Preparatory steps for the `fermipy` hands-on session

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1 Introduction

The `fermipy` hands-on session will consists of background information on how a *Fermi*-LAT analysis is performed along with some tips and tricks for your everyday analysis. Together, we will go through examples of different analysis cases (simple point sources, extended sources, dark matter searches). You are very welcome to follow along these examples and run your *Fermi* analysis on your computer. This is not strictly necessary to follow the session but of course it has the advantage that you can play around with the code and the plots we are going to create. We also plan to provide you with some simple exercises for which you also need a running installation of `fermipy`.

2 Installation

If you want to follow along the examples, you will need your own installation of `fermipy` and the `fermitools`. This section gives an overview how to install the software and provides you with links to the relevant web sites. The installation can be tricky and not work at times and we try to provide you with some ways how to address potential problems. If you don't get `fermipy` to work for the school, don't worry. You can still follow along the hands-on session.

2.1 Prerequisites

The *Fermi* analysis tools rely heavily on python. We strongly recommend that you use the `conda` package manager to install `fermipy` and the `fermitools`. Also, if you don't have python installed on your computer, `conda` is all you need.

The most lightweight possibility to install `conda` is actually `miniconda`. Installation scripts for the most common operating systems are provided on this page: `https://docs.conda.io/en/latest/miniconda.html`.

If you are running MacOS or Linux and have downloaded the `bash` installation script, simply open a terminal and navigate to the directory the script is lo-

cated. Let's assume you downloaded the script `Miniconda3-latest-MacOSX-x86_64.sh`, then you can run it with

```
chmod +x Miniconda3-latest-MacOSX-x86_64.sh
./Miniconda3-latest-MacOSX-x86_64.sh
```

2.2 Installing `fermipy`

The `conda` package manager operates with environments. For your projects, it's a good habit to create new fresh environments that include all necessary packages and dependencies. We go ahead and create a new environment for `fermipy` and the `fermitools` and also install `ipython` and the notebook `conda` kernels package so what we can easily use the software tools within `jupyter notebooks`. Also, at the time of writing, we need to use somewhat outdated versions of `astropy` and `matplotlib`. The newest versions cause issues with `fermipy`, which are already fixed, but not included in the `fermipy` installation version yet. To run the installation (which might take some time), execute the following command

```
conda create --name fermipy -c conda-forge -c fermipy -c fermi
    python=3.7 fermipy  fermitools=2.0.8 ipython nb_conda_kernels
    astropy=3.2.3 matplotlib=3.3.2
```

You can find further information on the `fermipy` documentation page: `https://fermipy.readthedocs.io` and the GitHub pages of the `fermitools`: `https://github.com/fermi-lat/Fermitools-conda`. If you run into problems, it is worthwhile to check the GitHub issue pages of `fermipy` and `fermitools` to see if someone already encountered a similar problem, see `https://github.com/fermiPy/fermipy/issues` and `https://github.com/fermi-lat/Fermitools-conda/issues`. Once the installation is complete, activate the environment by typing

```
conda activate fermipy
```

In order to see if everything worked, start up `python` (or preferably `ipython`) and try to import the so-called `GTAnalysis` object from `fermipy`:

```
from fermipy.gtanalysis import GTAnalysis
```

For instance, I had the problem that the `pyLikelihood` module could not be imported (I'm running python 3.7.9 on MacOS Mojave). I could fix the issue by installing the `fermitools` developer version:

```
conda create -n fermipy -c conda-forge -c fermi -c fermi/label/dev
    fermitools=2.0.18 python=3.7 fermipy ipython nb_conda_kernels
    astropy=3.2.3 matplotlib=3.3.2
```

2.3 Troubleshooting

If you have problems with the installation, the best thing is to open a GitHub issue on the `fermipy` GitHub page, `https://github.com/fermiPy/fermipy/issues`, and describe your problem there if it is not already solved in another issue.

3 Getting the examples and necessary data

We will use the examples provided on this GitHub repository: `https://github.com/me-manu/fermipy-extra`. If you know how to use `git`, you can simply clone the repository:

```
git clone git@github.com:me-manu/fermipy-extra.git
```

Alternatively, just go to the GitHub page, click on "Code" and then "Download ZIP". Then, unzip the archive into a directory.