



ROCKY WORLDS

Hannah Diamond-Lowe (STScI)

On behalf of the Core Implementation Team at STScI



STScI | SPACE TELESCOPE
SCIENCE INSTITUTE

rockyworlds.stsci.edu

May 7th, 2026

The Rocky Worlds DDT Program

- **Main aim:** look for **evidence of atmospheres** in rocky exoplanets orbiting **M-dwarf stars**.



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The Rocky Worlds DDT Program

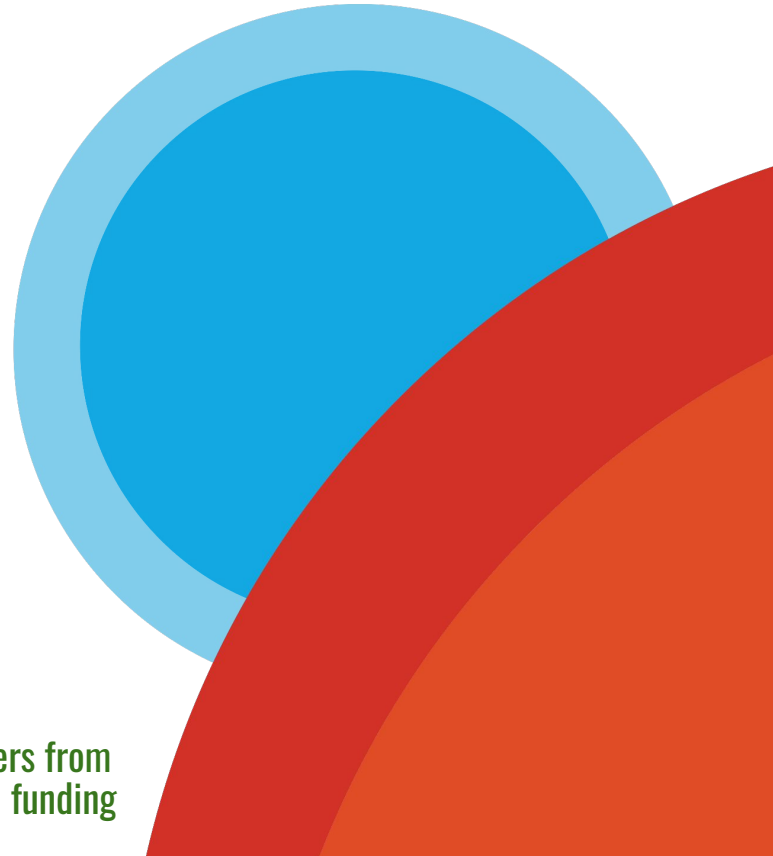
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- **How? Core Implementation Team (CIT)** deals with data + community (at STSCI); **Science Advisory Council (SAC)** advises the CIT. *

*Reminder that we have policies preventing CIT and SAC members from using proprietary data products; also publication, proposal, and funding restrictions.



Today's Agenda

1. Rocky Worlds status report
2. Data Challenge & Workshop
3. Rocky Worlds community engagement
4. Q & A



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Website: rockyworlds.stsci.edu

The most up-to-date details about the Rocky Worlds DDT



ABOUT

NEWS

TARGETS

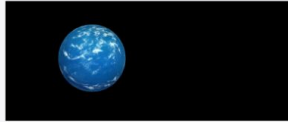
STATUS

DATA

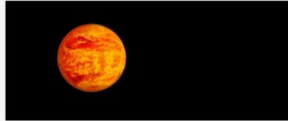
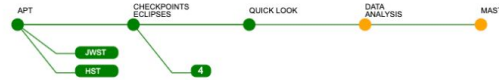
TEAMS



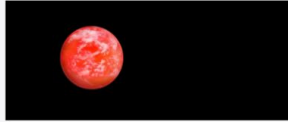
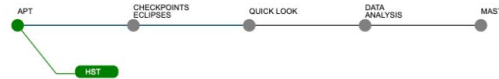
ROCKY WORLDS New scheduling timelines of observations for LTT-1445A and LHS-1140



