Tutorial: Set up and plotting for MaPSA

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1 Introduction

Guide to recreating plots from testing. This tutorial uses pre-generated data but eventually you will be plotting your own data.

2 Necessary Tools

1. Python 2.7
2. Anaconda
3. Computing accounts (refer to CMS Outer Tracker Documentation)
4. Jupyter notebook
5. GitHub

2.1 Python 2.7 through Anaconda

Feel free to skip this section if you can already run python 2.7. The module plots code is all written in python 2.7, so we need to be able to Download anaconda https://www.anaconda.com/. Once it's installed, go to the visual Anaconda Navigator. On the 'Home' tab, go to the jupyter notebook application and install it. Once finished, the button should be blue and say 'launch'.

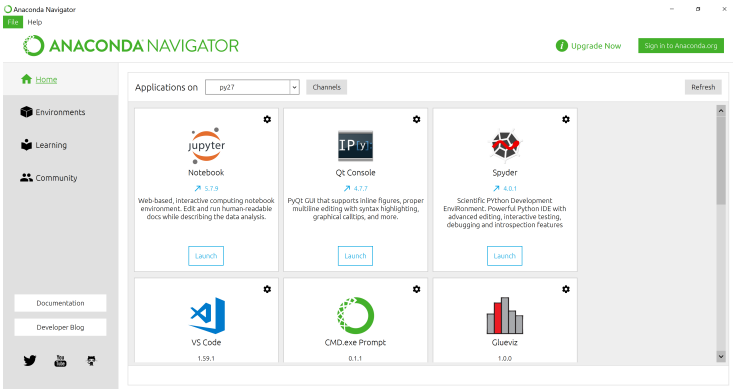

Figure 1: —-

Click the 'environments' tab. We want to create a python 2.7 environment.

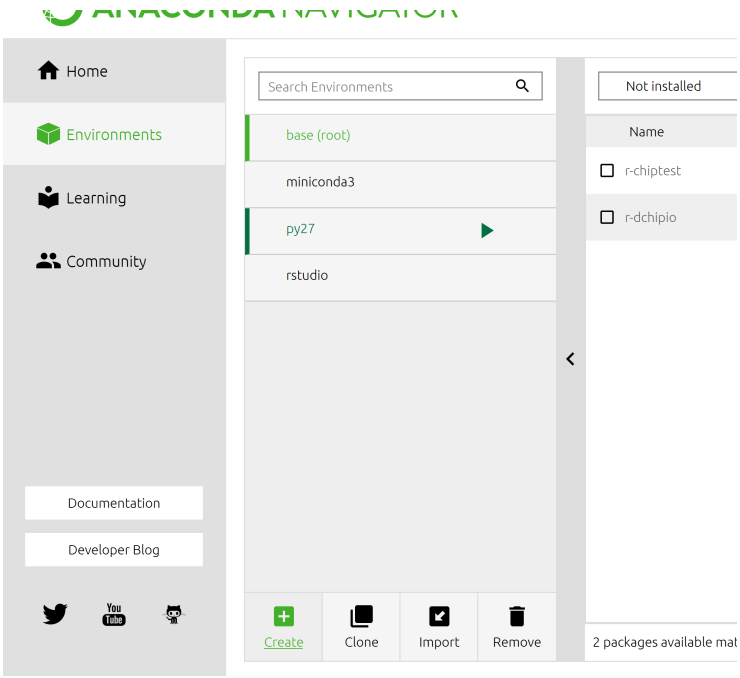

Figure 2: —-

Click on the green 'Create' button and then fill out the information as the following image shows.

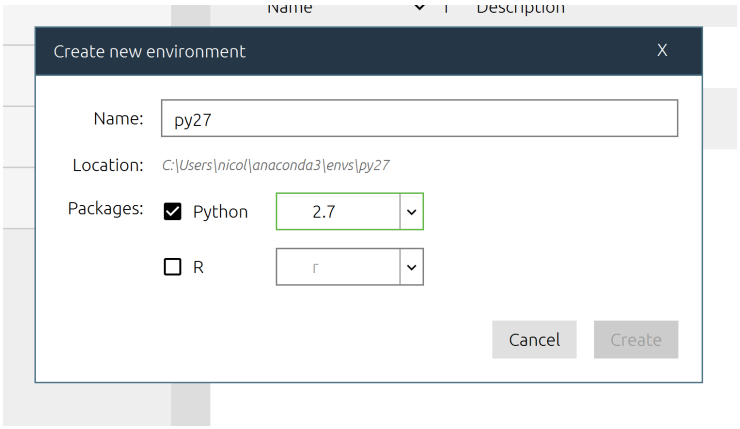

Figure 3: —-

Make sure the python version is 2.7 and name the environment 'py27' for simplicity. The environment will now show up under the list of all your environments. Essentially an environment is a python version and all the packages you have installed in that version.

Now, to launch our jupyter notebook. Press the trianglular 'play' button and four options appear:choose 'Open with Jupyter Notebook' or 'Open in Terminal'.

Important packages to install:

- numpy
- pandas
- scipy

2.2 Computing Accounts

Refer to refer to `CMS Outer Tracker Documentation` by Berkley Weyer and Lingqiang He.

2.3 Jupyter Notebook

Refer to `Python Tutorial.ipynb` for an introduction into Python and Jupyter notebooks.

2.4 GitHub

Most of the materiels will be https://github.com/osborn62/CMS-Outer-Tracker the under the `Tutorials` folder. You should make a github account and 'fork' the repository, allowing you to edit as much as you want without affecting the master.

3 Set Up to Run

3.1 Data Introduction

You are probably already familiar with the macro pixel sub-assembly (MaPSA). To make the necessary plots the data is organized into runs/tests. Before we have data of our own we will use data from given runs. For example `HPK31_1`. There are 16 macro pixel ASIC (MPA) chips on the MaPSA. Each MPA has 118x16 pixels. See the literature for explanation into all the tests (pixel alive, bump bond, etc.).

3.2 File Setup

In the `Tutorials` folder on the GitHub go to the `OT-Master` file. This folder has all necessary libraries to run the various tests. To plot you will be using the `MakeModulePlots.ipynb` notebook. The `Results_MPATesting` folder has data from a given run.

3.3 Jupyter Notebook

Go to this notebook `MakeModulePlots.ipynb` and walk through all the steps.