

Active and Passive Surface Wave Testing: Addressing Uncertainty using Open-Source Tools

Python and Jupyter

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Python

All of the examples we will cover will be using Python.

This presentation offers a very brief introduction to Python and various tools from the Python ecosystem.



Python as Open-Source

Python is released under the Python Software Foundation (PSF) license.
(see <https://docs.python.org/3/license.html>)

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What does this mean?

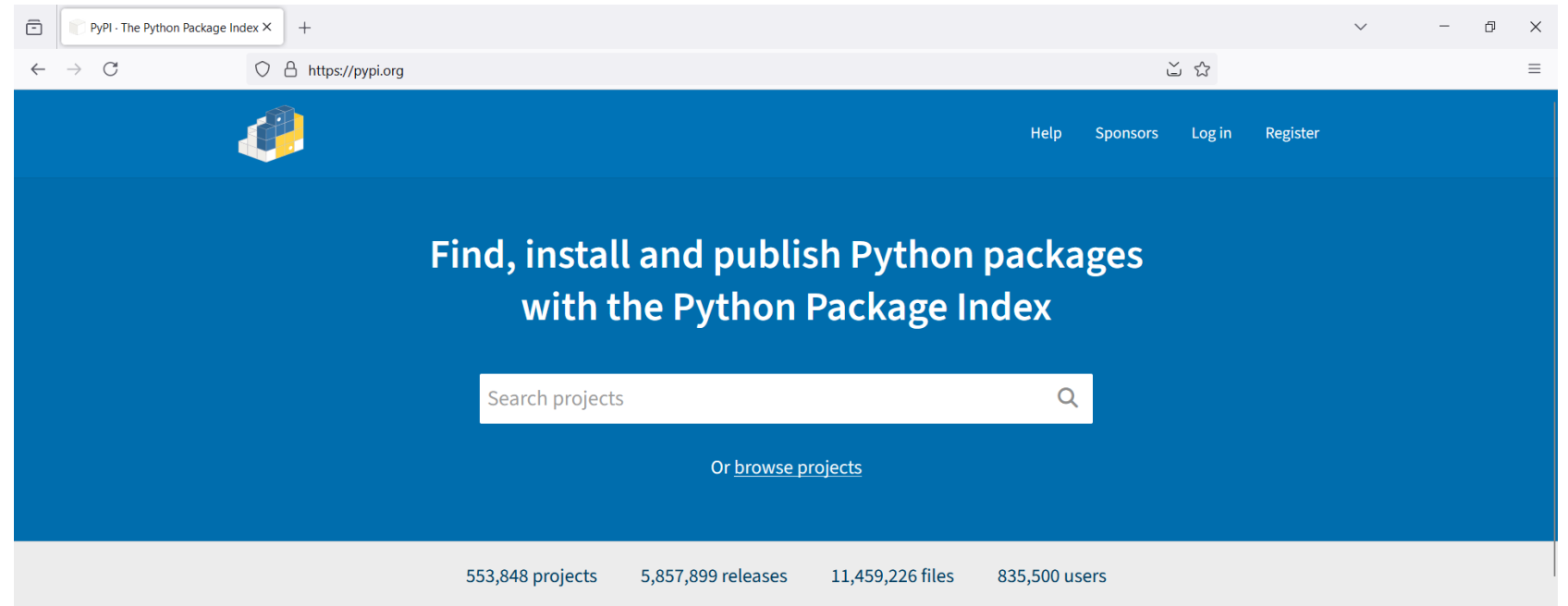
Free (no license) to use, modify, and distribute.

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** I am not a lawyer and this is not legal advice. **

Python as Community

**An active and growing
open-source community.**



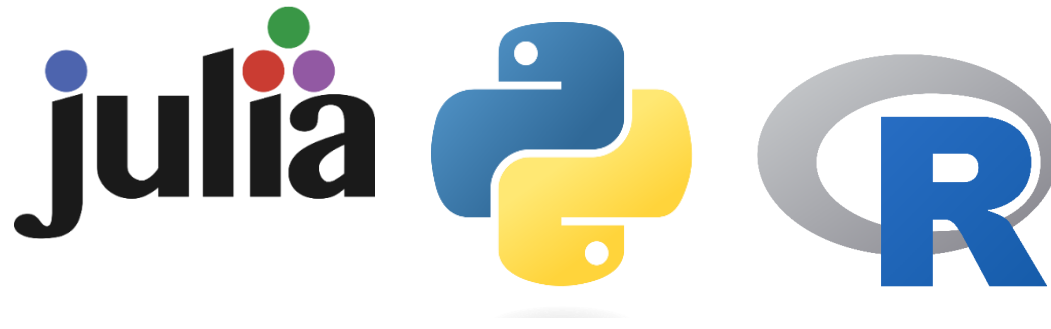
Show swprocess, swprepost, hvsrpy

The Jupyter Project

Started in 2014;
Out of the IPython Project started in 2001.

“Free software, open standards, and web services
for interactive computing across all
programming languages” – jupyter.org

Name from JULia, PYthon, R



Jupyter Lab

Jupyter started with the Jupyter Notebook.