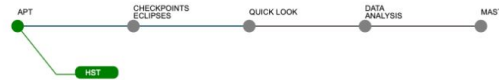
GJ-3929b



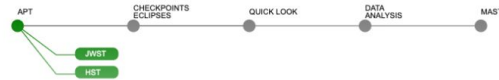
LTT-1445Ac



LTT-1445Ab



LHS-1140b



TOI-198b



JWST Status

Current RW Selected Targets

Parent Star	Planet	Radius (R _⊕)	Mass (M _⊕)	Period (Days)	Kmag	Teff (K)	a/R _★	R _p /R _★	Teq (K) ↑	Priority Metric ¹
LHS-1140	LHS-1140 b	1.73	5.6	24.74	8.8	2988	94.2	0.073	218	0.0762
TOI-198	TOI-198 b	1.44	3.91	10.22	7.9	3650	49.0	0.03	368	0.1581
LTT-1445 A	LTT-1445 A b	1.32	2.73	5.36	6.5	3340	30.2	0.045	430	-0.0503
TOI-244	TOI-244 b	1.52	2.68	7.4	8.0	3433	28.1	0.033	458	-0.0457
LTT-1445 A	LTT-1445 A c ¹	1.10	1.37	3.12	6.5	3340	21.1	0.036	514	-0.2283
HD 260655	HD 260655 c	1.53	3.09	5.71	5.9	3803	23.4	0.032	556	-0.0687
TOI-771	TOI-771 b	1.42	2.96	2.33	9.7	3201	15.7	0.054	571	-0.2284
TOI-406	TOI-406 c	1.32	2.08	3.31	8.8	3392	17.6	0.03	572	-0.1705
GJ-3929	GJ-3929 b	1.09	1.21	2.62	7.9	3384	16.8	0.033	584	-0.2937

JWST Status: December 2025

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Observations in progress

JWST Status: December 2025

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JWST Status: ~~December 2025~~ → May 2026

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JWST Status: ~~December 2025~~ → May 2026

GJ 3929 (b) data products available on MAST

GJ-3929 b		
Artist's Image	JWST Products	HST Products
<p>GJ-3929b</p>  <p>Expand Image</p> <p>JWST Program ID: 9235</p>	<p>Eclipse 1:</p> <ul style="list-style-type: none"> Eclipse Catalog (h5) Eclipse Catalog (fits) Light Curve (h5) Source Data DOI: 10.17909/c2jx-a977 <p>Eclipse 2:</p> <ul style="list-style-type: none"> Eclipse Catalog (h5) Eclipse Catalog (fits) Light Curve (h5) Source Data DOI: 10.17909/39mk-t407 <p>Eclipse 3:</p> <ul style="list-style-type: none"> Eclipse Catalog (h5) Eclipse Catalog (fits) Light Curve (h5) Source Data DOI: 10.17909/n0c3-868 	<ul style="list-style-type: none"> Combined HST Spectrum (fits) Light Curves (fits): <ul style="list-style-type: none"> COS: Visit 01 Visit 02 Visit 03 Visit 05 STIS: Visit 06 Visit 08 Visit 56 Visit 57 Visit 58 Visit 60 Custom extracted 1d spectra for STIS/G140M (Ly-alpha): <ul style="list-style-type: none"> Visit 08: ofkb08020_x1d Visit 08: ofkb08030_x1d Visit 57: ofkb57010_x1d Visit 58: ofkb58010_x1d

JWST Status: ~~December 2025~~ → May 2026

GJ 3929 (b) data products available on MAST — co-added spectrum

Work Credit:
JWST Data Analysis Lead [Taylor Bell](#)
JWST Data Analysis Team [Tyler Baines](#)
[Achrène Dyerk](#)
[Ian Wong](#)
[Joe Filippazzo](#)
[Brett Morris](#)
[Doug Long](#)
[Josh Lothringer](#)
[Elena Manjavacas](#)



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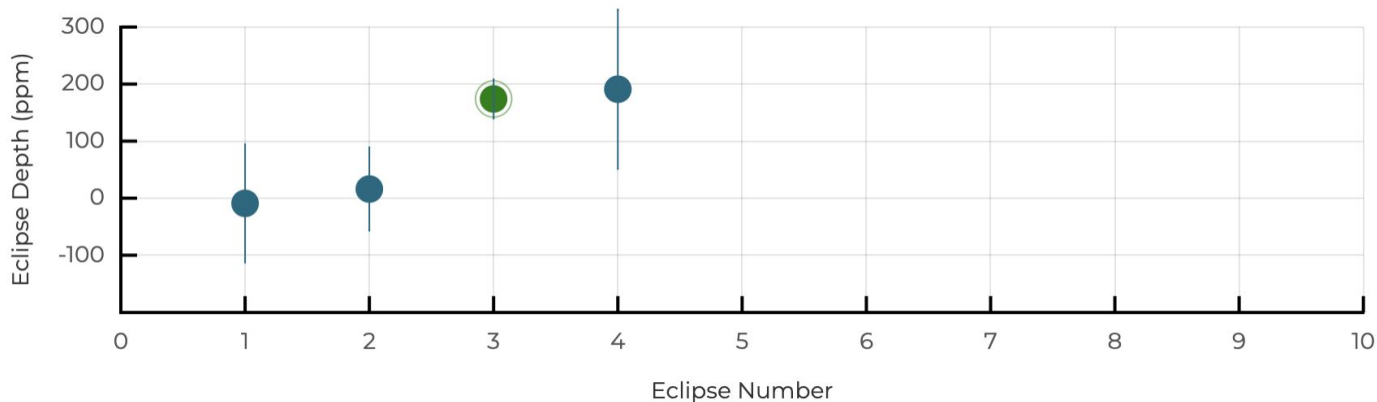
[TARGETS](#)

[STATUS](#)

[DATA](#)

[TEAMS](#)

GJ 3929b : eclipses and light curves



JWST Status: ~~December 2025~~ → May 2026

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[Elena Manjavacas](#)

