

documentation building

notebooks

Jose Enrique Ruiz
Instituto de Astrofísica de Andalucía – CSIC

Gammapy Coding Sprint
23rd – 27th November 2020

notebooks for developers

live with the code

 [gammapy / gammapy](#)

▣ .github
▣ dev
▣ docs
▣ examples
▣ gammapy
▣ licenses
▫ .codacy.yml
▫ .gitignore
▫ .travis.yml
▫ CHANGES.rst
▫ LONG_DESCRIPTION.rst
▫ MANIFEST.in
▫ Makefile
▫ README.rst
▫ azure-pipelines.yml
▫ environment-dev.yml
▫ lgtm.yml
▫ notebooks.yml
▫ pyproject.toml
▫ setup.cfg
▫ setup.py

▣ _static
▣ _templates/autosummary
▣ analysis
▣ astro
▣ catalog
▣ data
▣ datasets
▣ development
▣ estimators
▣ install
▣ irf
▣ makers
▣ maps
▣ modeling
▣ overview
▣ scripts
▣ stats
▣ tutorials
▣ utils
▣ visualization
▫ Makefile
▫ changelog.rst
▫ conf.py
▫ getting-started.rst
▫ howto.rst
▫ index.rst
▫ make.bat
▫ nitpick-exceptions
▫ overview.rst
▫ references.rst
▫ references.txt

▣ images
▫ analysis_1.ipynb
▫ analysis_2.ipynb
▫ analysis_3d.ipynb
▫ analysis_mwl.ipynb
▫ astro_dark_matter.ipynb
▫ background_model.ipynb
▫ catalog.ipynb
▫ cta.ipynb
▫ cta_data_analysis.ipynb
▫ cta_sensitivity.ipynb
▫ detect.ipynb
▫ event_sampling.ipynb
▫ exclusion_mask.ipynb
▫ extended_source_spectral_analysis.ip...
▫ fermi_lat.ipynb
▫ hess.ipynb
▫ index.rst
▫ light_curve.ipynb
▫ light_curve_flare.ipynb
▫ light_curve_simulation.ipynb
▫ maps.ipynb
▫ mcmc_sampling.ipynb
▫ modeling.ipynb
▫ modeling_2D.ipynb
▫ models.ipynb
▫ overview.ipynb
▫ pulsar_analysis.ipynb
▫ ring_background.ipynb
▫ sed_fitting.ipynb
▫ simulate_3d.ipynb
▫ spectrum_analysis.ipynb
▫ spectrum_simulation.ipynb
▫ survey_map.rst

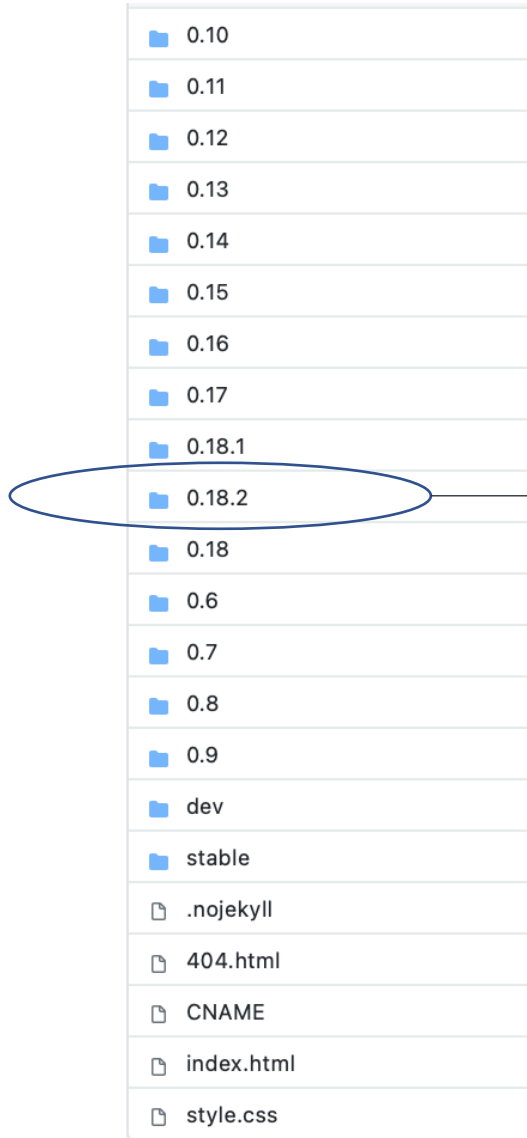
▫ DC1_3d.png
▫ gammapy_maps.png
▫ gammapy_mcmc.png

...but they may be anywhere else !!

