



NASA/IPAC INFRARED SCIENCE ARCHIVE

Fornax Science Console

Scalable Compute Next to NASA Data

Hands-On Science with
OpenUniverse2024 Roman and
Rubin Simulations

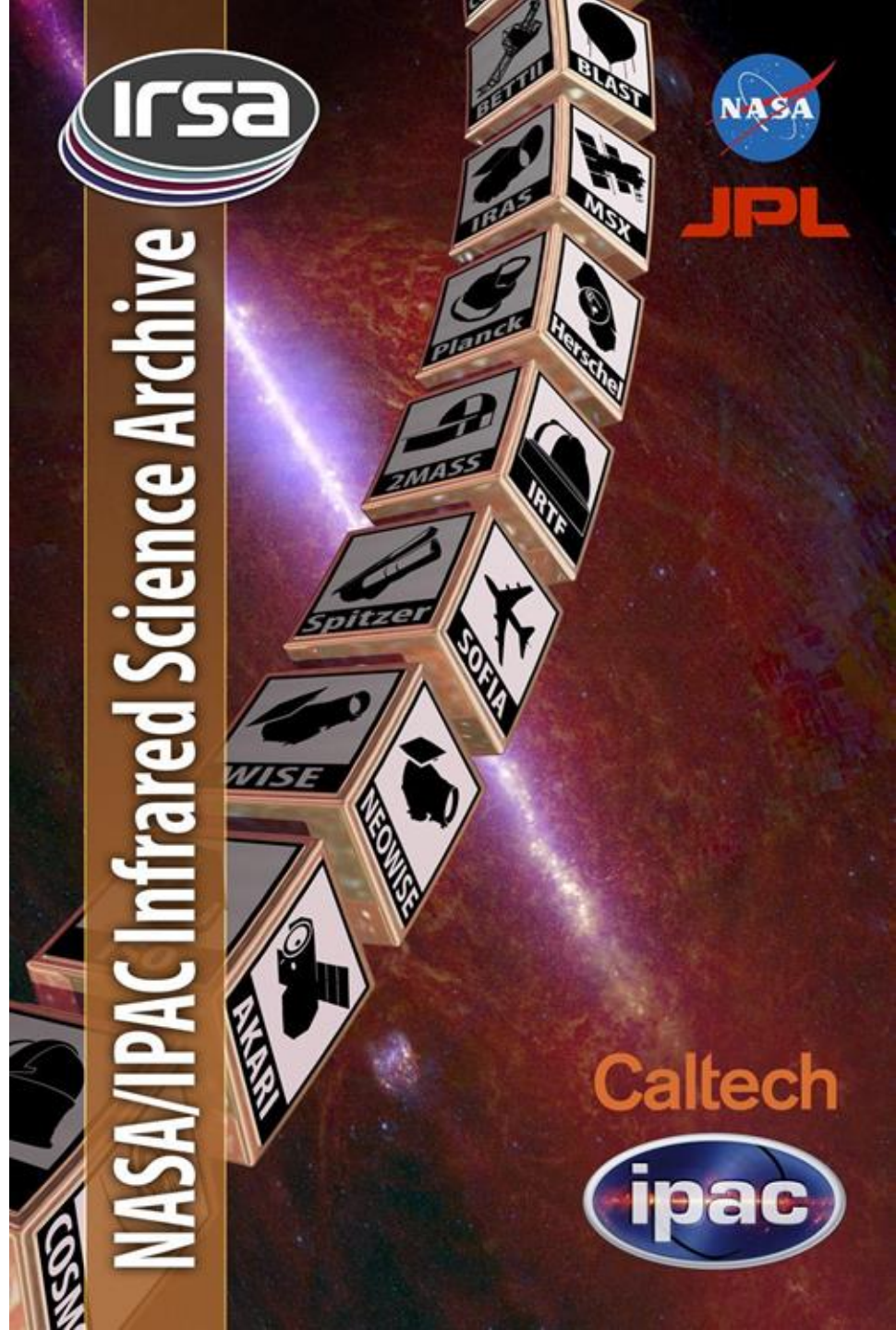
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for IRSA Data Science Team
and Fornax Initiative



NASA/IPAC Infrared Science Archive



Workshop Website

irsa.ipac.caltech.edu/OpenUniverse-workshop-2026



What Is Fornax?