Light Curves for Eclipse 3

hlsp_rocky-worlds_jwst_miri_gj3929b-ecl003_f1500w_v1.0_lc

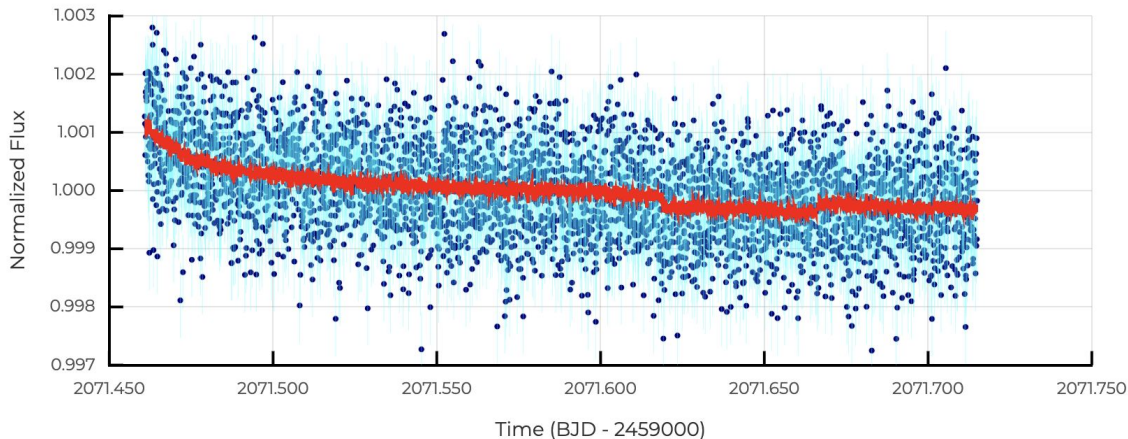
Reset Plot

Hide Error Bars

Number of pixels to bin: 1

Raw Light Curve

Cleaned Light Curve



JWST Status: ~~December 2025~~ → May 2026

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GJ-3929	GJ-3929 b	Observations in progress → Observations Complete ³							584	-0.2937

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TOI-771	TOI-771 b	Waiting to schedule → APT submitted ⁰¹						15.7	0.054	571	-0.2284	
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JWST Status: ~~December 2025~~ → May 2026

APTs and Scheduling report are live



LHS-1140b



PROGRAM INFORMATION

HST (Cycles 33/34/35 allocation)

[HST 18222 Program Information](#)

[Download the HST 18222 APT file](#)

JWST (Cycles 4/5/6 allocation)

[JWST 12498 Program Information](#)

[Download the JWST 12498 APT file](#)

SCHEDULING TIMELINE

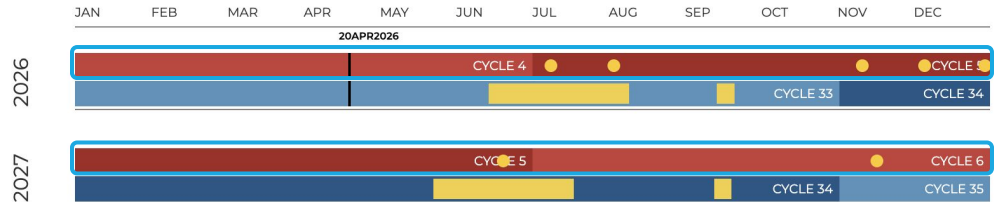
LAST UPDATE: 14APR2026

2026 13 APR

[Download the JWST Scheduling Report](#)

2026 27 FEB

[Download the HST Scheduling Report](#)



JWST Status: ~~December 2025~~ → May 2026

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LHS-1140b



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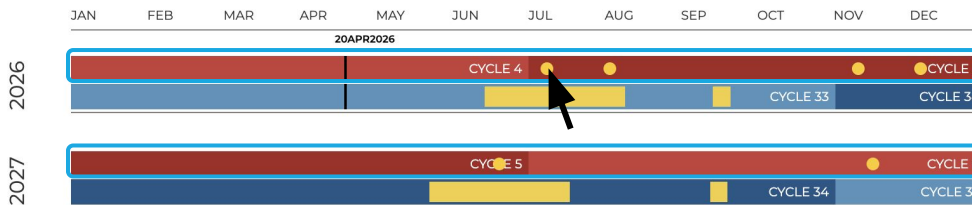
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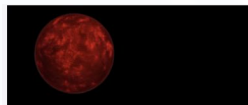
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LHS-1140b



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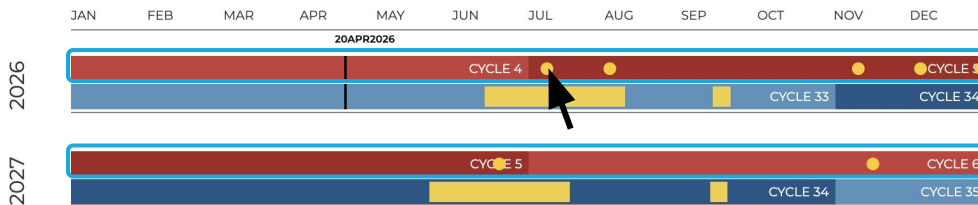
LAST UPDATE: 14APR2026