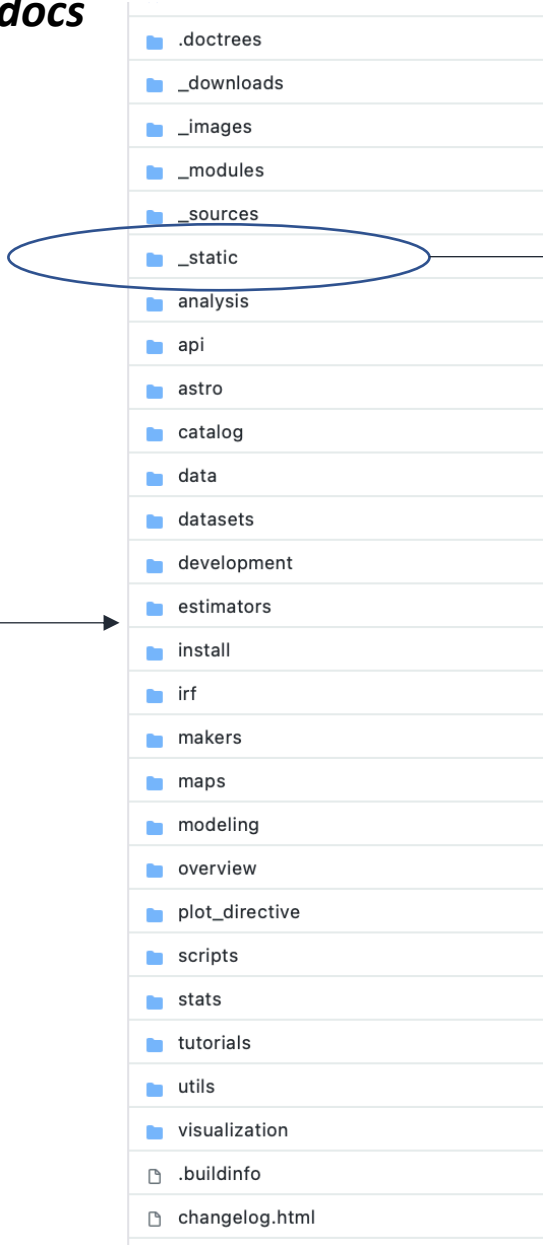
notebooks for users

live with the versioned built docs

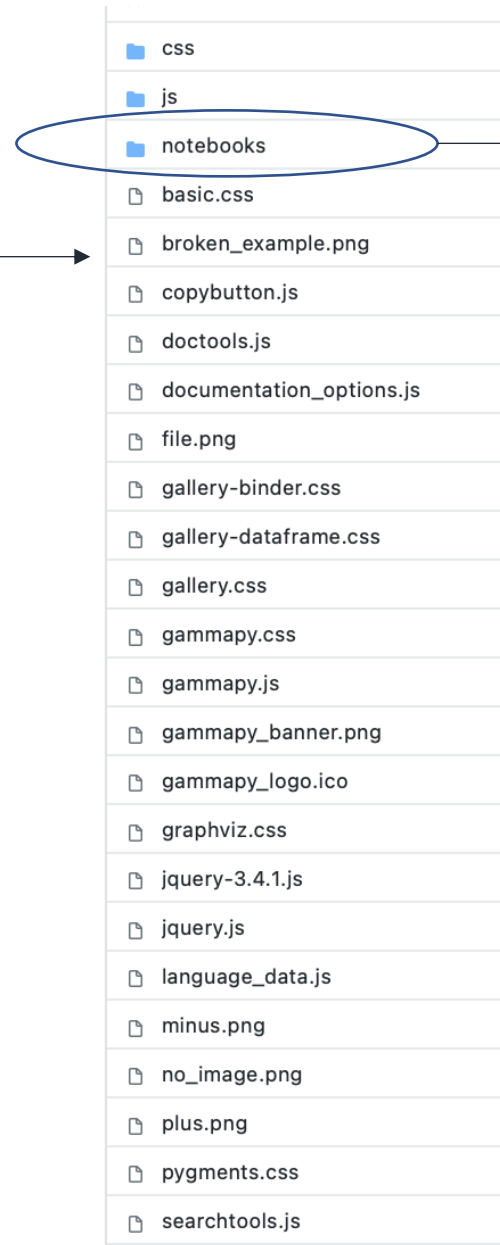
 [gammapy / gammapy-docs](#)



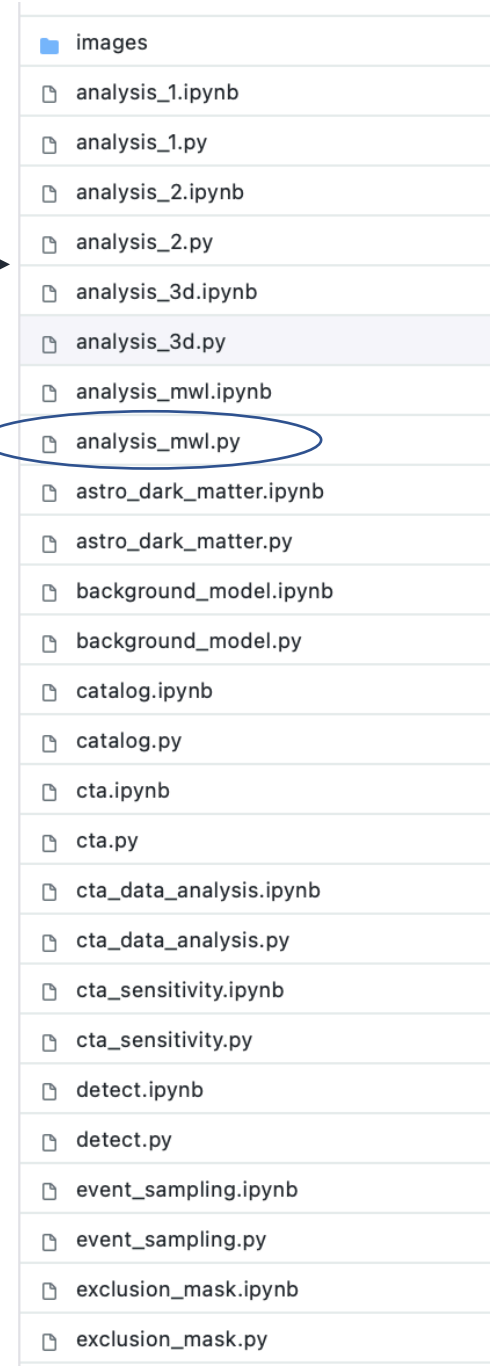
0.10
0.11
0.12
0.13
0.14
0.15
0.16
0.17
0.18.1
0.18.2
0.18
0.6
0.7
0.8
0.9
dev
stable
.nojekyll
404.html
CNAME
index.html
style.css