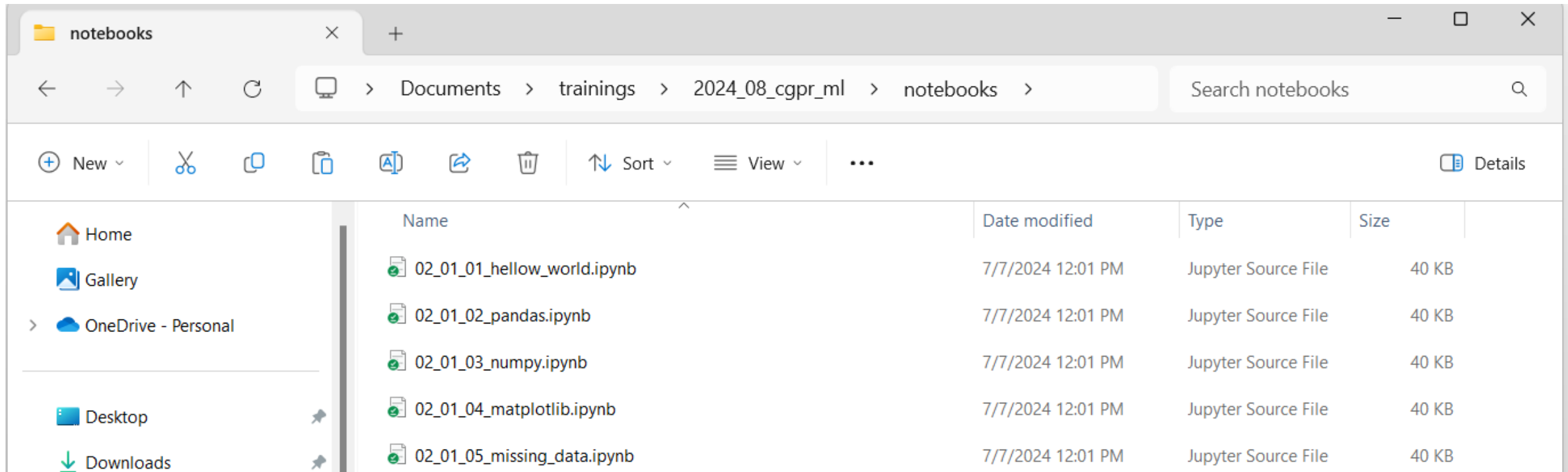
However, in 2018 the traditional Jupyter Notebook interface was replaced with Jupyter Lab.

Jupyter Notebook refers to file (.ipynb)
Jupyter Lab refer to environment where file runs.