- **Fornax Science Console**
 - Scalable cloud compute next to NASA data. Because downloading data is boring!
 - TB-scale data storage options. Filesystem and cloud. Private and shared.
 - Familiar JupyterLab interface. Browser-based.
 - Pre-installed software.
- **Documentation**
- **Python notebook tutorials**
- **Helpdesk and Community Forum**





NASA Data Next to Fornax



- Public S3 buckets on the AWS Open Data Registry
 - nasa-irsa-spherex
 - nasa-irsa-euclid-[q1,q2]
 - nasa-irsa-wise
 - nasa-irsa-spitzer
 - nasa-irsa-simulations
 - ipac-irsa-ztf
 - nasa-heasarc
 - stpubdata
- Fast access from Fornax. Close to data, good bandwidth.
- Read files in place with astropy, pandas, lsdb, etc.
- Notebooks demonstrate usage.

irsa.ipac.caltech.edu/docs/notebooks

IRSA TUTORIALS



IRSA cloud access introduction

This is the introductory tutorial demonstrating basic python access to the IRSA-curated images and catalogs available in AWS S3 cloud storage buckets.

Learning Goals:

- Find datasets and connection information.
- Browse buckets.
- Find an image and retrieve a cutout.
- Navigate a catalog and perform a basic query.

OpenUniverse2024

[OpenUniverse2024](#) simulates the overlapping imaging surveys to be carried out by the Nancy Grace Roman Space Telescope and the Vera C. Rubin Observatory, covering roughly 70 square degrees of matched optical and infrared sky. Start with the Quickstart tutorial, which introduces the directory layout, the parquet catalogs, and the image search that the other tutorials build on.

[Quickstart →](#)

Access OpenUniverse2024 Roman and Rubin images and catalogs.

[Firefly Visualization →](#)

Use Firefly to explore the structure of the OpenUniverse2024 Roman and Rubin simulations and visualize their content.

[Roman TDS Supernova →](#)

Explore the OpenUniverse2024 Roman Time Domain Survey observation sequence and animate a simulated SN Ia across epochs.

Fornax Now in Beta



Announcement: The Fornax Science Console welcomes Beta testers.

Fornax User Documentation

Quick Start Guide

Fornax Science Console Capabilities

Tutorial Notebooks

Data Access

Developing Code

Frequently Asked Questions (FAQ)

Forum and Helpdesk

Acknowledgements

New User Documents

Additional Resources

Quick Start Guide

The Fornax Science Console is a robust tool for scientific research. This quick-start guide introduces the basic steps to begin using it effectively.

2. Log In

Once your [account](#) has been created, log in to the Fornax Science Console:

[Fornax Science Console](#)

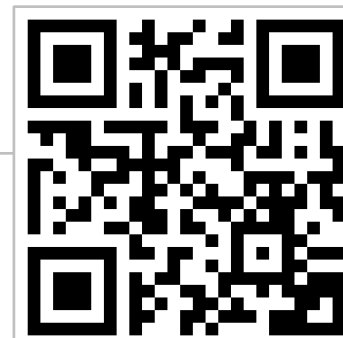
After submitting your username and password, you will be prompted for a Multi-Factor Authentication (MFA) code. The code will be automatically emailed to the address you used when registering your account.