.doctrees
_downloads
_images
_modules
_sources
_static
analysis
api
astro
catalog
data
datasets
development
estimators
install
irf
makers
maps
modeling
overview
plot_directive
scripts
stats
tutorials
utils
visualization
.buildinfo
changelog.html



css
js
notebooks
basic.css
broken_example.png
copybutton.js
doctools.js
documentation_options.js
file.png
gallery-binder.css
gallery-dataframe.css
gallery.css
gammapy.css
gammapy.js
gammapy_banner.png
gammapy_logo.ico
graphviz.css
jquery-3.4.1.js
jquery.js
language_data.js
minus.png
no_image.png
plus.png
pygments.css
searchtools.js



images
analysis_1.ipynb
analysis_1.py
analysis_2.ipynb
analysis_2.py
analysis_3d.ipynb
analysis_3d.py
analysis_mwl.ipynb
analysis_mwl.py
astro_dark_matter.ipynb
astro_dark_matter.py
background_model.ipynb
background_model.py
catalog.ipynb
catalog.py
cta.ipynb
cta.py
cta_data_analysis.ipynb
cta_data_analysis.py
cta_sensitivity.ipynb
cta_sensitivity.py
detect.ipynb
detect.py
event_sampling.ipynb
event_sampling.py
exclusion_mask.ipynb
exclusion_mask.py

the notebooks.yaml index file *is not* a tutorials.yaml file

■ .github
■ dev
■ docs
■ examples
■ gammapy
■ licenses
▢ .codacy.yml
▢ .gitignore
▢ .travis.yml
▢ CHANGES.rst
▢ LONG_DESCRIPTION.rst
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▢ azure-pipelines.yml
▢ environment-dev.yml
▢ lgtm.yml
▢ notebooks.yaml
▢ pyproject.toml
▢ setup.cfg
▢ setup.py

```
1 # This is a list of available notebooks.
2 # It's used for automatic testing and downloading of datasets notebooks.
3 # Dataset ebl declared in overview notebook is used in some Sphinx docs examples.
4 # Names of notebooks should be unique. Let's keep it alphabetical.
5 - name: analysis_1
6   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_1.ipynb
7   datasets:
8     - hess-dl3-dr1
9   tutorial: True
10 - name: analysis_2
11   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_2.ipynb
12   datasets:
13     - hess-dl3-dr1
14   tutorial: True
15 - name: analysis_3d
16   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_3d.ipynb
17   datasets:
18     - cta-1dc
19     - fermi-3fhl-gc
20   images:
21     - DC1_3d
22   tutorial: True
23 - name: analysis_mwl
24   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_mwl.ipynb
25   datasets:
26     - crab-3datasets
27   tutorial: True
28 - name: astro_dark_matter
29   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/astro_dark_matter.ipynb
30   datasets:
31     - dark_matter_spectra
32   tutorial: True
33 - name: catalog
34   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/catalog.ipynb
35   datasets:
```

- 31 notebooks declared
- the content of this file is edited manually

the notebooks.yaml index file *is not* a tutorials.yaml file

```
15 - name: analysis_3d
16   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_3d.ipynb
17   datasets:
18     - cta-1dc
19     - fermi-3fhl-gc
20   images:
21     - DC1_3d
22   tutorial: True

80 - name: fermi_lat
81   url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/fermi_lat.ipynb
82   requires: healpy
83   datasets:
84     - fermi_3fhl
85     - fermi-3fhl-gc
86   tutorial: True
```

included when ***gammapy download tutorials***

download notebook files

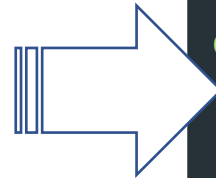
may be skipped when tested with ***make test-nb***

```
$ gammapy download notebooks --help
Usage: gammapy download notebooks [OPTIONS]

Download notebooks
```

download of a specific tutorial

- notebook
- datasets
- images



```
$ gammapy download tutorials --help
Usage: gammapy download tutorials [OPTIONS]

Download notebooks, scripts and datasets

Options:
  --src TEXT      Specific tutorial to download.
  --out TEXT      Path where notebooks and datasets folders will be copied.
                  [default: gammapy-tutorials]

  --release TEXT  Number of release - ex: 0.12
  -h, --help     Show this message and exit.
```

files will be copied.

