EXOplanet Transit Interpretation Code (EXOTIC) Instructions: How to Run the Code with a Python Notebook

These are the instructions for running EXOTIC to reduce your photometric data using the python notebook. This is the recommended way to use EXOTIC, offering a much more interactive and user-friendly experience and significantly simplifying the installation process. **This is the simplest and most interactive way to run EXOTIC!**

You can run EXOTIC in the Google Collab without any installation! For this reason, it is highly recommended that you use the Google Collab.

However, if you are more experienced with the command line or already have Jupyter Notebook installed, you can also run the notebook in Jupyter Notebook. If you have unreliable Wi-Fi, this may also be the best option for you. In order to use Jupyter Notebook, you will have to install it along with Python and a few more dependencies, which will be detailed in the following instructions.

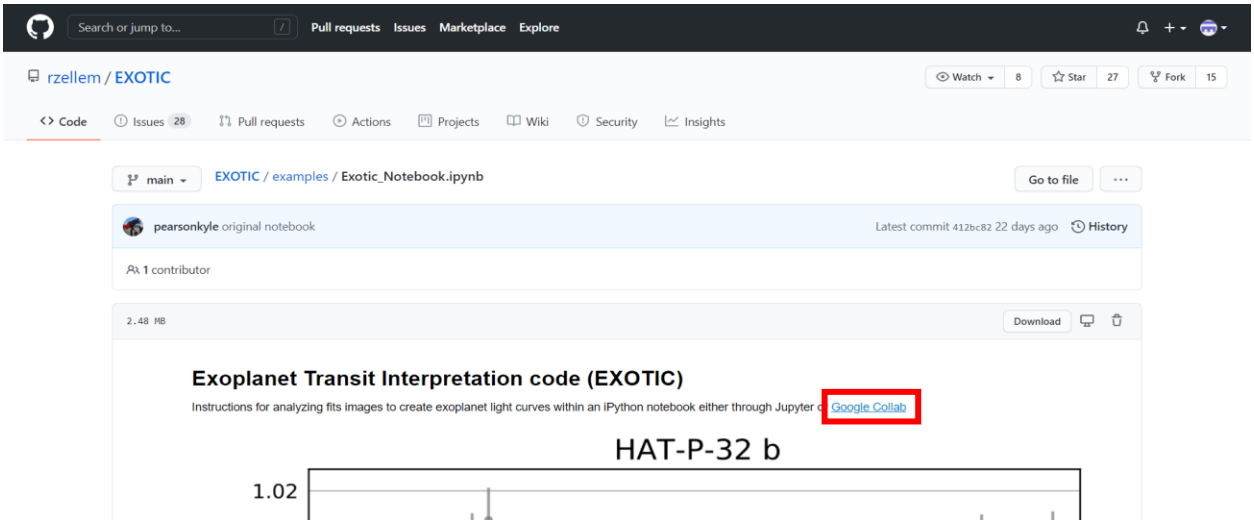
Please note: in order to be able to click on the links and select text in this document, you must **download it off GitHub**. The GitHub preview simply shows you an image of the document, which does not allow for those functions.

I. Opening the Notebook

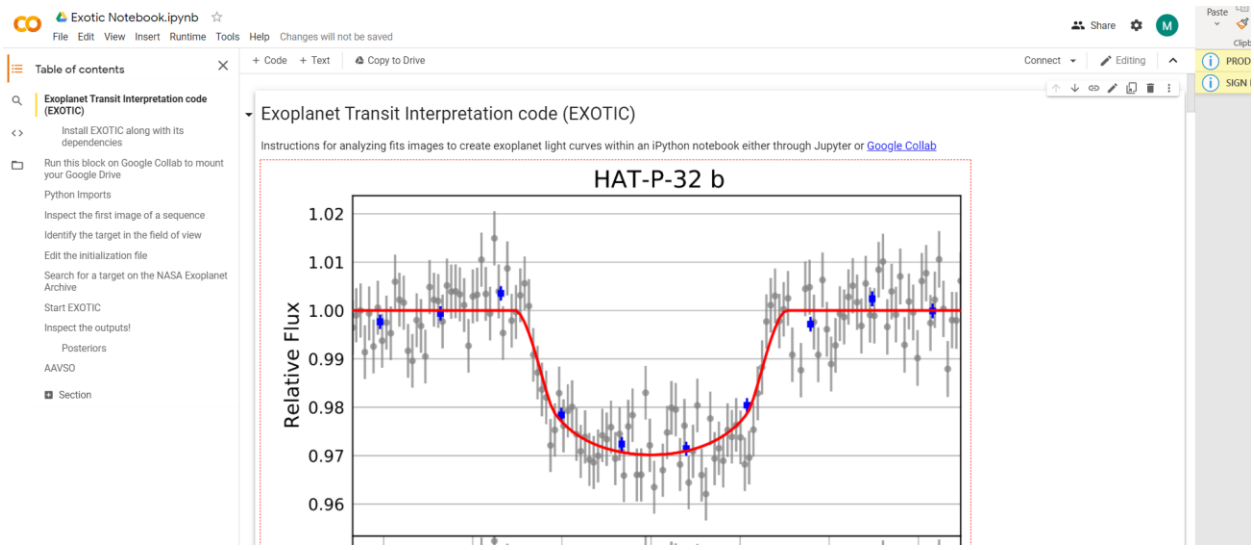
Google Collab Instructions:

- Navigate to this link: https://github.com/rzellem/EXOTIC/blob/main/examples/Exotic_Notebook.ipynb

- Click on the link for ‘Google Colab’ highlighted in blue (shown in the red box below).



- This link should take you to the Google Collab with the notebook already opened. You should see the interface below in your application.



Jupyter Notebook Instructions:

- Navigate to this link: https://github.com/rzellem/EXOTIC/blob/main/examples/Exotic_Notebook.ipynb
    - Download the notebook file off of GitHub.
- Open your Terminal app.
    - If you are using Windows, open the app 'Command Prompt'
    - If you are using a Mac, open the app 'Terminal'
    - If you are using the Linux/Unix operating system, open Ubuntu or the corresponding application.
- You will have to install Python and Jupyter Notebook, if you don't already have these installed. To do so, follow these next steps:
    - To install Python, navigate to the following link and select the Download button for the latest Python version. Please make sure you are downloading the correct one for your computer (Mac, Windows, or Linux/Unix). Complete the download.

- Type 'curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py' and hit enter. Running each of these commands will take some time (probably a few minutes). Wait for them to complete.
- **If you are using a Mac or Linux/Unix,** type 'python get-pip.py' and hit enter. If this command fails, try replacing 'python' with 'python3'.
- **If you are using Windows,** type 'py get-pip.py' and hit enter. If this command fails, try replacing 'python' with 'python3'.
- Finally, type 'pip install notebook' and hit enter. If this command fails, use 'pip3 install notebook'.

- Enter the command below to open Jupyter Notebook in your browser.
    - Type ‘jupyter notebook’ and hit enter.
    - This should prompt the following response in your terminal, and your browser should automatically open Jupyter.

```
C:\Users\Marlena Smith>jupyter notebook
[I 19:41:27.031 NotebookApp] JupyterLab extension loaded from C:\anaconda3\lib\site-packages\jupyterlab
[I 19:41:27.031 NotebookApp] JupyterLab application directory is C:\anaconda3\share\jupyter\lab
[I 19:41:27.290 NotebookApp] Serving notebooks from local directory: C:\Users\Marlena Smith
[I 19:41:27.291 NotebookApp] The Jupyter Notebook is running at:
[I 19:41:27.291 NotebookApp] http://localhost:8888/?token=d29b11691b98e4d6bc07560d5105a7bf49b3c77fefa4d41a
[I 19:41:27.291 NotebookApp]  or http://127.0.0.1:8888/?token=d29b11691b98e4d6bc07560d5105a7bf49b3c77fefa4d41a
[I 19:41:27.291 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 19:41:27.360 NotebookApp]

    To access the notebook, open this file in a browser:
        file:///C:/Users/Marlena%20Smith/AppData/Roaming/jupyter/runtime/nbserver-72280-open.html
    Or copy and paste one of these URLs:
        http://localhost:8888/?token=d29b11691b98e4d6bc07560d5105a7bf49b3c77fefa4d41a
     or http://127.0.0.1:8888/?token=d29b11691b98e4d6bc07560d5105a7bf49b3c77fefa4d41a
```

- Finally, navigate to your downloads (or the location you saved the .ipynb file) and select it to open.