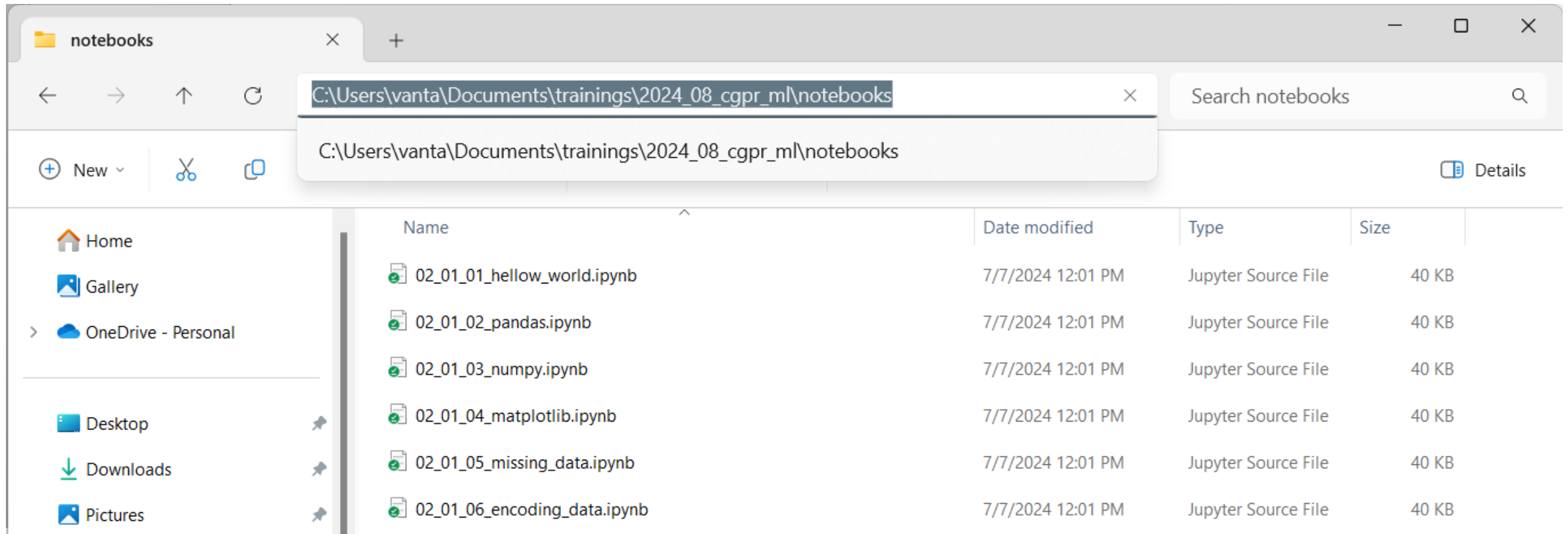
Jupyter Lab Basics | Starting Jupyter

Open file explorer to the location of your choice



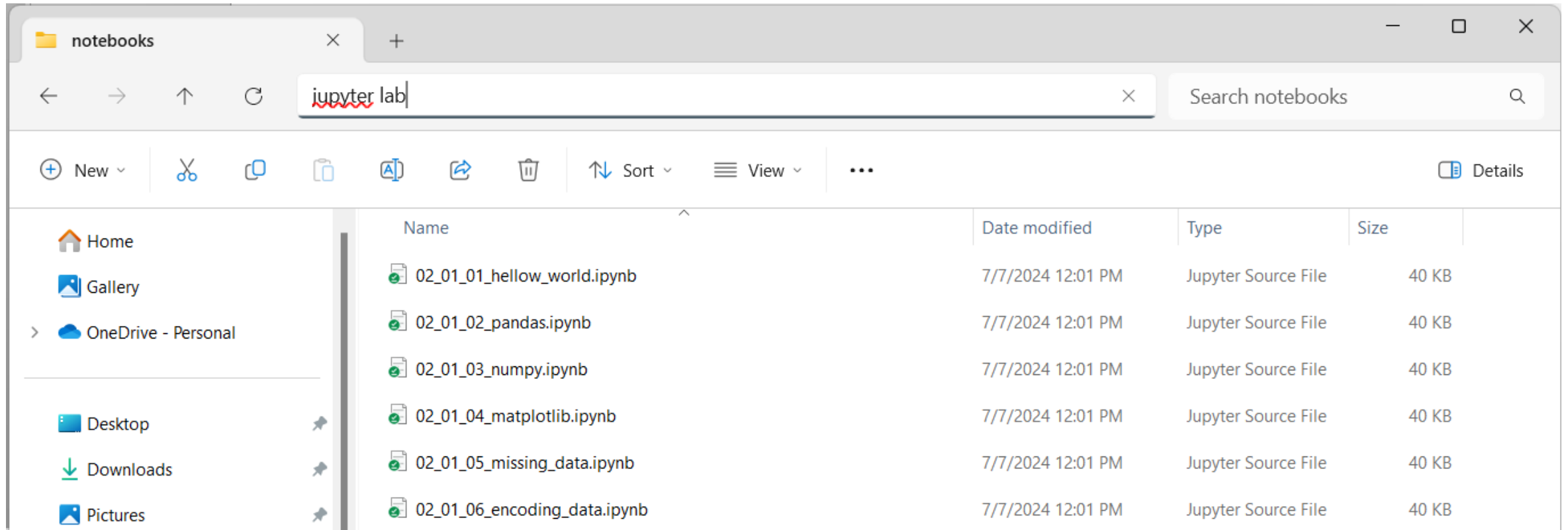
Jupyter Lab Basics | Starting Jupyter

Select top path



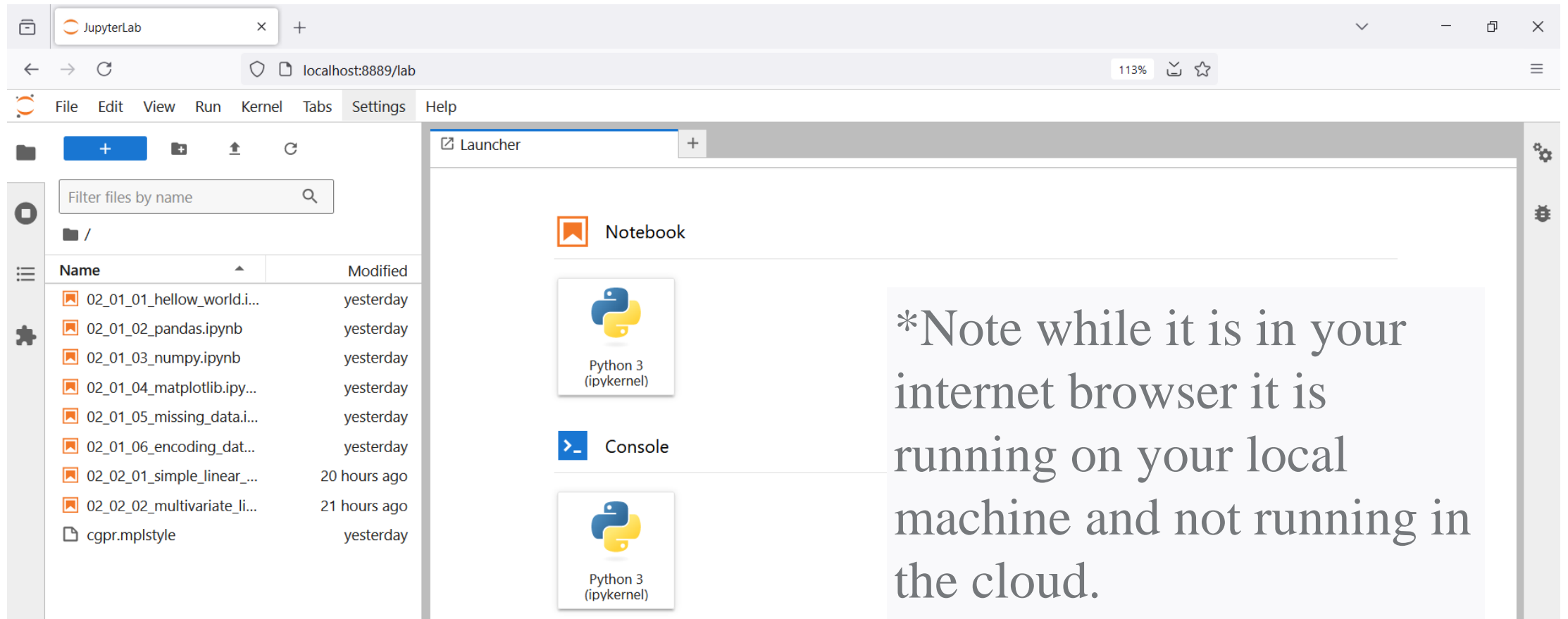
Jupyter Lab Basics | Starting Jupyter

Replace it with `jupyter lab` and press Enter.