tutorials

the *not versioned* datasets folders

```
15 - name: analysis_3d
16 url: https://raw.githubusercontent.com/gammapy/gammapy/master/docs/tutorials/analysis_3d.ipynb
17 datasets:
18   - cta-1dc
19   - fermi-3fhl-gc
20 images:
21   - DC1_3d
22 tutorial: True
```

gammapy / gammapy-data

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

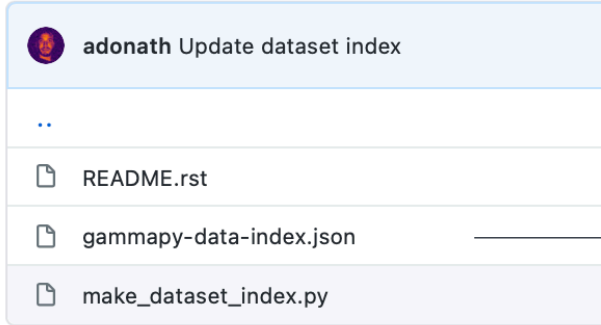
master 1 branch 0 tags Go to file Add file Code

adonath Merge pull request #5 from AtreyeeS/bkg_ex 1c5ff8b 25 days ago 18 commits

catalogs	upload datasets	8 months ago
cta-1dc	upload datasets	8 months ago
dark_matter_spectra	upload datasets	8 months ago
ebl	upload datasets	8 months ago
fermi-3fhl-crab	Introduce BackgroundIRFModel	26 days ago
fermi-3fhl-gc	upload datasets	8 months ago
fermi_3fhl	upload datasets	8 months ago
figures	upload datasets	8 months ago
hawc_crab	upload datasets	8 months ago
hess-dl3-dr1	upload datasets	8 months ago
joint-crab/spectra	upload datasets	8 months ago
tests	Merge pull request #5 from AtreyeeS/bkg_ex	25 days ago
README.md	update README.md	8 months ago

the *versioned* list of folders within the dataset pack

master | [gammapy](#) / [dev](#) / [datasets](#) /



adonath Update dataset index

..

README.rst

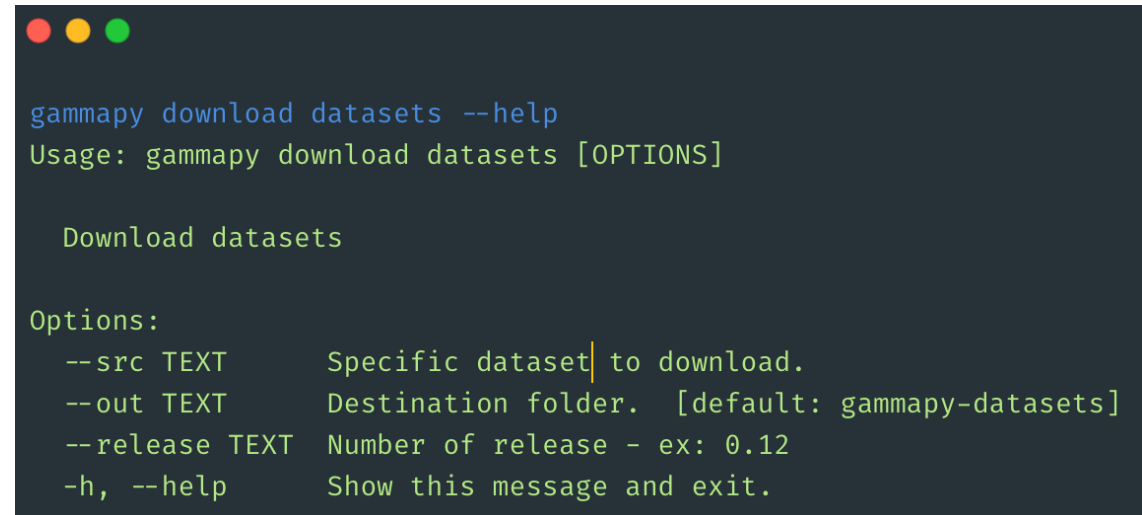
gammapy-data-index.json

make_dataset_index.py

```
{
  "name": "joint-crab",
  "description": "tbd",
  "files": [
    {
      "path": "joint-crab/spectra/hess/arf_obs23523.fits",
      "url": "https://github.com/open-gamma-ray-astro/joint-crab/raw/master/results/spectra/hess/arf_obs23523.fits",
      "filesize": 8640,
      "hashmd5": "26ed95b824b56ee4631b9063b2316b7a"
    },
    {
      "path": "joint-crab/spectra/hess/arf_obs23559.fits",
      "url": "https://github.com/open-gamma-ray-astro/joint-crab/raw/master/results/spectra/hess/arf_obs23559.fits",
      "filesize": 8640,
      "hashmd5": "cf7087a9f7cac11767036501bc6d43de"
    }
  ],
}
```

- the `gammapy-data-index.json` is a list of *datasets folders*
- a dataset folder contains a list of *data files*
- the list of datasets folders may be different for every release
- A specific dataset for a specific release may be downloaded
- the data files are not versioned