2026 13 APR

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2026 27 FEB

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Eclipse 1

Observation #1

Exposure Duration: 11.03h

Planned for: July 10, 2026

Status: Implementation

JWST Status: ~~December 2025~~ → May 2026

APTs and Scheduling report are live



LHS-1140b



Visit Status Report for HST 18222

Mon Apr 20 16:24:56 EDT 2026

Visit	Status	Target(s)	Configs	Orbits	Plan Windows
01	Implementation	WAVE LHS-1140	STIS/CCD STIS/NUV-MAMA	2	Jun 15, 2026 - Aug 10, 2026 (2026.166 - 2026.222)
02	Implementation	WAVE CCDFLAT LHS-1140	STIS/CCD	1	Sep 13, 2027 - Sep 20, 2027 (2027.256 - 2027.263)
03	Implementation	LHS-1140	COS/NUV COS/FUV	4	Sep 14, 2026 - Sep 21, 2026 (2026.257 - 2026.264)
04	Implementation	LHS-1140	COS/NUV COS/FUV	4	May 24, 2027 - Jul 19, 2027 (2027.144 - 2027.200)
05	Implementation	LHS-1140	COS/NUV COS/FUV	4	May 24, 2027 - Jul 19, 2027 (2027.144 - 2027.200)
06	Implementation	LHS-1140	COS/NUV COS/FUV	4	May 24, 2027 - Jul 19, 2027 (2027.144 - 2027.200)

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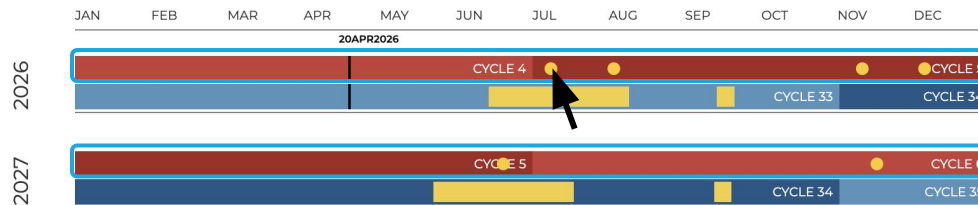
2026 13 APR

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2026 27 FEB

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Eclipse 1
 Observation #1
 Exposure Duration: 11.03h
 Planned for: July 10, 2026
 Status: Implementation



JWST Status: ~~December 2025~~ → May 2026

Current RW Selected Targets

Parent Star	Planet	Radius (R _⊕)	Mass (M _⊕)	Period (Days)	Kmag	Teff (K)	a/R _★	R _p /R _★	Teq (K) ↑	Priority Metric [†]		
LHS-1140	LHS-1140 b	Scheduling in progress → Observations scheduled ⁷³							218	0.0762		
TOI-198	TOI-198 b	Scheduling on hold (in consultation with SAC)						49.0	0.03	368	0.1581	
LTT-1445 A	LTT-1445 A b	Scheduling in progress					6.5	3340	30.2	0.045	430	-0.0503
TOI-244	TOI-244 b	Waiting to schedule ⁴					8.0	3433	28.1	0.033	458	-0.0457
LTT-1445 A	LTT-1445 A c	Scheduling in progress					6.5	3340	21.1	0.036	514	-0.2283
HD 260655	HD 260655 c	Waiting to schedule ⁷¹					5.9	3803	23.4	0.032	556	-0.0687
TOI-771	TOI-771 b	Waiting to schedule → APT submitted ⁰¹						15.7	0.054	571	-0.2284	
TOI-406	TOI-406 c	Waiting to schedule ³¹					8.8	3392	17.6	0.03	572	-0.1705
GJ-3929	GJ-3929 b	Observations in progress → Observations Complete ³								584	-0.2937	

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Today's Agenda

1. Rocky Worlds status report
2. **Data Challenge & Workshop**
3. Rocky Worlds community engagement
4. Q & A




Rocky Worlds Data Challenge & Workshop

Soft launch announced

Rocky Worlds DDT Data Challenge and Data Challenge Workshop — Save the Date

[View all news >](#)

March 19, 2026

The [Rocky Worlds DDT](#)  Core Implementation Team (CIT) will soon launch the Rocky Worlds DDT Data Challenge, aimed at engaging the community in the analysis and interpretation of JWST MIRI 15 μm time series observations of terrestrial exoplanets in eclipse. The Data Challenge will feature two JWST MIRI 15 μm Time Series Observation (TSO) datasets:

1. Actual JWST MIRI observations of GJ 3929 b obtained as part of the Rocky Worlds program, and
2. Simulated observations of LHS 1140 b, designed to resemble data the program will obtain in the future.

Participants will be invited to analyze the datasets and submit their results, with the goal of comparing methodologies and identifying best practices for studying rocky exoplanet atmospheres.

The Data Challenge is expected to open in late April 2026 and run through late August 2026. It will culminate with the Rocky Worlds DDT Data Challenge Workshop, held on November 16–18, 2026 at Space Telescope Science Institute.