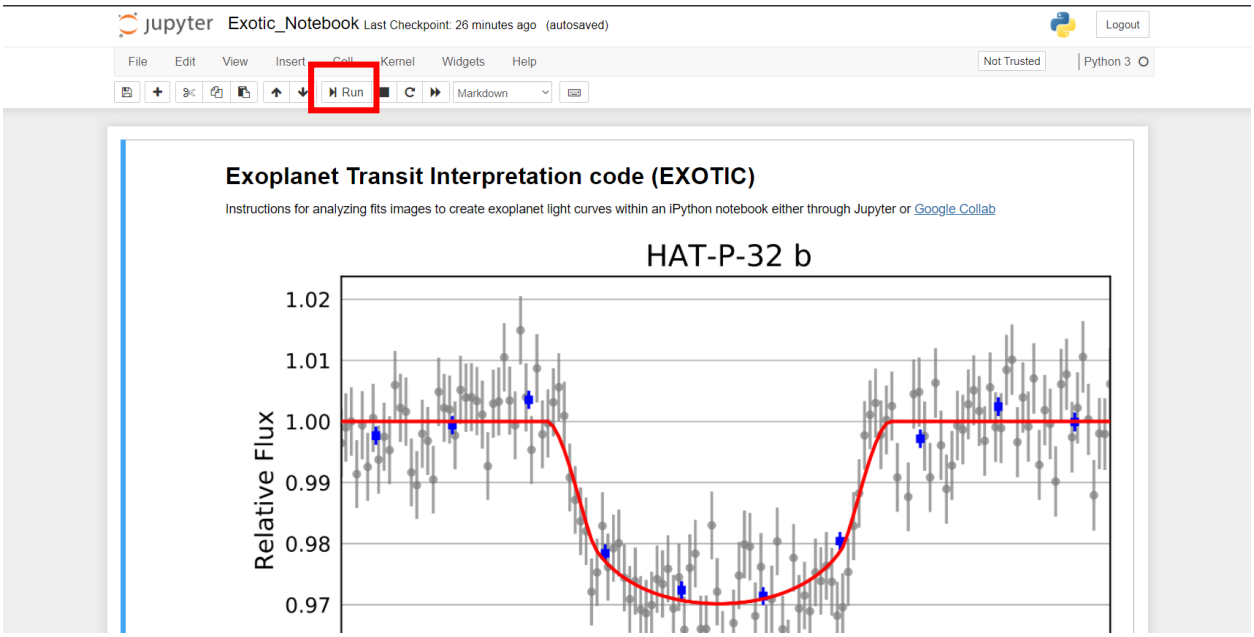
II. Running the Notebook

<u>Note:</u> the following instructions are for running the notebook in either the Google Collab OR Jupyter Notebook.

Running the Notebook is very simple! The following steps will walk you through the process:

- Python notebooks are broken up into cells, which are simply blocks of code you can run independently of one another. To run EXOTIC, we will be running each cell sequentially (top to bottom).
- To run a cell:
    - If you are in the Google Collab, simply click the ‘play’ button in the top left corner of the cell. See figure below.

- If you are in Jupyter, select the cell by clicking on it, and then hit the run button on the top of the page. A selected cell will have a blue highlight on the left side. See figure below.



- Run each of the following cells, reading the instructions/descriptions above them first. Follow the instructions and enter any values you are prompted for.
- Cell #1 will install EXOTIC and all of its dependencies for you. **Please note** that you will have to run this command each time you open the notebook.
- In the cell titled ‘Tell EXOTIC where to find your files’, you are given the option to input your input values manually or use an input file, which is a file that contains all the parameters needed to run EXOTIC, including the location of your data. Instead of inputting these manually during the reduction process, you only need to input the path to the input file itself.

- For using the input file:
    - You can test this method by using the file in your EXOTIC folder titled “inits.json”. This input file contains the figures for the star HAT-P-32b, which corresponds to the sample data.
    - Similarly, to quickly create an input file and therefore bypass entering the data manually, make a copy of the file ‘inits.json’ (this is the input file for the sample data on HAT-P-32 b) in the main EXOTIC directory. Then, simply replace the values with those for your own data.
    - If you are the values of any of the parameters, you can leave those blank. As will be shown later in the instructions, all of the values in your input file will be compared to those published in the Exoplanet Archive for your planet. You will be able to choose to use these values as well.
    - When saving your new input file, you **must** save it into the same directory that holds your data.
    - Upon entering the location of your data, EXOTIC will automatically detect your input file and parse through it to determine your input values.
- If you do not select this option, you will be prompted to enter your values manually.
- After running all of the cells, you will have completed the reduction process, and are able to view some of the resulting figures and files! Congratulations!
- To view the rest of the output files, visit the folder that you specified as your save folder.
- For more information on how EXOTIC works and how to interpret your results, see the other guides in the Documentation folder.

Happy reducing! If you have any questions, please message us on Slack or via email!