- the content of the `gammapy-data-index.json` is declared and generated with `make_dataset_index.py`



```
gammapy download datasets --help
Usage: gammapy download datasets [OPTIONS]

Download datasets

Options:
  --src TEXT      Specific dataset to download.
  --out TEXT      Destination folder. [default: gammapy-datasets]
  --release TEXT  Number of release - ex: 0.12
  -h, --help     Show this message and exit.
```

last but not least: we do also have an index to download *versioned scripts*



master ▾ [gammapy](#) / examples /

adonath Make polish

- ..
- models
- README.rst
- example_2_gauss.py
- scripts.yaml**
- survey_map.py

```
12 lines (11 sloc) | 421 Bytes
1 # This is a list of available example scripts.
2 # It's used for downloading of scripts with gammapy download.
3 # Let's keep it alphabetical.
4 - name: example_2_gauss
5   url: https://raw.githubusercontent.com/gammapy/gammapy/v0.18.2/examples/example_2_gauss.py
6   datasets:
7     - cta-1dc
8 - name: survey_map
9   url: https://raw.githubusercontent.com/gammapy/gammapy/v0.18.2/examples/survey_map.py
10  datasets:
11    - hess-dl3-dr1
12
```

```
$ gammapy download scripts --help
Usage: gammapy download scripts [OPTIONS]

Download scripts

Options:
  --src TEXT      Specific script to download.
  --out TEXT      Path where the versioned python scripts will be copied.
                  [default: gammapy-scripts]

  --release TEXT  Number of release - ex: 0.12
  --silent
  -h, --help     Show this message and exit.
```

- a specific script for a specific release may be downloaded
- the content of the scripts.yaml is edited manually

the release publishing *manual* process

<https://docs.gammapy.org/0.18.2/development/release.html>

1. Update the dataset index file by running `make dataset-index` and copy it over to `gammapy-0.14-data-index.json` in the webpage repo.
2. Copy over `notebooks.yaml` to `gammapy-0.14-tutorials.yaml` and adapt the links contained in the file to point to `https://docs.gammapy.org/0.14/_static/notebooks`.
3. Copy the script index file from the last release to `gammapy-0.14-scripts.yaml` and add new examples by hand if needed.
4. Copy the environment file from the last release to `gammapy-0.14-environment.yaml` and adapt dependency versions as required.
5. Mention release on the front page and on the news page of the Gammapy webpage (update `index.html` and `news.html` in the **gammapy webpage repo**).
6. Update the version number in `docs/install/index.rst`
7. Follow the instructions how to release an Astropy affiliated package [here](#).
8. Checkout the git tag v0.14 and build the release documentation and publish it in `gammapy-docs` **Github repository** Adapt `stable/index.html` to point to v0.14 in the gammapy docs repo.
9. Update the Gammapy conda-forge package at <https://github.com/conda-forge/gammapy-feedstock>
10. Encourage the Gammapy developers to try out the new stable version (update and run tests) via the Github issue for the release and wait a day or two for feedback.

Update version number in Binder `Dockerfile` in **gammapy webpage repo** master branch and tag the release for Binder.

