODO: write me!

Briefly discuss Gammapy approach pro / con here or above?

## References

- [1] Astropy Collaboration, T. P. Robitaille, E. J. Tollerud, and P. Greenfield et al., *Astropy: A community Python package for astronomy*, *AAP* **558** (Oct., 2013) A33.
- [2] M. Raue and C. Deil, *PyFACT: Python and FITS analysis for Cherenkov telescopes*, in *American Institute of Physics Conference Series* (F. A. Aharonian, W. Hofmann, and F. M. Rieger, eds.), vol. 1505 of *American Institute of Physics Conference Series*, pp. 789–792, Dec., 2012.