LST1 data analysis experience with Gammapy

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For standard LST data analysis

- I had started using gammapy since v0.17, as the Science Tool, to produce the first LST-1 DL3 file, along with following pyirf and GADF, with the huge help of Léa Jouvin.
- We have been working with **almost 0** standard background model or a standard PSF IRF so far -> 1D spectral analysis with gammapy for LST1 standard analysis.
- Even within the small scope of usage, we LST1 analyzers have faced quite a few issues and also received a huge support from the gammapy dev team!
- We will summarize some of the issues we faced and the feedback we have currently during this session.

DL3 file compression (.fits vs .fits.gz)

- The distinction was noticed when working with large datasets (>~10^8 events or >~30 hrs of Livetime of data with loose DL3 cuts).
- While accessing any information from an Observation object, or in any other way from the DL3 files, Gammapy takes a long time to unzip the files and then use them. Generally, in 1D spectral analysis, this happens multiple times.
- The processing time is considerably reduced when we remove this intermediate process by having the DL3 files, unzipped.
- This is not an urgent requirement, but would be nice if it can fixed in the future, maybe by storing the file information after unzipping it the first time, or by using a faster unzipping method

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EBL de-absorption documentation

- EBL Absorption model is well documented in gammapy.
- However the simple steps on producing an EBL de-absorbed spectra of a real data, is not documented and it would be really helpful for general users.
- This can be done within some example of spectral analysis.

General spectral plots

- There was some flexibility in choosing the units, labels of some plots like SED, LC, etc, until v0.19, but is not present anymore.
- It would be great to have some option to have choice in units like, using TeV or ergs for SED plot, or using Time formats other than "iso" and "mjd" in LC.
- There was an issue with plotting the OFF regions for datasets with energy dependent RAD_MAX values, but was quickly resolved in v0.20.0.
- Theta2 plot functions from gammapy are not based on energy bins. I had created my own template function and used it so far. It can be helpful to have the functions improved in gammapy.
- The rad_max_vs_energy plot function can be improved (yticks for example can have better format)

Spectral analysis from OGIP files?

- It might be helpful to have some examples on how to perform spectral analysis with the OGIP files or the Dataset files (DL4 -> DL5).
- It might be super easy for the initiated and those who have worked with X-ray Astrophysics, but can be really helpful for the new analyzers and the uninitiated.

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Spectral energy binning

To make a constant binning to estimate flux points, we have to choose the same energy bins as those set for the dataset creation. Otherwise, Gammapy would change them automatically.

Decorrelation energy

From the documentation, it is not entirely clear how we should proceed with standard analyses. We could include a function that calculates it for a given dataset and a range of energies for estimating the reference energy in the docs.

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Statistical results?

From the documentation, it is not straightforward to obtain the goodness of the SED model fit (e.g., p-value). Some more insight in this regard would be good in the Fitting tutorial.