1

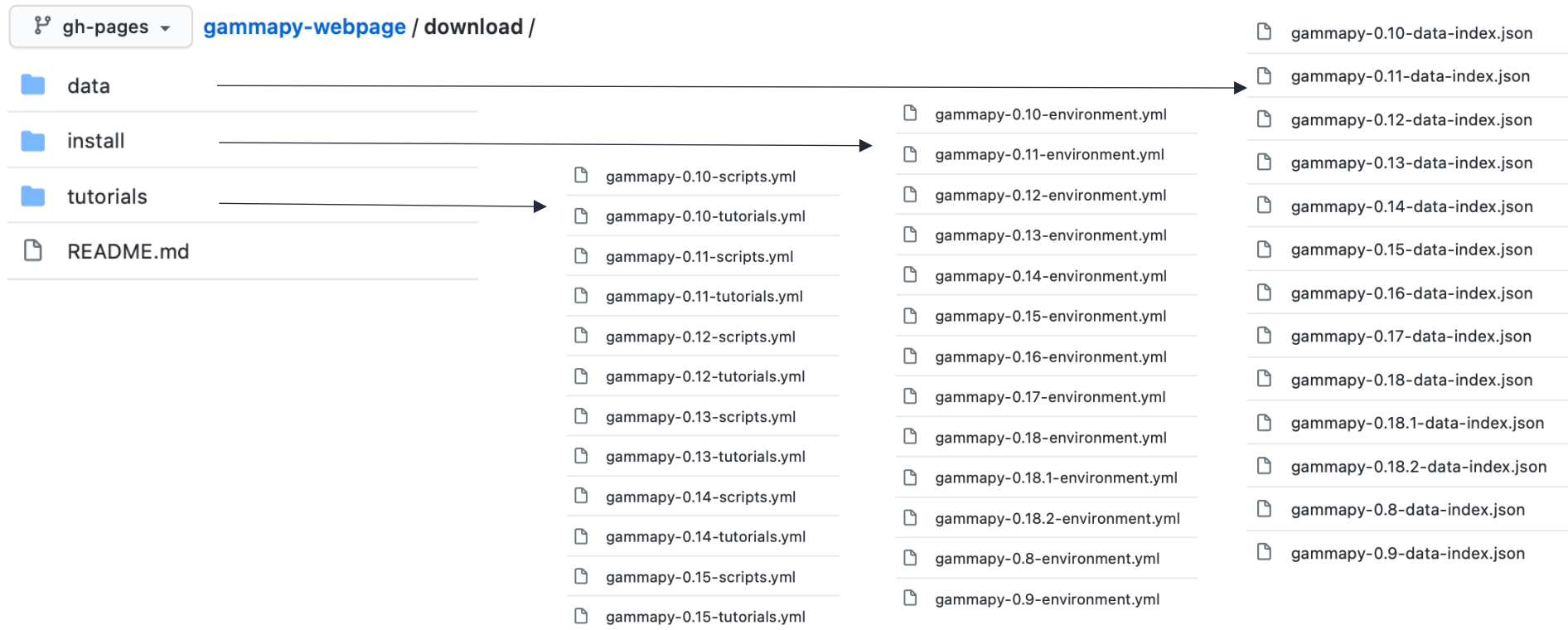
2

3

the release publishing *manual* process

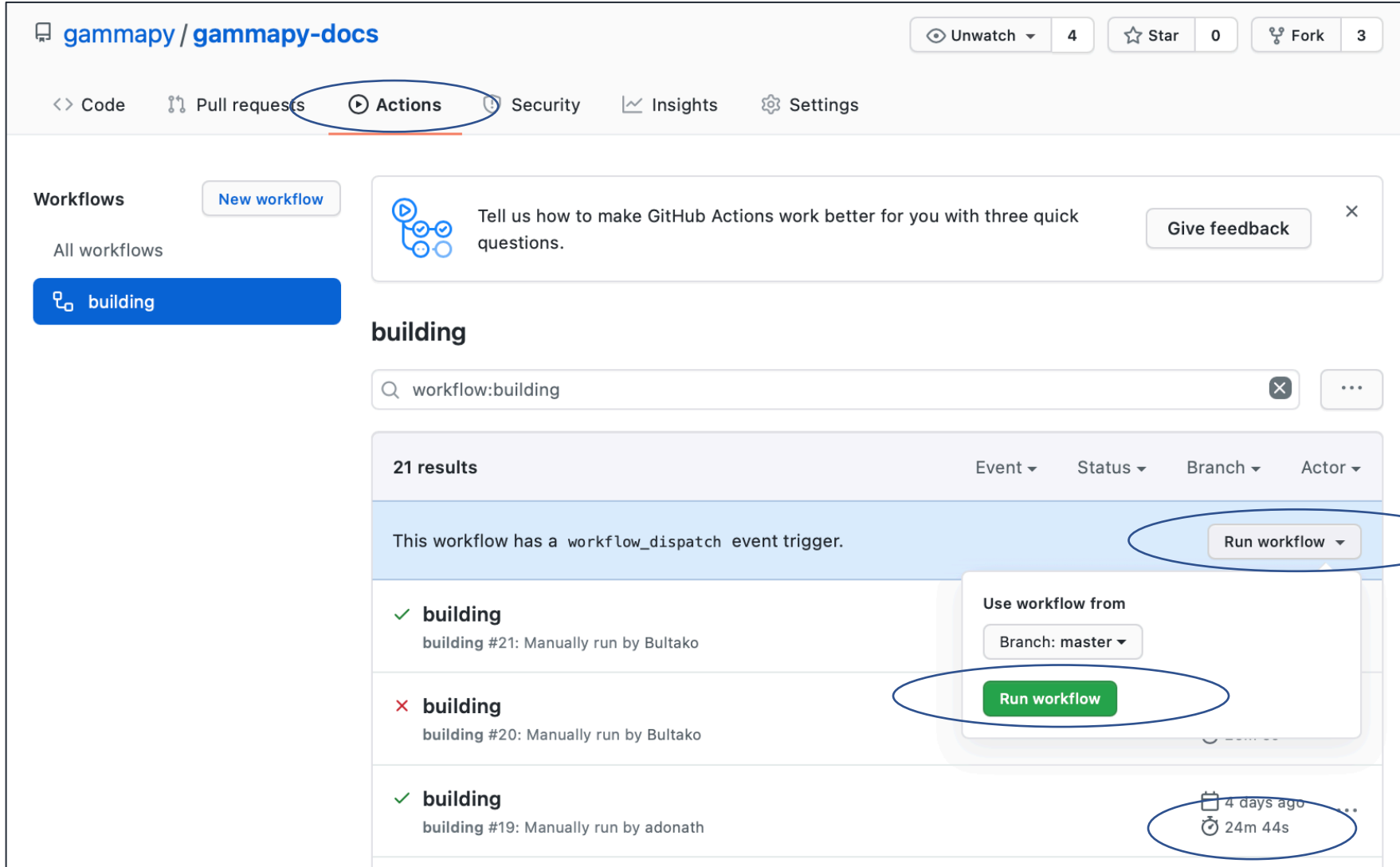
<https://docs.gammapy.org/0.18.2/development/release.html>

1. Update the dataset index file by running `make dataset-index` and copy it over to `gammapy-0.14-data-index.json` in the webpage repo.
2. Copy over `notebooks.yaml` to `gammapy-0.14-tutorials.yaml` and adapt the links contained in the file to point to `https://docs.gammapy.org/0.14/_static/notebooks`.
3. Copy the script index file from the last release to `gammapy-0.14-scripts.yaml` and add new examples by hand if needed.