Once logged in, you will see the [Dashboard](#) with navigation links on the left and your account's

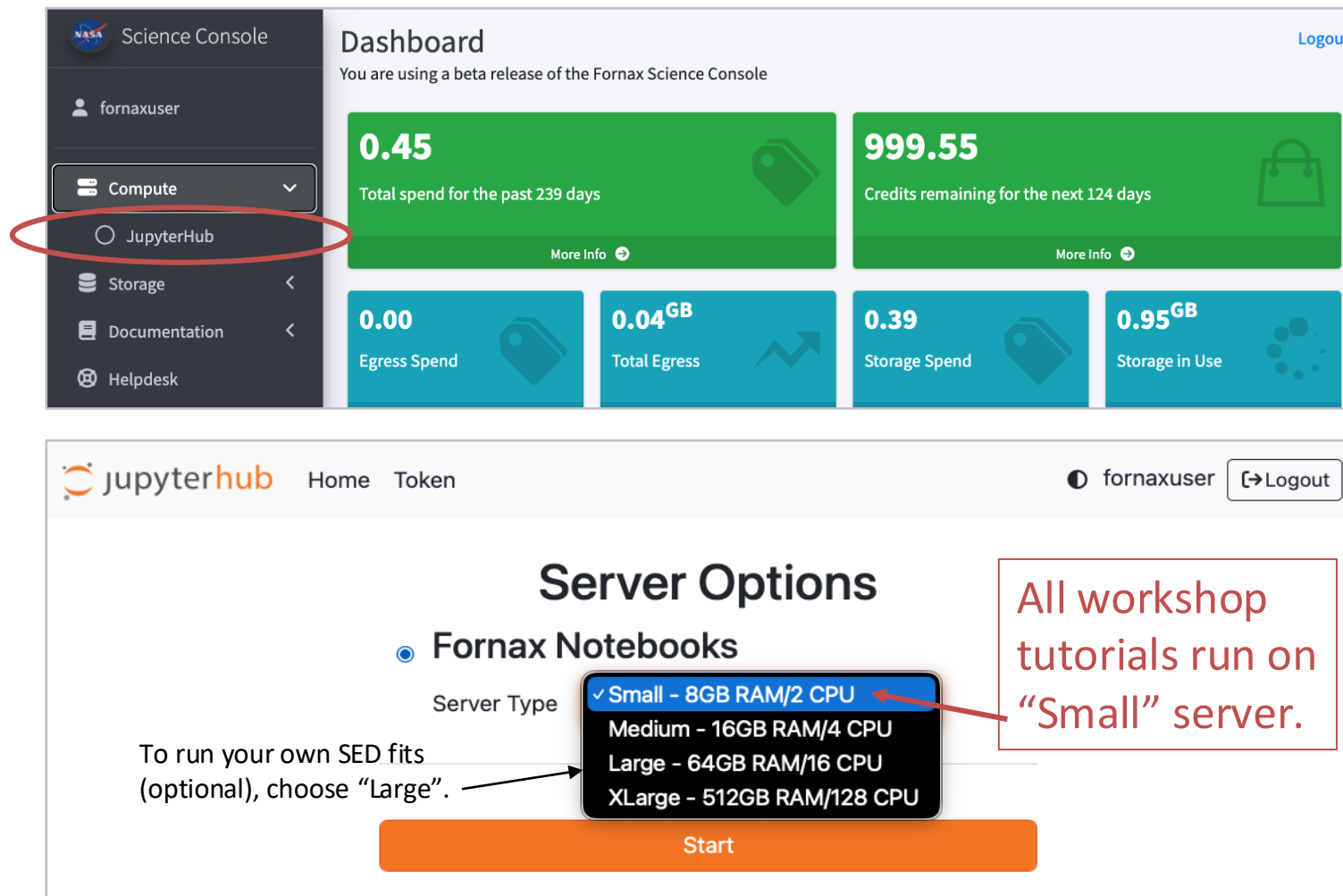
CONTENTS

1. Get an Account
2. Log In
3. Start a Server Session
4. Open a New Notebook
5. Shut Down Your Server

docs.fornax.sciencecloud.nasa.gov/quick-start/



Start a Server



The image shows two screenshots from the Fornax Science Console. The top screenshot is the 'Dashboard' for a user named 'fornaxuser'. It displays various metrics: total spend of 0.45, credits remaining of 999.55, egress spend of 0.00, total egress of 0.04GB, storage spend of 0.39, and storage in use of 0.95GB. The 'Compute' menu is expanded, and 'JupyterHub' is selected. The bottom screenshot shows the 'JupyterHub' interface with 'Server Options'. Under 'Fornax Notebooks', the 'Small' server type is selected, which has 8GB RAM and 2 CPU. A red box highlights this selection with the text 'All workshop tutorials run on "Small" server.' An arrow points to the 'Large' option with the text 'To run your own SED fits (optional), choose "Large".' A 'Start' button is visible at the bottom.

