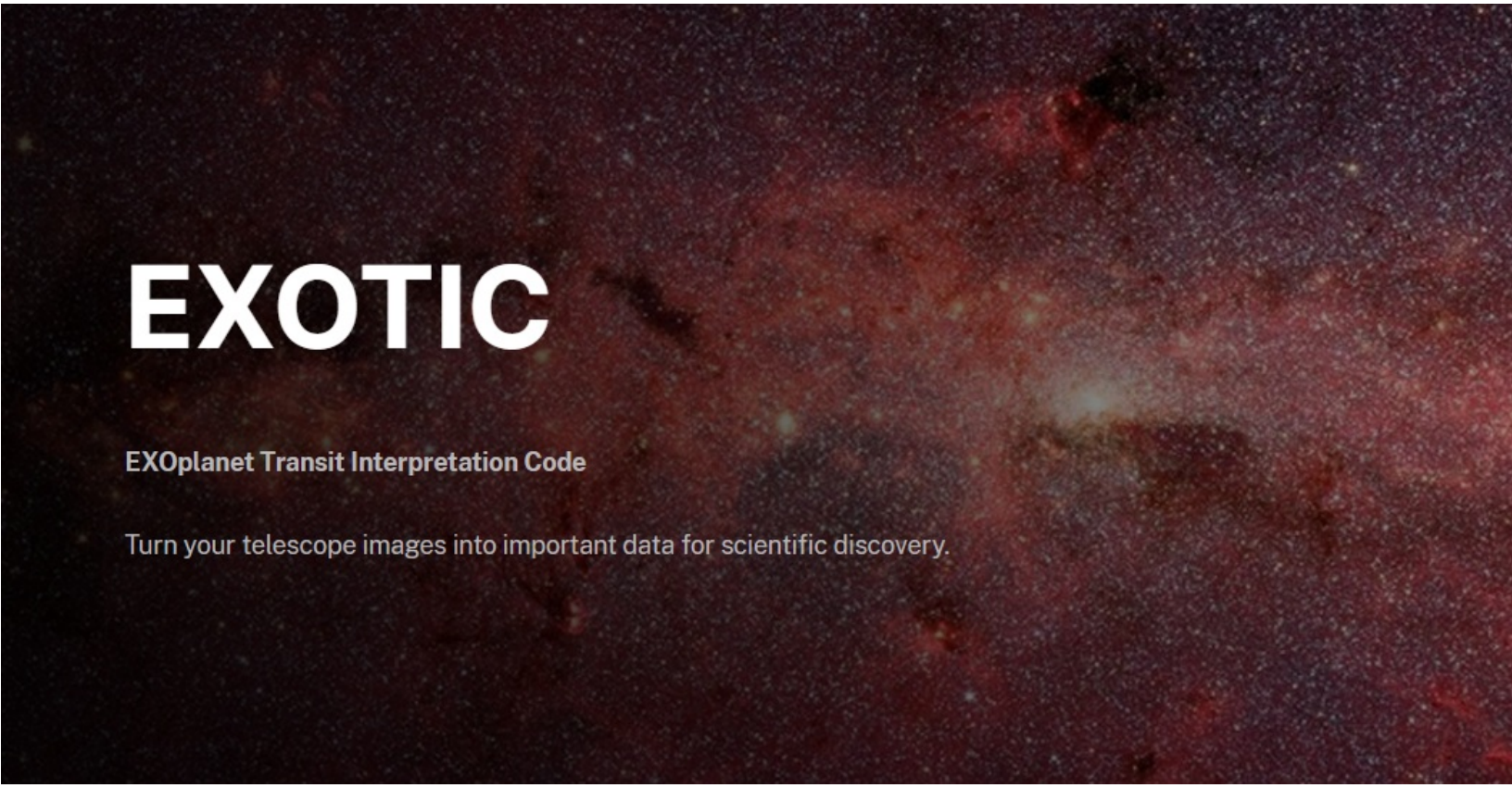

EXOTIC
User Guide

For the Exoplanet Watch Citizen Science program

Managed by the Exoplanet Exploration Program and the Jet Propulsion Laboratory for NASA's Astrophysics Division

Learn more on GitHub

EXOTIC

USER GUIDE

LESSON MENU

How to prep and upload FITS images

Prepare your FITS images

Estimated time: 1 minutes

The requirements for FITS files are as follows:

- Gather them in a single folder, named appropriately (e.g. "HATP32Dec20217").
- Make sure the extension for the images is .fits/.FITS or .fitz/.FITZ or .FITS.gz
- The files themselves must have a modern header including parameters for UT time, exposure time, WCS coordinations (optional).

FITS stands for Flexible Image Transport System. FITS is the most commonly used digital file format in astronomy. The FITS standard was designed specifically for astronomical data, and includes provisions such as describing photometric and spatial calibration information, together with image origin metadata.