the doc building *automated* process

Building the */dev* documentation is a matter of a click in Github actions interface



the doc building *manual* process – versioned and executable docs

2

Building the */release* documentation

Commit Hash	Message	Time
dbc36f2	commit docs dev version	2 days ago
0.10	change to red color for notes on updated versions	12 months ago
0.11	change to red color for notes on updated versions	12 months ago
0.12	change to red color for notes on updated versions	12 months ago
0.13	change to red color for notes on updated versions	12 months ago
0.14	change to red color for notes on updated versions	12 months ago
0.15	fix missing spacing between logo and title	12 months ago
0.16	fix binder badge	10 months ago
0.17	Add docs/0.17	8 months ago
0.18.1	fix tutorials	2 days ago
0.18.2	fix tutorials	2 days ago
0.18	fix tutorials	2 days ago
0.6	change to red color for notes on updated versions	12 months ago
0.7	change to red color for notes on updated versions	12 months ago

versioned

- tag release in *gammapy* repository
- go to *gammapy / gammapy-docs*
- build the dev version with github actions interface
- duplicate the dev folder and rename it after release number
- edit *index.html* file to redirect to last release folder

3

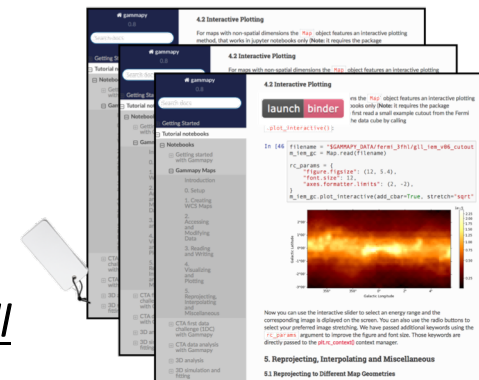
executable

- go to master branch in *gammapy / gammapy-webpage*
- edit *Dockerfile* to install last release in binder
- tag the repository after the release number
- launch binder and check everything works

Commit Hash	Message	Time
06b6d32	Add Dockerfile for v0.18.2	2 days ago
Initial	Initial commit	5 years ago
Initial	Initial commit	5 years ago
Initial	fix pip install packages	12 months ago

rebuilding and old version

- git checkout to version tag
- build docs locally with *make docs-all*



docs and notebooks processing commands

build documentation processing the notebooks

make docs-all

- *nbs* *bool* *process notebooks (default True)*
- *src* *string* *path to process notebooks (default "")*
- *fmt* *bool* *black code-style (default False)*

clean notebooks

make clean-nb

- *code style with black app and strip the output cells*
- *notebooks are stored with outputs cells stripped to ease code review in diffs*

test notebooks

make test-nb

- *run notebooks if requirements are satisfied*
- *provide clean error tracebacks*

test scripts

make test-scripts

- *execute scripts collection sequentially*

build documentation processing only rst files

make docs-sphinx

display built documentation

make docs-show

notebooks processing needs the notebooks.yaml file

internals mechanisms in docs building with notebooks processing – make docs-all

```
docs-all:
    python -m gammapy.utils.notebooks_process --src="$(src)" --nbs="$(nbs)" --fmt="$(fmt)"
    cd docs && python -m sphinx . _build/html -b html
    python -m gammapy.utils.notebooks_links --src="$(src)" --nbs="$(nbs)"
```

gammapy.utils.notebooks_process.py

- *read the list in notebooks.yaml file*
- *clean the notebooks - code style with black app and strip the output cells*
- *convert cleaned notebooks into .py scripts version*
- *copy cleaned empty notebooks and .py scripts into downloadable path docs/_static/notebooks*
- *execute notebooks in source docs path to produce filled notebooks with outputs*
- *add upper box with right version links to binder and downloadable files*

sphinx . _build/html -b html

- *build the html documentation in docs/_build/html*
- *processing the .rst files with sphinx*
- *processing the filled notebooks with nbsphinx*

internals mechanisms in docs building with notebooks processing – make docs-all

```
docs-all:
    python -m gammapy.utils.notebooks_process --src="$(src)" --nbs="$(nbs)" --fmt="$(fmt)"
    cd docs && python -m sphinx . _build/html -b html
    python -m gammapy.utils.notebooks_links --src="$(src)" --nbs="$(nbs)"
```

gammapy.utils.notebooks_links

- *convert API syntax labels into relative links into the generated API docs*
- *convert urls in absolute links found in nbs and pointing to the /dev docs website into its release url*
- *convert urls in absolute links found in html and pointing to the /dev docs into relative links*
- *check broken links in notebooks and raise warnings*

★ ***bring back cleaned notebooks*** from downloadable path into source docs path

consistent syntax to make links to documentation **within MD cells of notebooks**

- to notebooks: `[Maps in first steps with Gammapy](first_steps.ipynb#Maps)`
- to RST doc files: `[Help](../getting-started.rst#help)`
- to API ref docs:

```
- `~gammapy.maps`
- `~gammapy.maps.Geom`
- `~gammapy.maps.Geom.is_image`
- `~gammapy.maps.Geom.is_image()`
```

notebooks review process

- notebooks are stored empty / without outputs cells to ease code review in diffs
- you may also use ReviewNB

review-notebook-app bot commented 3 days ago

Check out this pull request on [ReviewNB](#)

See visual diffs & provide feedback on Jupyter Notebooks.