Science Console

fornaxuser

Compute

JupyterHub

Storage

Documentation

Helpdesk

Dashboard

You are using a beta release of the Fornax Science Console

Logout

0.45

Total spend for the past 239 days

999.55

Credits remaining for the next 124 days

0.00

Egress Spend

0.04^{GB}

Total Egress

0.39

Storage Spend

0.95^{GB}

Storage in Use

jupyterhub

Home

Token

fornaxuser

Logout

Server Options

Fornax Notebooks

Server Type

- ✓ Small - 8GB RAM/2 CPU
- Medium - 16GB RAM/4 CPU
- Large - 64GB RAM/16 CPU
- XLarge - 512GB RAM/128 CPU

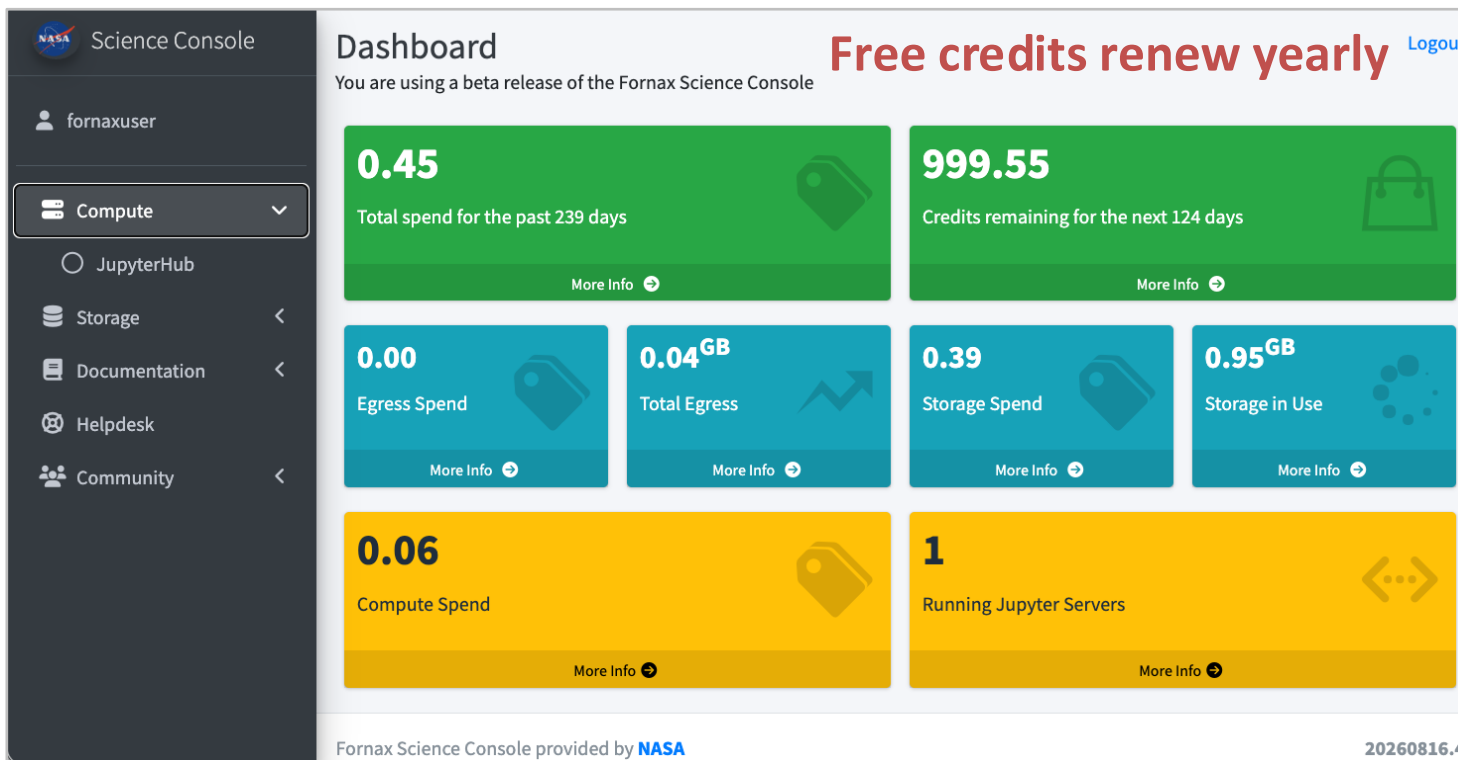
To run your own SED fits (optional), choose "Large".