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USER GUIDE

LESSON MENU

How to prep and upload FITS images

Upload images to Google Drive

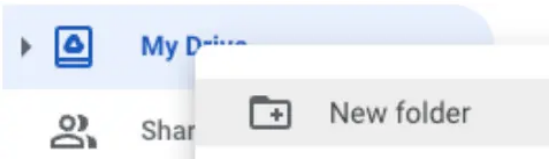
Estimated time: 3 minutes

GOAL: Upload your .FITS images into Google Drive in way that EXOTIC can use them into an EXOTIC directory

- e.g. EXOTIC/HatP32Apr12022/

1. In another window, log in to Google Drive.

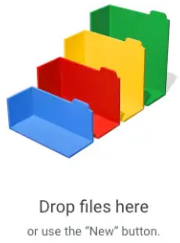
2. **In Google Drive**, if you don't already have an EXOTIC folder in your drive, right click on My Drive (in the left nav) and click New Folder. Name the folder "EXOTIC".



3. Click the arrow next to My Drive to see the subfolders and click EXOTIC.

4. **On your computer**, put your .FITS files into a single folder uniquely named for your observation (e.g. "HatP32Apr12022").

5. From your filesystem, drag this folder into Google Drive where it says "Drop files here".



Done! You will use this path (e.g. "EXOTIC/HatP32Apr12022") when loading your images into EXOTIC.

Remember to "select all" when the Colab requests access to your files. We recommend you create/use a free, separate account from your personal one so you can grant access without concerns and not take up precious cloud storage space.

PREV

Prepare your FITS images

NEXT

Adding darks, flats and biases

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USER GUIDE

LESSON MENU

How to prep and upload FITS images

Adding darks, flats and biases

Estimated time: 3 minutes

Darks, Flats and Biases can be uploaded as their own folders *inside* the file with your .FITS images. The folders should be named "darks", "flats", and "biases", respectively.

You can upload them according to the User Guide entry Upload Images to Google Drive.

PREV

Upload images to Google Drive

NEXT

Determine the parameters for your telescope

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USER GUIDE

LESSON MENU

How to determine coordinates using a StarChart

Determine the parameters for your telescope

Estimated time: 3 minutes

EXOTIC Standard let's you select MicroObservatory or Exoplanet Watch .4 Meter and it will find your StarChart for you.

If you are using another telescope, you should be able to determine the FOV, and you can ask on the Exoplanets Watch Slack group for more info**.**

You will enter the information at the AAVSO Variable Star Plotter.

PREV

Adding darks, flats and biases

NEXT

Getting the StarChart Image URL

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USER GUIDE

LESSON MENU

How to determine coordinates using a StarChart

Getting the StarChart Image URL

Estimated time: 1 minutes

Once you have plotted a star in the AAVSO Variable Star Plotter, you will get to a StarChart, such as this one for HAT-P-32.

On the image of the StarChart itself, either A) right-click on the image and choose "Copy Link/URL" or double click to go to the image and copy the URL from your browser window.

This is your StarChart Image URL for use in determining coordinates in EXOTIC.

PREV

Determine the parameters for your telescope

NEXT

Use your StarChart to determine coordinates

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USER GUIDE

LESSON MENU

How to determine coordinates using a StarChart

Use your StarChart to determine coordinates

Estimated time: 3 minutes

Using EXOTIC and an AAVSO StarChart, you must determine and enter the target star and comparison stars. Watch this video to see how it's done.

PREV

Getting the StarChart Image URL

NEXT

Download Sample FITS images

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USER GUIDE

LESSON MENU

How to get data for use in EXOTIC Standard

Download Sample FITS images

Estimated time: 4 minutes

The Exoplanet Watch team maintains a set of sample data on github for a HAT-P-32 b transit on December 20, 2017. You can download it here (25mb) and upload it to your Google Drive for use in EXOTIC Standard.

Our data checkout feature allows anyone to get REAL exoplanet data straight in your email inbox. Like professional astronomers who get data sent to them from remote telescopes, Exoplanet Watch offers this authentic tool for participants.

PREV

Use your StarChart to determine coordinates

NEXT

Upload inits.json into the FITS image folder in Google Drive

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USER GUIDE

LESSON MENU

How to use a custom inits.json file

Upload inits.json into the FITS image folder in Google Drive

Estimated time: 2 minutes

Put the inits file into Google Drive in *the same folder* as your FITS images.

EXOTIC Standard and EXOTIC Advanced will both recognize the inits.json file in that folder and allow you to skip the coordinate entry steps.

For reference, there are several reasons to use a custom inits.json file.

- You may be dealing with a candidate planet that has no Planetary Parameters in the Exoplanet Database yet.
- You might have changes to the Planetary Parameters or particular coordinates you have already worked out.
- You may wish to re-use an inits.json file you've generated in the past (or had sent to you), and don't wish to go through the entering of coordinates again.