The workshop will bring together Data Challenge participants to present their findings, exchange ideas, and develop a set of best practices for data reduction of MIRI

Rocky Worlds Data Challenge & Workshop

Extensive preparation work nearing completion

- Data challenge data almost finished (MIRI/F1500W photometric time series)
 - Real data set: GJ 3929 b from Rocky Worlds DDT
 - Synthetic data set based on LHS 1140 b
- Submission form with detailed questionnaire
- Jupyter notebooks to help users turn posteriors into submission-ready format
- Developed expertise with Kaggle (platform for hosting data challenges)
- Official announcement and opening of the data challenge (hard launch) coming up in a few weeks
- Data challenge open from May to August 2026 (wrap up ahead of the JWST Cycle 6 deadline)
- Outreach plan:
 - Virtual, recorded tutorial session (~June)
 - Hands-on demonstration at Exoplanet VI (Néstor Espinoza)
 - Presentation at Cool Stars (Hannah Diamond-Lowe)

Rocky Worlds Data Challenge & Workshop

Work ramping up

Workshop is designed to be the culmination of the Data Challenge: deep dive into data reduction best practices for Rocky Worlds DDT data + scientific talks to connect analysis to interpretation and results

- Science Organizing Committee formed (everyone invited said yes!)
 - Had first kick-off meeting
 - Upcoming decisions:
 - Invited speakers
 - Workshop block schedule
- Workshop dates announced (16–18 November 2026)
- Opening of registration and abstract submission (mid-May)
- Workshop promoted everywhere Data Challenge or Rocky Worlds DDT is presented

Today's Agenda

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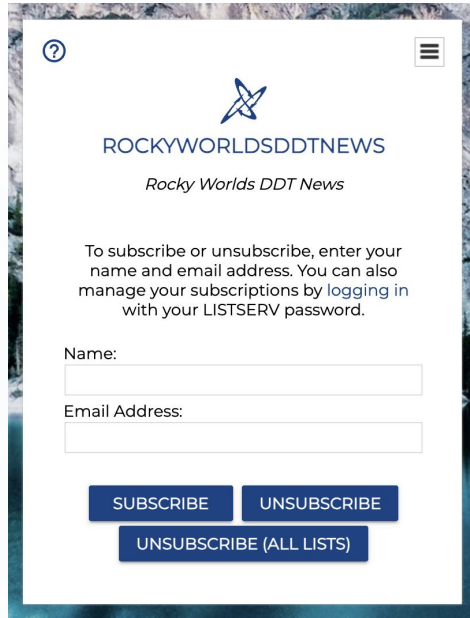
Avenues for engagement

All the different ways the community interacts with Rocky Worlds DDT

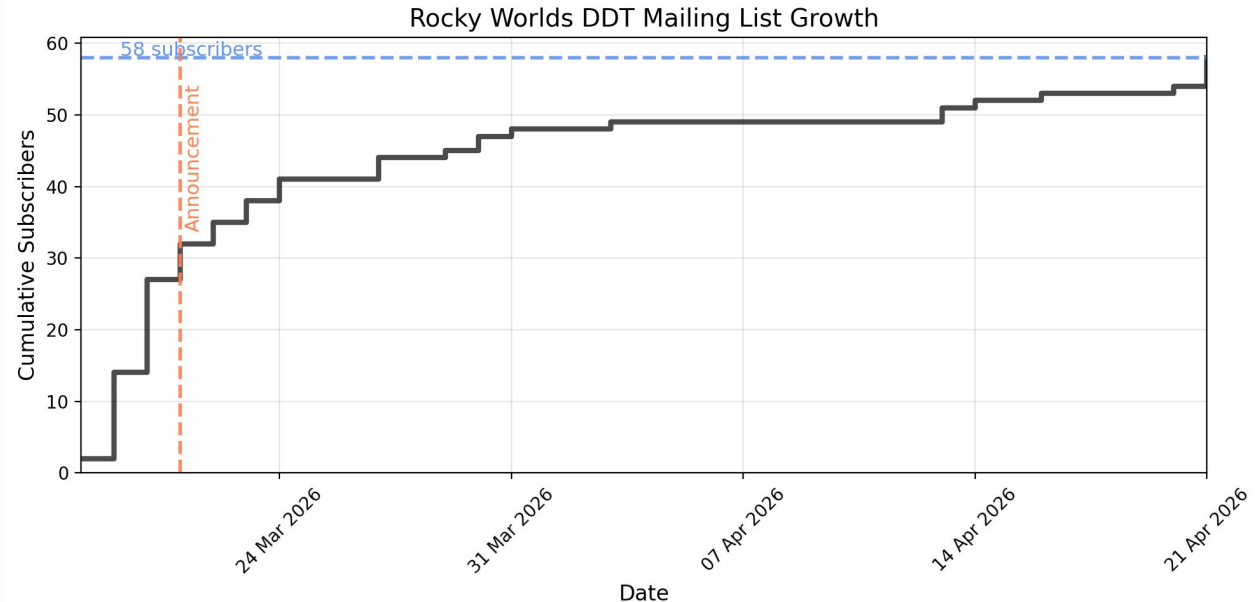
Avenues for engagement

All the different ways the community interacts with Rocky Worlds DDT

- Sign up for [mailing list](#) (more frequent announcements and updates)