Powered by [ReviewNB](#)

DISCUSSION 3 COMMITS 2 **CHANGES 4**

docs/tutorials/cta_data_analysis.ipynb

Hide Previous Version Hide Outputs

↑ Click to expand ↓

<pre>1 %%time 2 images_ts = ts_image_estimator.run(stacked)</pre>	<pre>1 %%time 2 images_ts = ts_image_estimator.run(stacked)</pre>
<pre>1 sources = find_peaks(2 images_ts["sqrt_ts"].get_image_by_idx((0,)), 3 threshold=5, 4 min_distance="0.2 deg", 5) 6 sources</pre>	<pre>1 sources = find_peaks(2 images_ts["sqrt_ts"], 3 threshold=5, 4 min_distance="0.2 deg", 5) 6 sources</pre>
<pre>1 source_pos = SkyCoord(sources["ra"], sources["dec"]) 2 source_pos</pre>	<pre>1 source_pos = SkyCoord(sources["ra"], sources["dec"]) 2 source_pos</pre>

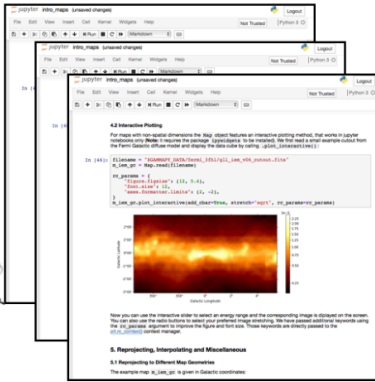
versioned executable user documentation

<https://github.com/gammapy/adass2018-gammapy-poster>

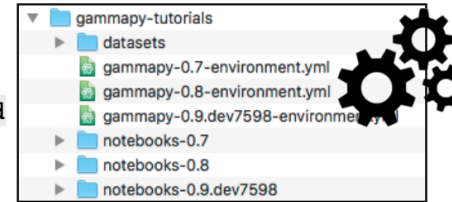
```
gammapy jupyter run  
gammapy jupyter test  
gammapy jupyter strip
```



Datasets
Lookup files

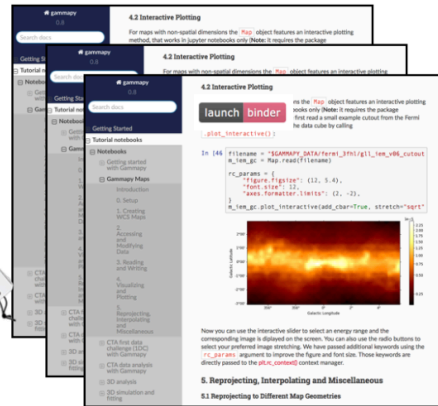


gammapy download

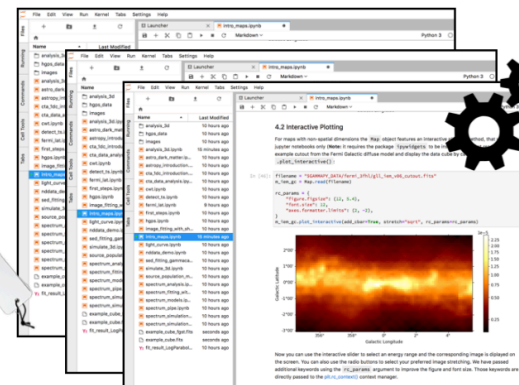


GitHub git

make docs



launch binder



$\gamma\pi$ notebooks - now

- ✓ may be *placed anywhere* in the docs folder structure
- ✓ may be part of a tutorial *triplet* (notebook, dataset, image)
- ✓ may be *downloaded individually as tutorial* and also as a file
- ✓ may be *tested* and skipped if required libraries are missing
- ✓ provide clear error *tracebacks* when tested
- ✓ versioned release *links to binder* and downloadable files are created during doc built-in
- ✓ versioned release *links to API docs* are created from API short syntax during doc built-in
- ✓ absolute links to dev docs website are translated into relative links in the html files
- ✓ absolute links to docs website are translated into versioned release links in nbs
- ✓ are output *stripped* to ease code review when diffing
- ✓ may be *styled code formatted* with black

$\gamma\pi$ notebooks - improvements

✓ *simplify the release process*

- *remove versioned index files for scripts, notebooks, tutorials and datasets*
 - *scripts.yaml*
 - *notebooks.yaml*
 - *gammapy-data-index.json*
- *remove binder links?*
- *simplify/speed notebooks execution*
- *tests takes more than 15min, while the whole docs building process takes a bit more than 20min.*

✓ *storage*

- *use [jupytertext](#) paired filled notebooks and .md files instead of empty notebooks?*
- *[nbsphinx](#) allows to build html notebooks stored in .md format*
- *still some processing needed (tests, links conversion, upper box)*
- *developers working methodology changes*

✓ *display and layout*

- *display notebooks collection in a gallery view*

✓ *user contribution*

- *provide an easy way for users to contribute with their own notebooks*
- *<https://github.com/Bultako/tutorials>*
- *<https://www.iaa.csic.es/~jer/recipes>*