Start

All workshop tutorials run on "Small" server.

The server will take a few minutes to start.

Fornax Dashboard



Servers

- Small, 40 hrs/wk for a year: 181 credits
- Large, 100 hours: 77 credits
- Xlarge, 100 hours: 759 credits

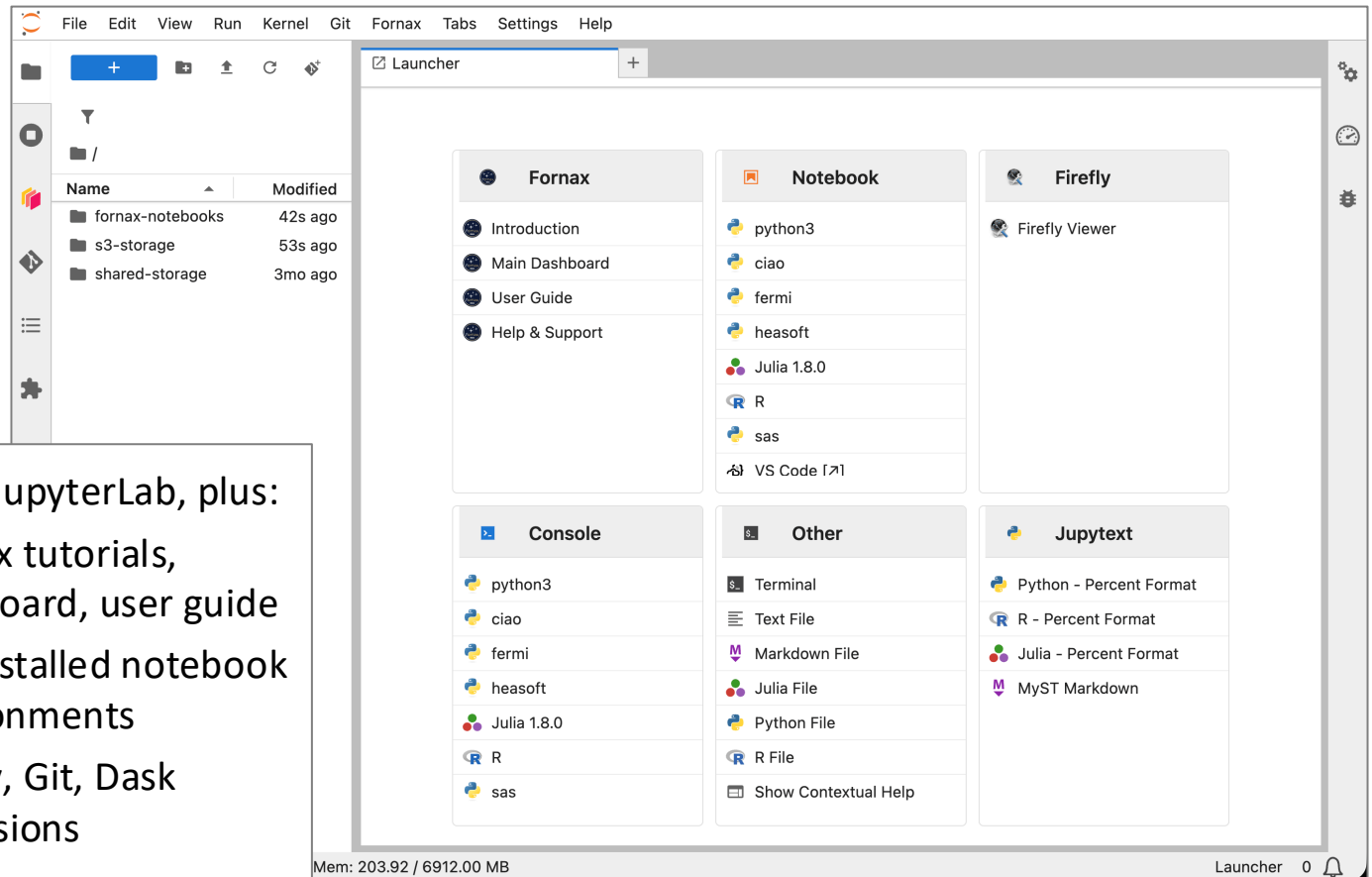
Storage

- 100 GB home directory, one year: 108 credits
- 1 TB private S3, one year: 276 credits
- Free credits renew yearly

Egress • Download 20 GB from Fornax to your local machine: 1.80 credits



Fornax Science Console



Standard JupyterLab, plus:

- Fornax tutorials, dashboard, user guide
- Pre-installed notebook environments
- Firefly, Git, Dask extensions