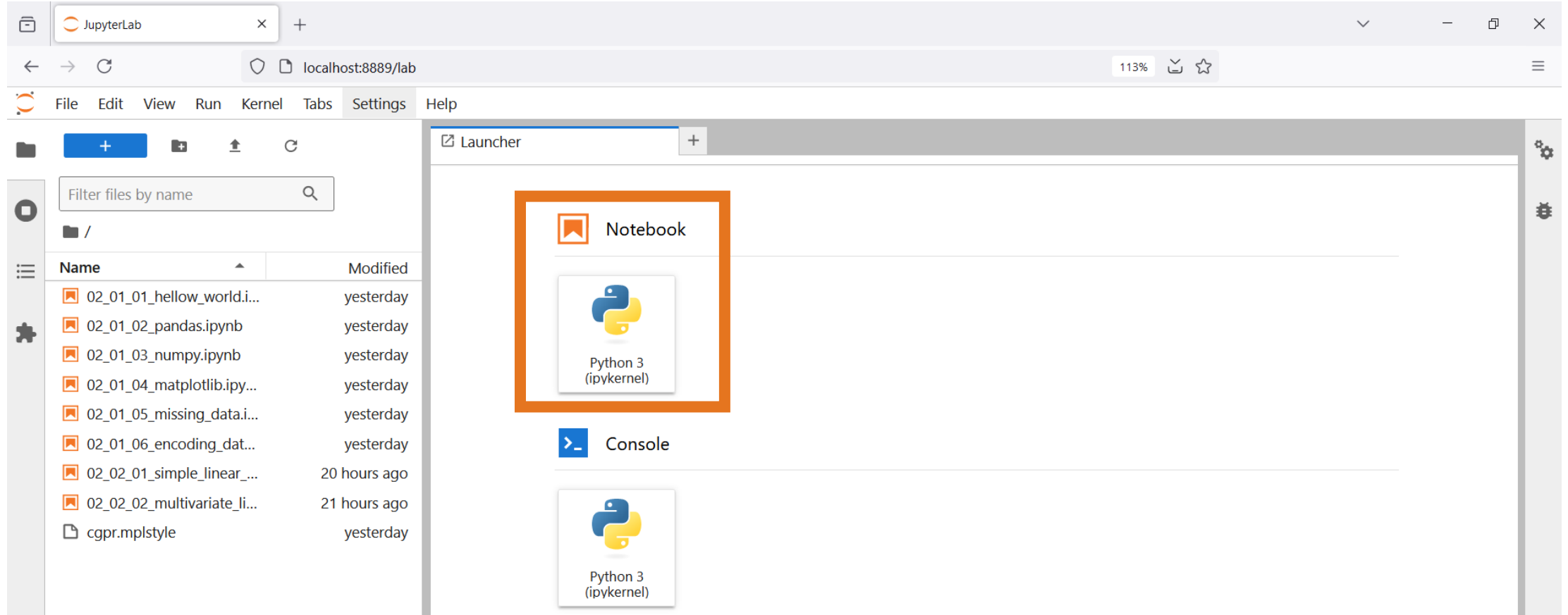
Jupyter Lab Basics | Starting Jupyter

Jupyter Lab will now open in your preferred browser.*



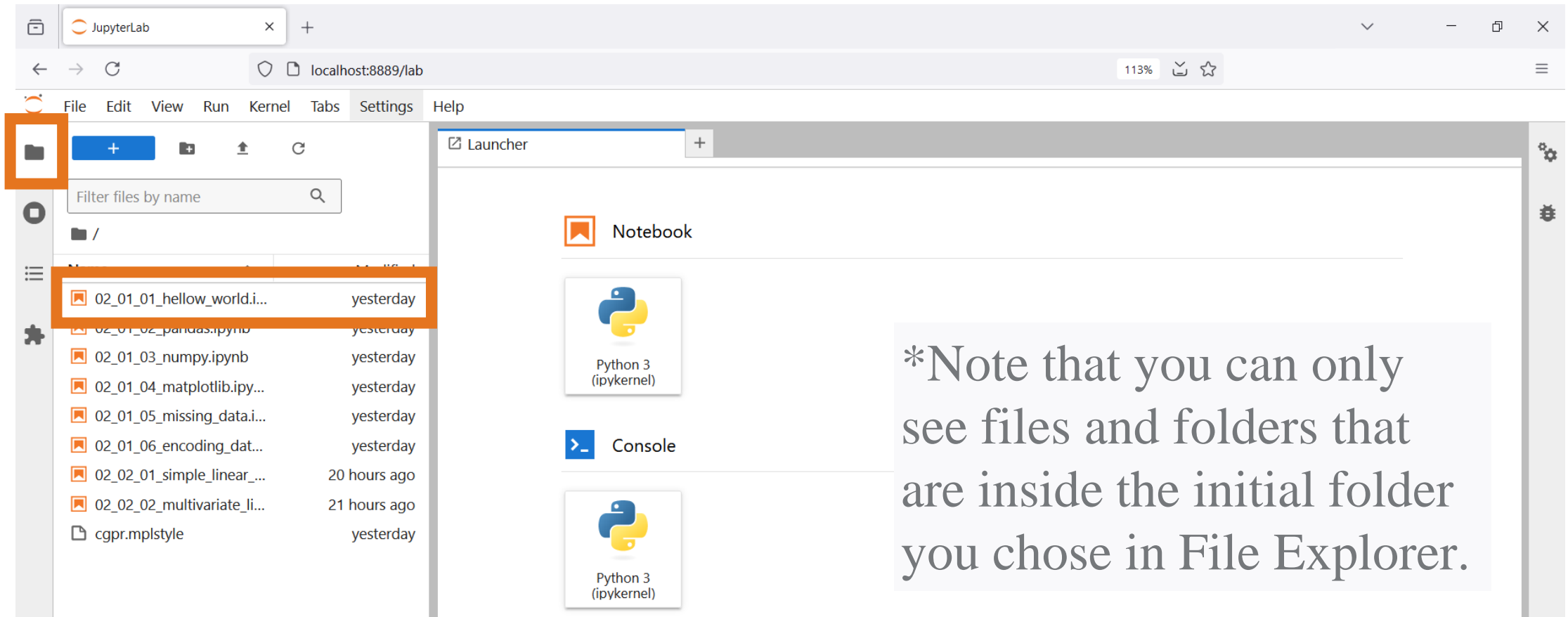
Jupyter Lab Basics | Starting Jupyter

Open a new notebook.



Jupyter Lab Basics | Starting Jupyter

Open existing notebook.

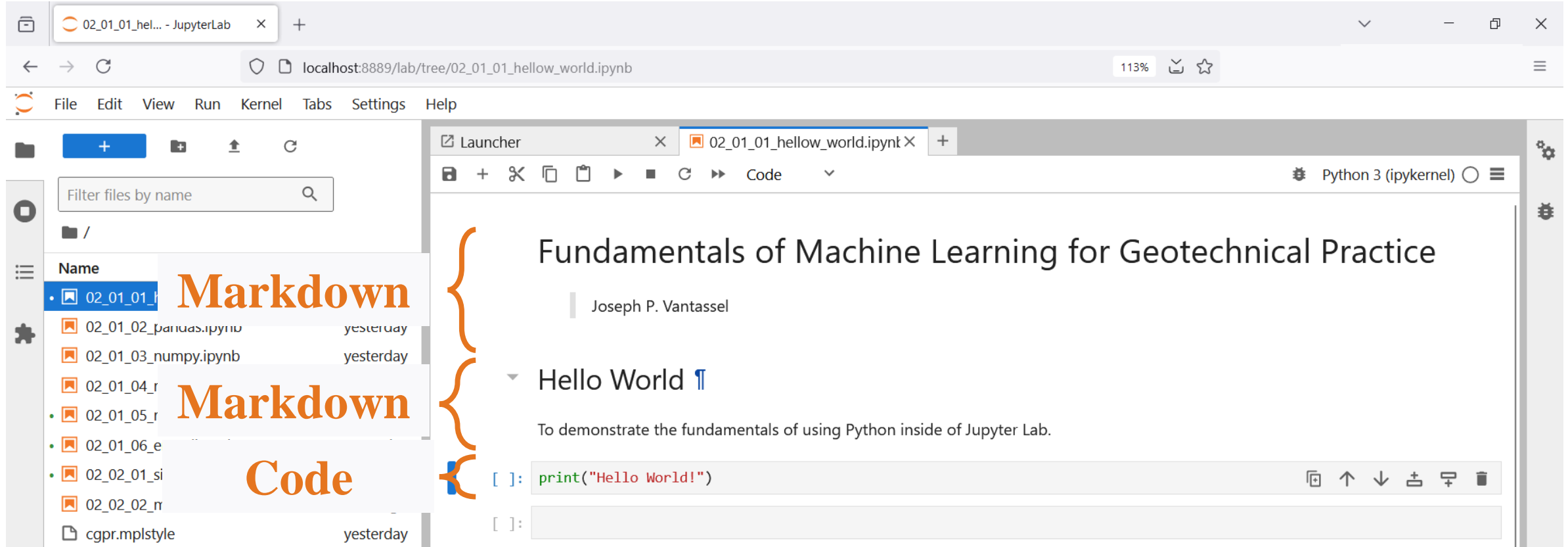


The screenshot displays the JupyterLab web interface in a browser window. The address bar shows 'localhost:8889/lab'. The left sidebar contains a 'File Explorer' panel with a search bar and a list of files. The file '02_01_01_hellow_world.i...' is highlighted with an orange box. The main area shows a 'Launcher' tab with 'Notebook' and 'Console' options. The 'Notebook' option is selected, showing a Python 3 (ipykernel) environment. A text box on the right side of the interface contains the following note:

*Note that you can only see files and folders that are inside the initial folder you chose in File Explorer.