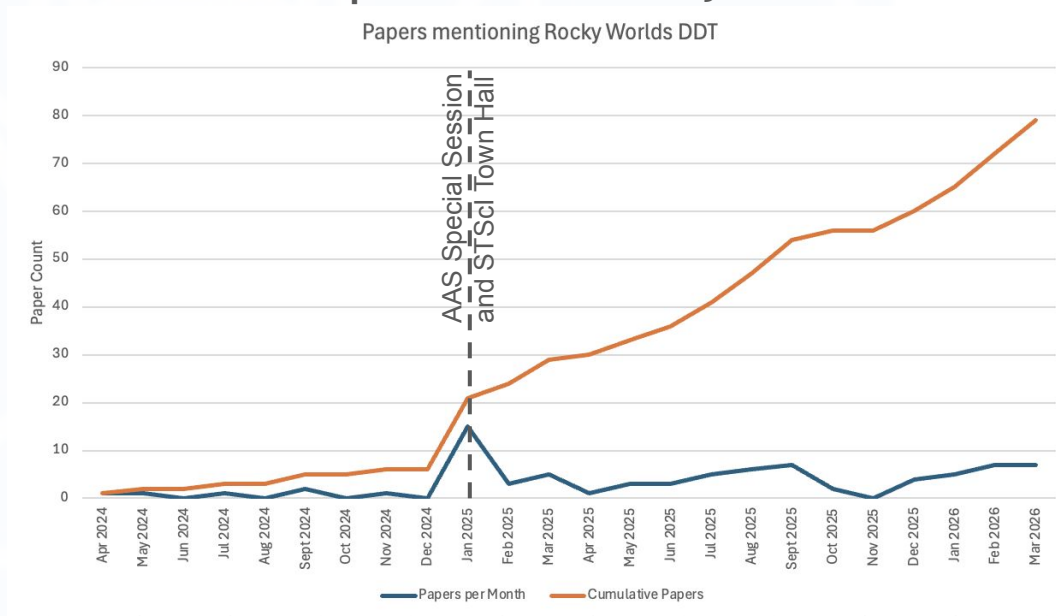
The image shows a web form for signing up to the Rocky Worlds DDT News mailing list. At the top, there is a logo consisting of a stylized blue star or compass rose, followed by the text "ROCKYWORLDSDDTNEWS" and "Rocky Worlds DDT News". Below this, a paragraph of text reads: "To subscribe or unsubscribe, enter your name and email address. You can also manage your subscriptions by logging in with your LISTSERV password." There are two input fields: "Name:" and "Email Address:". At the bottom, there are three buttons: "SUBSCRIBE", "UNSUBSCRIBE", and "UNSUBSCRIBE (ALL LISTS)".



Avenues for engagement

All the different ways the community interacts with Rocky Worlds DDT

- Sign up for mailing list (more frequent announcements and updates)
- References in publications to Rocky Worlds DDT



ADS query:

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(full:"Rocky Worlds DDT" OR  
(full:"Director's Discretionary" AND  
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OR full:JWST) OR  
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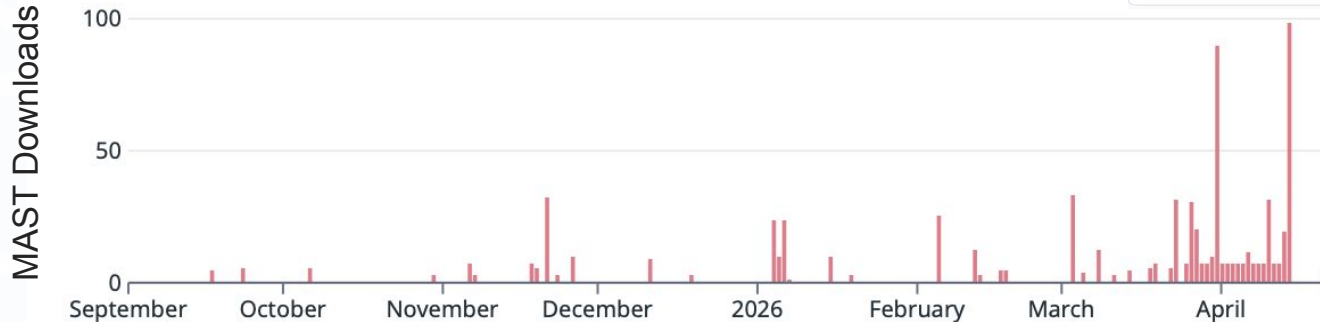
Report of the Working Group
Redfield et al., (2024)