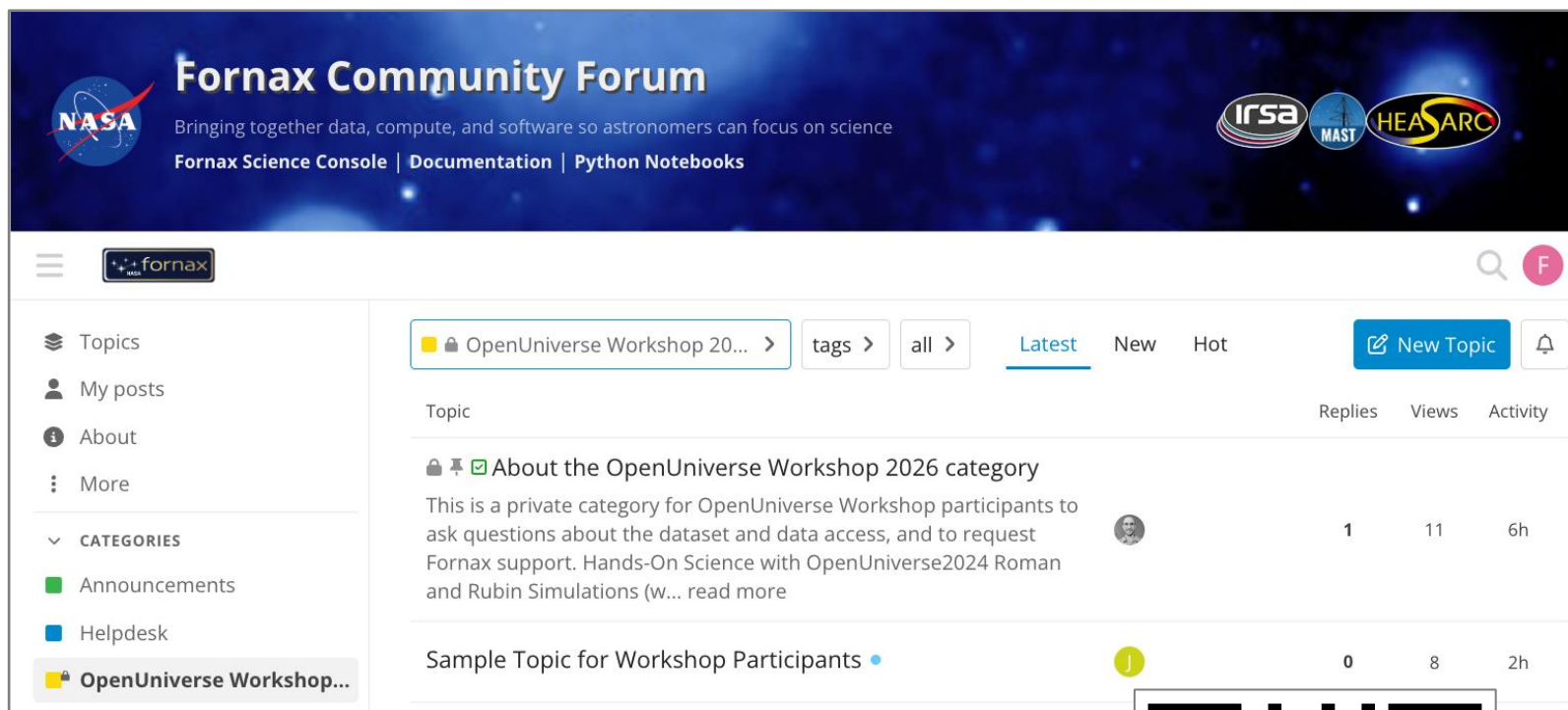
Fornax Forum & Helpdesk



- Ask questions
- Learn about new features
- Report problems
- Get support
- Share results

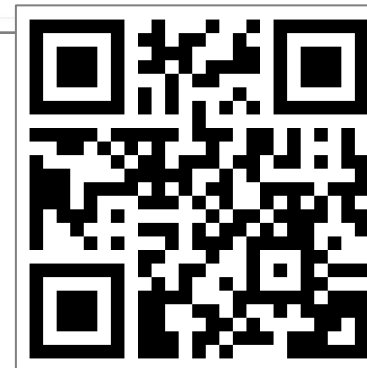
A screenshot of the Fornax Community Forum website. The header features the NASA logo, the title "Fornax Community Forum", and the tagline "Bringing together data, compute, and software so astronomers can focus on science". It also includes links to "Fornax Science Console", "Documentation", and "Python Notebooks". Logos for IRSA, MAST, and HEASARC are displayed on the right. The main content area shows a sidebar with navigation links (Topics, My posts, About, More) and a list of categories (Announcements, Helpdesk, User Discussion, All categories). The main content area displays the "Categories" tab with a list of topics: Announcements (30), Helpdesk (55), and User Discussion (4). Each category has a brief description and a list of sub-topics.

Workshop Support



Private category for this workshop. Post:

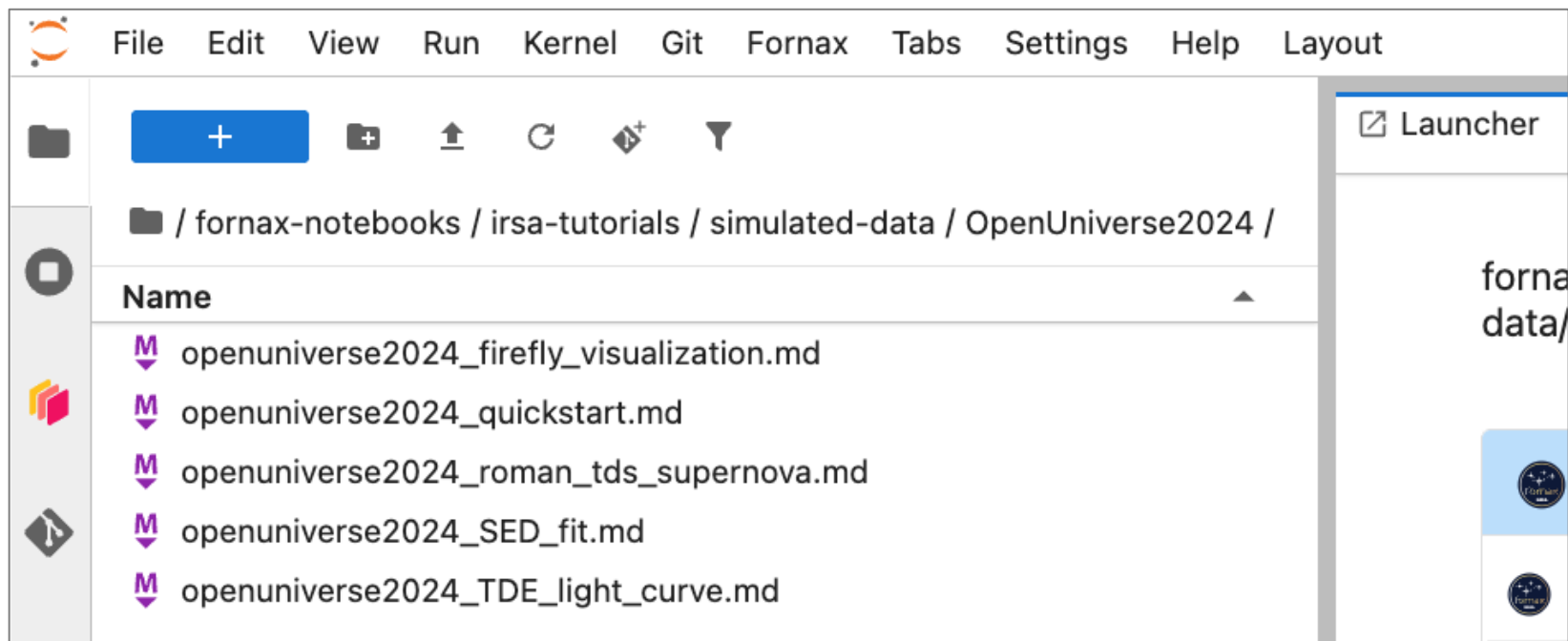
- OpenUniverse2024 dataset questions
- Data access questions
- Tutorial questions
- Fornax technical issues



OpenUniverse2024 Tutorials

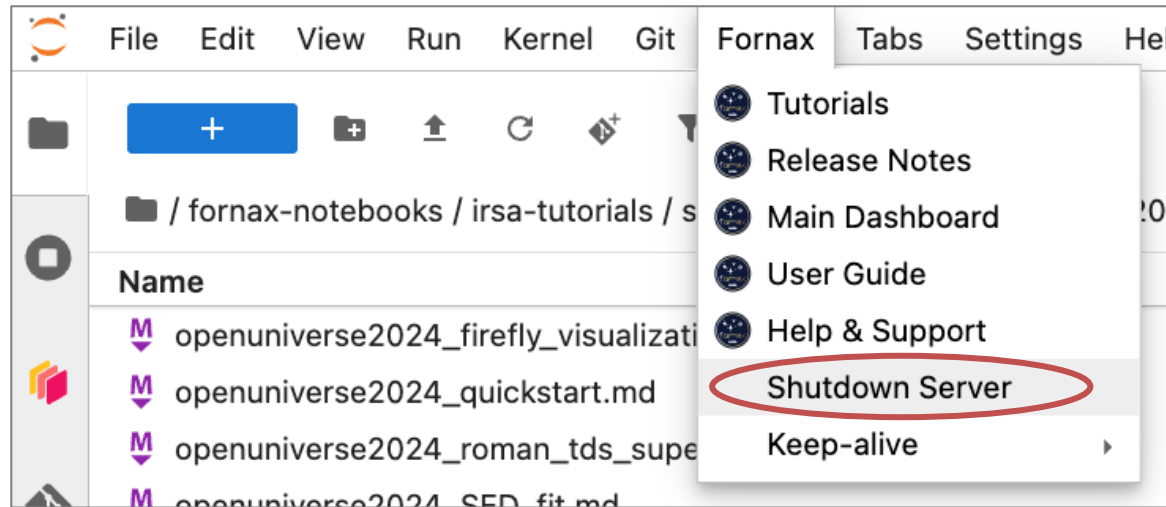


~/fornax-notebooks/irsa-tutorials/simulated-data/OpenUniverse2024/



Notebooks will automatically connect to the irsa-tutorials environment kernel, which has all libraries and other dependencies pre-installed.

Shut Down When Done



Be sure to shut down your server when you're done working so your credit charges stop.