Jupyter Lab Basics | Hello World

Each notebook is composed of cells for markdown or code.



The screenshot displays the JupyterLab web interface. On the left, a file browser shows a list of files in the current directory. The file `02_01_01_hellow_world.ipynb` is selected. Overlaid on this list are three labels: **Markdown** (orange text) pointing to the first two files, **Markdown** (orange text) pointing to the third file, and **Code** (orange text) pointing to the fourth file. The main area shows the notebook `02_01_01_hellow_world.ipynb` open. It contains a title cell with the text "Fundamentals of Machine Learning for Geotechnical Practice" and the author "Joseph P. Vantassel". Below this is a code cell titled "Hello World" with the text "To demonstrate the fundamentals of using Python inside of Jupyter Lab." and a code cell containing the Python code `print("Hello World!")`. The interface includes a top menu bar with options like File, Edit, View, Run, Kernel, Tabs, Settings, and Help. The bottom status bar shows the current kernel is "Python 3 (ipykernel)".

Jupyter Lab Basics | Hello World

Select cell, Shift + Enter to execute code

The screenshot displays the JupyterLab web interface in a browser window. The address bar shows the URL `localhost:8889/lab/tree/02_01_01_hellow_world.ipynb`. The left sidebar contains a file explorer with a list of notebooks, including `02_01_01_hellow_world.i...`, which is currently selected. The main workspace shows the notebook content, which includes a title 'Hello World' and a code cell. An orange callout box highlights the code cell, showing the prompt `[1]:` followed by the code `print("Hello World!")` and the output `Hello World!`. Another orange callout box highlights the 'Hello World' title and the first code cell, with an arrow pointing to the code cell. The interface also shows a menu bar with options like File, Edit, View, Run, Kernel, Tabs, Settings, and Help.

Jupyter Lab Basics | Hello World

Save your work: **CRTL + S**

Black dot indicates notebook is not saved. Notebook saves both code and output.

The screenshot displays the JupyterLab interface. On the left, a file browser shows a list of files and folders. The main area displays a notebook titled '02_01_01_hellow_world.ipynb'. The notebook content includes a title 'Fundamentals of Machine Learning', an author 'Joseph P. Vantassel', and a 'Hello World' section. The code cell contains the following code:

```
[1]: print("Hello World!")
```

The output of the code cell is 'Hello World!'. The notebook's title bar shows a black dot, indicating it is not saved. An orange box highlights the title bar and the code cell, with an arrow pointing to the text 'Black dot indicates notebook is not saved. Notebook saves both code and output.'

Jupyter Lab Basics | Hello World

Select cell, Shift + Enter to execute code

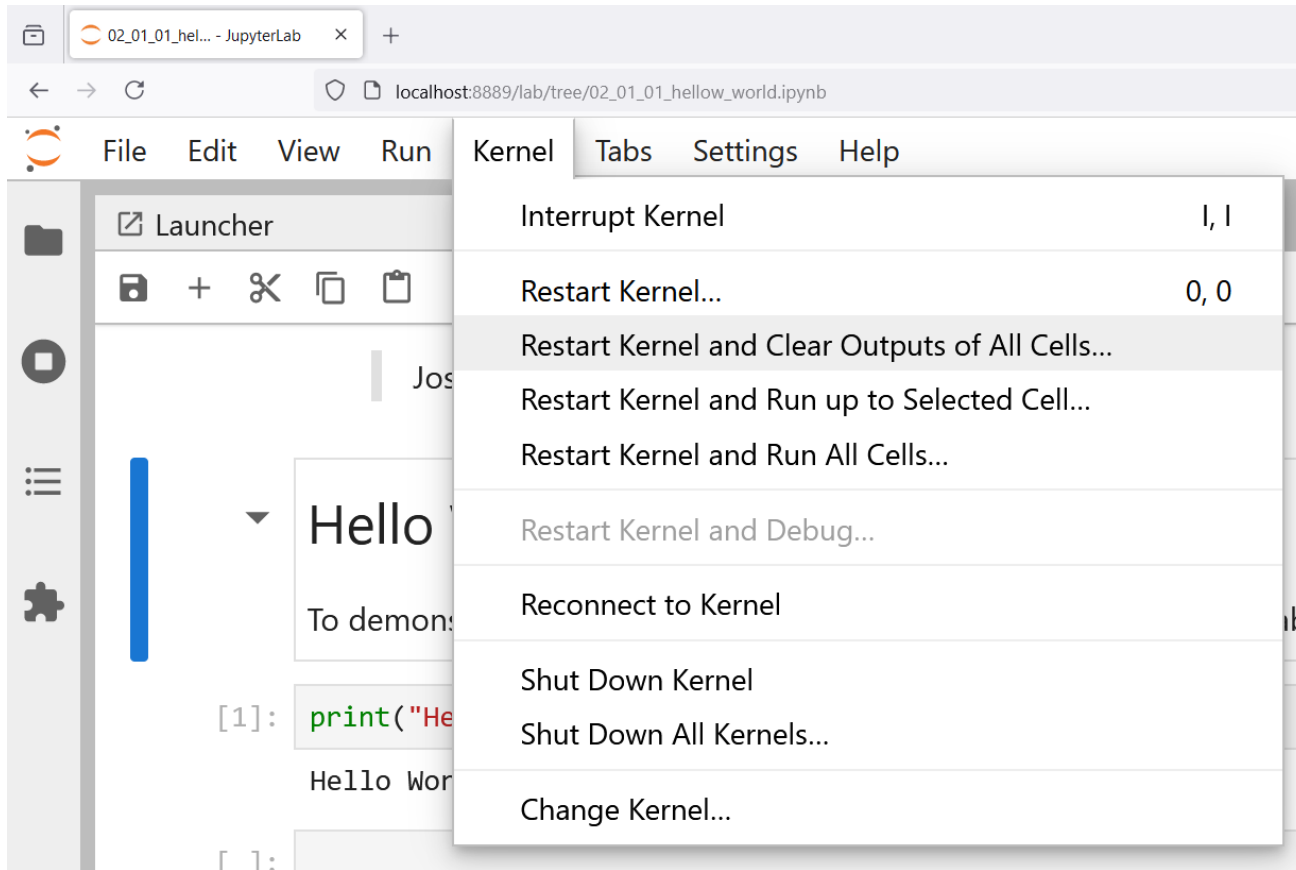
The screenshot shows the JupyterLab web interface. On the left is a file browser with a search bar and a list of files. The file `02_01_01_hellow_world.i...` is selected. The main area on the right is a code editor for the selected file. It shows a document titled "Fundamentals of Machine Learning for Geotechnical Practice" by Joseph P. Vantassel. Under the heading "Hello World", there is a paragraph: "To demonstrate the fundamentals of using Python inside of Jupyter Lab." Below this is a code cell with the following content:

```
[1]: print("Hello World!")
```