Avenues for engagement

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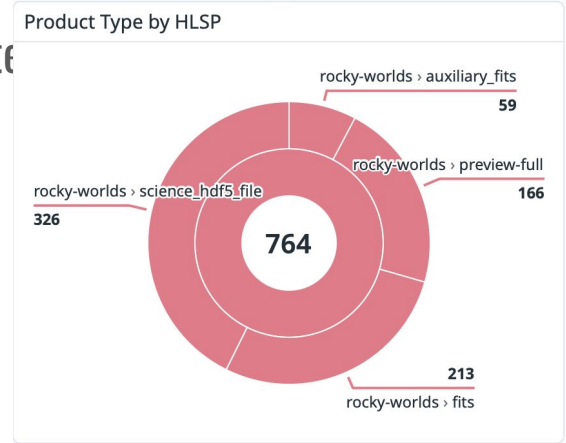
- Sign up for mailing list (more frequent announcements and updates)
- References in publications to Rocky Worlds DDT
- Data product downloads from MAST

provenance
rocky-worlds ▼



By the numbers:

- Total MAST File Downloads: **764**
- Total Download size: **229 MB**
- HLSP website views: **2,810 views** from **2,144 unique users**



Avenues for engagement

All the different ways the community interacts with Rocky Worlds DDT

- Sign up for mailing list (more frequent announcements and updates)
- References in publications to Rocky Worlds DDT
- Data product downloads from MAST
- Approved observing programs complementary to Rocky Worlds DDT

JWST	Cycle 4		7073	Charting the Cosmic Shoreline	PI: Jacob Lustig-Yaeger Co-PI: Kevin Stevenson	0	244.8/0.0	NIRISS/SOSS NIRSpec/BOTS	GO
			7251	Does Our Closest M-Dwarf Rocky Neighbor Have An Atmosphere? We Need to Find Out.	PI: Katherine Bennett	12	43.6/0.0	NIRCam/GTS	GO
	Cycle 5		11481	Outer Giants around Habitable-Zone Rocky Multiple Systems	PI: Anne-Marie Lagrange Co-PIs: Anthony Boccaletti, Florian Destrieux, and Jonas Wehrung-Montpezat	12	45.1/0.0	MIRI/Coronagraphy	GO

HST	33	GO	18030	Kevin France	University of Colorado at Boulder	USA	Muscles Advanced Library With an Atmospheric Retention Emphasis	36	+Chandra & XMM
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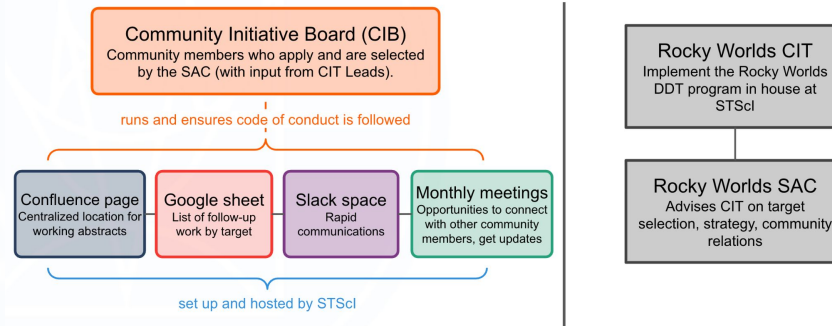
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- References in publications to Rocky Worlds DDT
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- Approved observing programs complementary to Rocky Worlds DDT
- Community Involvement Initiative led by community members



A “TFOP-light” organization | separate from CIT work





Summary: Rocky Worlds DDT



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-  **Spinning up Data Challenge & Workshop** — A lot of hard work is wrapping up to initiate the data challenge, with work to organize the culminating workshop spinning up.