PREV

Download Sample FITS images

NEXT

Register for an AAVSO account

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LESSON MENU

How to submit your lightcurve to AAVSO

Register for an AAVSO account

Estimated time: 4 minutes

To register for the AAVSO website, please fill out the Registration Form completely. This will allow you to log in to the AAVSO website which is necessary for submitting data, posting to a forum, and subscribing to our email publications, among other things.

PREV

Upload inits.json into the FITS image folder in Google Drive

NEXT

Get an AAVSO observer code

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LESSON MENU

How to submit your lightcurve to AAVSO

Get an AAVSO observer code

Estimated time: 5 minutes

Once logged in, click "My account" at the top of any AAVSO web page, then click the profile tab, then the "Request Observer Code" button. Initials will be automatically assigned to you.

If you do not already have a website account, you will need to create one and then log in before requesting your initials (see "How do I register for an AAVSO website account and why should I?" above). **If you have ever had an observer code (observer initials) in the past, please contact the AAVSO to recover your old initials instead of requesting new ones**

PREV

Register for an AAVSO account

NEXT

Submit your lightcurve data

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How to submit your lightcurve to AAVSO

Submit your lightcurve data

Estimated time: 15 minutes

Observations of exoplanet transits can be submitted using the exoplanet data submission tool. For more information please check out the documentation.

PREV

Get an AAVSO observer code

NEXT

Generate a lightcurve for submission to AAVSO

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USER GUIDE

LESSON MENU

How to start using EXOTIC

Generate a lightcurve for submission to AAVSO

Beginner Tutorial is the best place to start.

Read "How to prep and upload FITS images" if you have not already done so. Once your images are in Google Drive...

Run EXOTIC Standard to use Exoplanet Watch telescope data generate a lightcurve for submission to AAVSO.

Run EXOTIC Advanced to use your own telescope images and/or need to use particular advanced functionality.

The Quick Start will run directly in your browser (no setup required!) using the Colaboratory platform. Colaboratory is supported on most major browsers, and is most thoroughly tested on desktop versions of Chrome and Firefox.

PREV

Submit your lightcurve data

NEXT

Error: name 'setupDisplay' is not defined

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USER GUIDE

LESSON MENU

Troubleshooting EXOTIC

Error: name 'setupDisplay' is not defined

Estimated time: 1 minutes

EXOTIC runs on Google Colab, a platform for sharing code. It is not really meant for running apps, so you might run into some interesting issues.

If you do the steps out of order, you may get an error saying "**NameError Traceback (most recent call last)**", along with some other code.

If it also says something about "**name 'setupDisplay' is not defined**", you can be sure you missed Step #1. Reload the page and make sure you are running the steps in order.

PREV

Generate a lightcurve for submission to AAVSO

NEXT

Stuck in EXOTIC and just want to restart

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USER GUIDE

LESSON MENU

Troubleshooting EXOTIC

Stuck in EXOTIC and just want to restart

Estimated time: 1 minutes

EXOTIC runs on Google Colab, a platform for sharing code. It is not really meant for running apps, so you might run into some interesting issues.

One of these is a cool feature that may be frustrating. Basically this program will keep running, just as you left it, even if you reload the page. Here are some steps to take:

- **You can stop a running Step** by clicking on the "run" button. If it doesn't stop, click it a second time. You can tell it is running if the "run" button is spinning.
- **You can restart the whole program** by clicking "Runtime" in the top nav, then "Restart Runtime"
- **If you're *still* having issues**, click "Runtime" in the top nav, then "Disconnect and Delete Runtime"

PREV

Error: name 'setupDisplay' is not defined

NEXT

I suddenly see a bunch of code, how do I make it go

away?

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LESSON MENU

Troubleshooting EXOTIC

I suddenly see a bunch of code, how do I make it go away?

Estimated time: 1 minutes

EXOTIC runs on Google Colab, a platform for sharing code. It is not really meant for running apps, so you might run into some interesting issues.

Most often, seeing a bunch of code happens because a user has clicked "Show Code", or, less often, double-clicked the title of a code segment, or clicked the little black arrow next to a code segment title. (this *is* a code-sharing platform after all)

There are numerous ways to re-hide the code:

- Click on the code, then in the top nav, click "View" then "Show/Hide Code"
- Double click on the title of the code segment (i.e. "Load Telescope Images")
- Click the small black arrow next to the Step title so it turns right instead of down
- Right click on the vertical bar to the left of the code, choose "Form" and then "Hide Code" (this is my favorite)
- To the top right of an active code segment, there is a toolbar. Click the three dots, then "Form", and then "Hide Code"

If what you're seeing is output from EXOTIC running and you want to get rid of it, **there are two ways to hide the output:**

- Click on the output, then in the top nav, click "View" then "Show/Hide Output"
- There is an icon next to the output that looks like a box with an arrow coming out of it (to the right). If you roll over it, you will see an X. Click it.

PREV

Stuck in EXOTIC and just want to restart

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