The output of the code cell is displayed below the code: "Hello World!". The interface includes a top menu bar with options like File, Edit, View, Run, Kernel, Tabs, Settings, and Help. The bottom status bar shows the current kernel as "Python 3 (ipykernel)".

Jupyter Lab Basics | Hello World

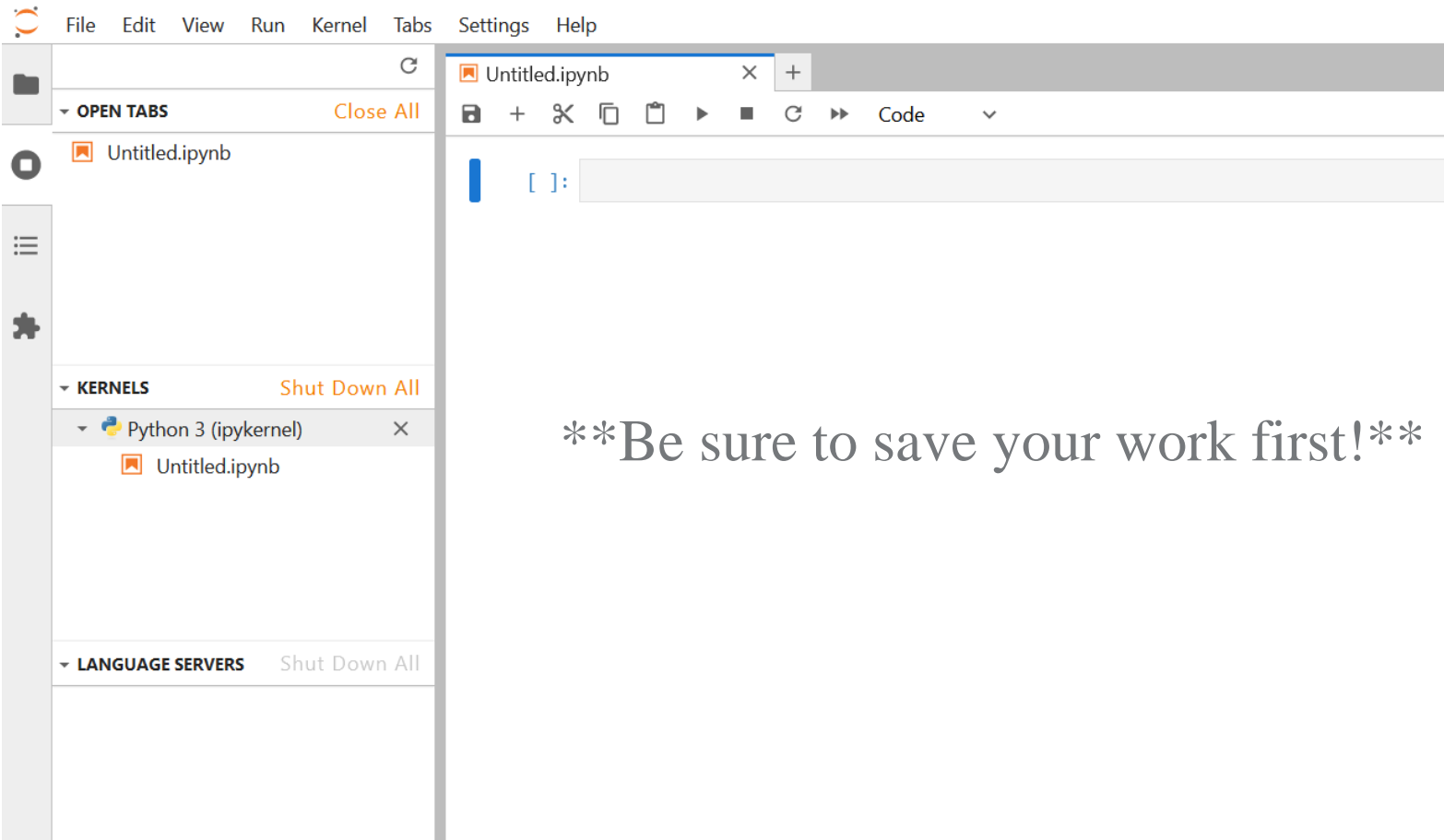
To restart: Kernel > Restart Kernel and Clear Outputs of All Cells



