Gammapy & Data Challenge

Roberta Zanin & Christoph Deil

SeeVogh 27 April 2017

Data challenge info

- https://forge.in2p3.fr/projects/data-challenge-1-dc-1/wiki

- https://cta.cta-observatory.org/indico/sessionDisplay.py?sessionId=1&confId=1300#20170306

Data challenge deadlines

- No official deadlines

- Final simulation not ready yet

- IMO, at least two weeks before the release
  - One week for the simulation
  - One week for testing formats and their compatibility with gammapy & ctools

- Results ready by the end of the summer, DC official end in La Palma meeting (November 2017) when Stefan will deliver to the CB the close-out document

Other DC information

- Not possible to download a specific ROI.
    - Data will be distributed as GB sized tarball
    - https://owncloud.cta-observatory.org/index.php/apps/files/

- A fully open DC: the sky models will be described in detail and released together with the data.

- Not clear yet how support to people will be organized

- What in the files?:

```
$ tree gammapy-extra/test_datasets/cta_1dc/
gammapy-extra/test_datasets/cta_1dc/
├── caldb
│   └── data
│       └── cta
│           └── prod3b
│               └── bcf
│                   └── South_z20_50h
│                       └── irf_file.fits
├── data
│   └── baseline
│       └── gc
│           ├── gc_baseline_000659.fits.gz
│           ├── gc_baseline_001320.fits.gz
│           └── gc_baseline_001398.fits.gz
├── hdu-index.fits.gz
└── obs-index.fits.gz
```

Sky models

- Galactic GPS data release
  (covering GPS, Galactic center and SFR KSP, partially DM)
  - Diffuse emission
  - DM halo
  - Fermi bubbles
  - Known gamma-ray source
  - PWN population (no energy-dependent morphology)
  - SNR population (Cristofari et al's model)
  - 6 known gamma-ray binaries + 5 new ones (no phase-folded spectral variability)
  - 12 brightest pulsars (PL extrapolation up to TeV)
  - NO transients

Sky models

- Extragalactic data release (~550 sources)
  - 46+11 sources in TeVcat
  - 86 srcs with no redshift in 1FHL
  - 184 src with redshift in 1FHL
  - 185 srcs with redshift taken from the 3FGL
  - 38 src from 2FHL not previously included

Goals of this data challenge

- Make people familiarize with the analysis tools available

- Produce the Astronomy picture of the day ☺

- Scientific results? This data release will be the starting point for the studies needed for the upcoming papers (in most cases too simplified sky models)

- Practically speaking, preparing results for the close-out document.
  - Each SWG has created a list of results they expect to produce from this DC

Close-out document: an example

Galactic SWG analyses for the first data Challenge

Pulsar Wind Nebulae
- Population study: determine the number and spatial distribution of PWN in the dataset.
- Accurately reconstruct the spectra of a sample of PWN.
- Produce a map of at least one extended PWN.

Supernova Remnants
- Population study: determine the number and spatial distribution of SNR in the dataset.
- Accurately reconstruct the spectra of a sample of SNR.
- Produce a map of at least one resolved SNR shell.

Gamma-ray Binaries
- Reconstruct the spectra and lightcurves of the known TeV gamma-ray binaries.
- Identify and reconstruct the lightcurve of at least one new binary.

Pulsars
- Reconstruct the spectra and lightcurves of the Crab and Vela Pulsars.
- Attempt to identify and reconstruct the lightcurve of at least one additional pulsar.

Galactic Center
- TBD

General
- Identify at least one PeVatron.
- Identify missing components which should be incorporated into the next data challenge.
- Produce a map of the Galactic Plane Survey.

any doubt?

- Feel free to
  - contact Christoph and myself via email or via slack
  - use the CTA SWG mailing lists