The kernel keeps track of all variables and allows code in different cells to interact. It also allows cells to be executed in any order and multiple times.

Jupyter Lab Basics | Hello World

Shutting Down



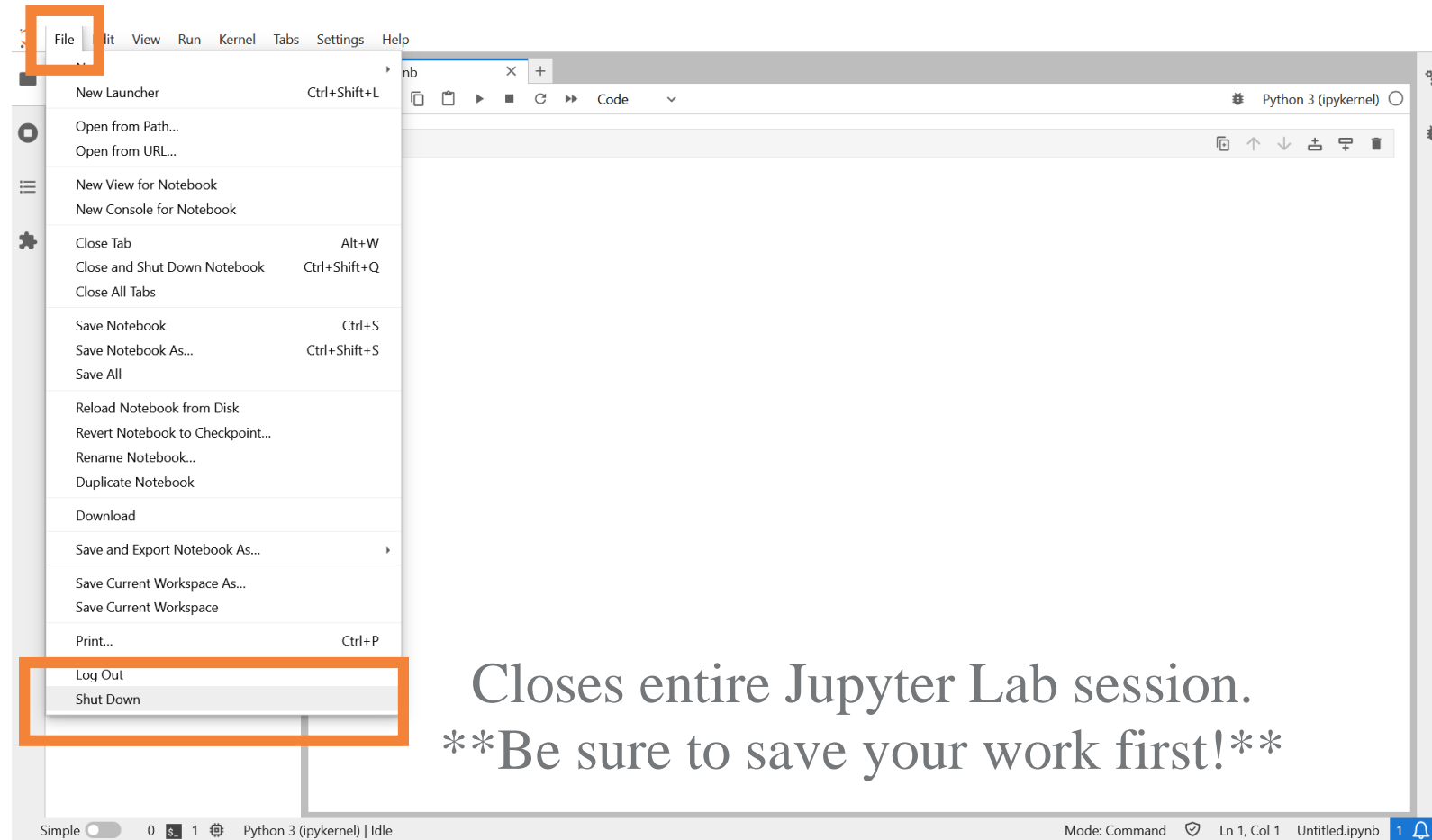
Close Tab(s)

Close Kernel(s)

Be sure to save your work first!

Jupyter Lab Basics | Hello World

Shutting Down



Closes entire Jupyter Lab session.
Be sure to save your work first!