Summary

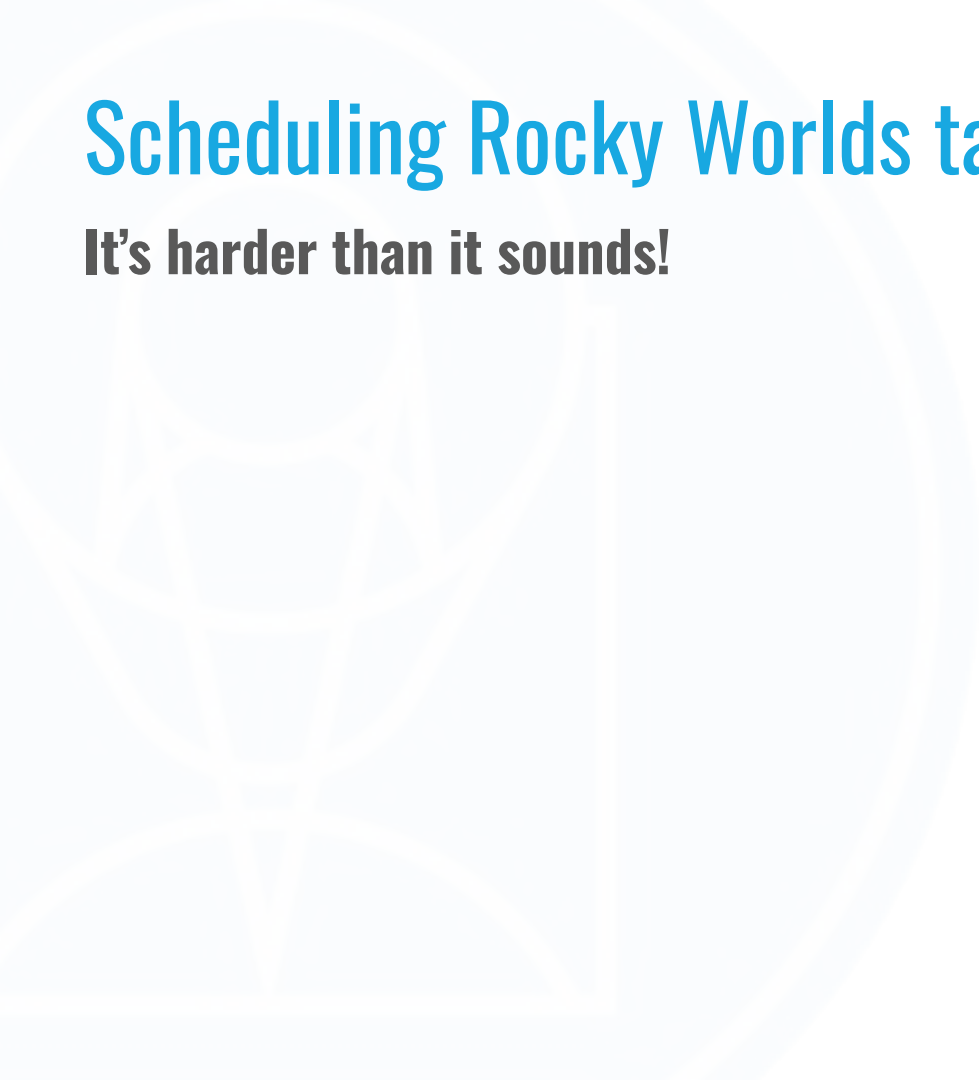
-  **Scheduling observations, data collection, generation of data products** — all underway and being released to the community regularly.
-  **Spinning up Data Challenge & Workshop** — A lot of hard work is wrapping up to initiate the data challenge, with work to organize the culminating workshop spinning up.
-  **Rocky Worlds in the community** — healthy signs of community engagement with data product downloads, mailing list sign-ups, scientific publications, and complementary observations.

Extra Slides



Scheduling Rocky Worlds targets

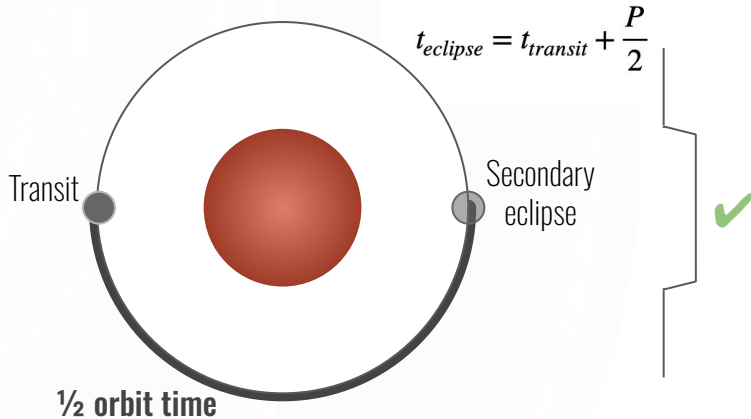
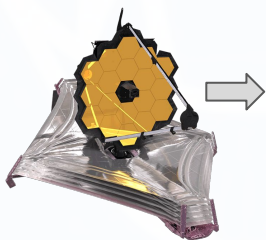
It's harder than it sounds!



Scheduling Rocky Worlds targets

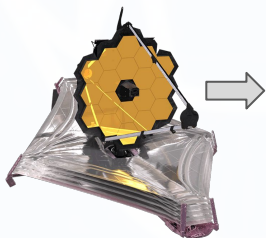
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Circular orbit

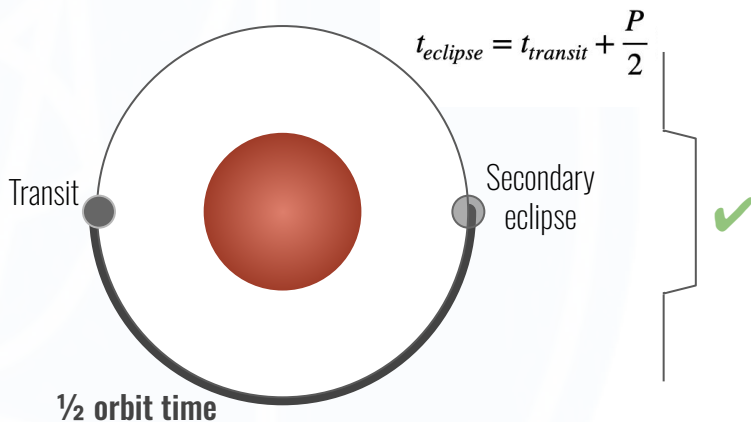


Scheduling Rocky Worlds targets

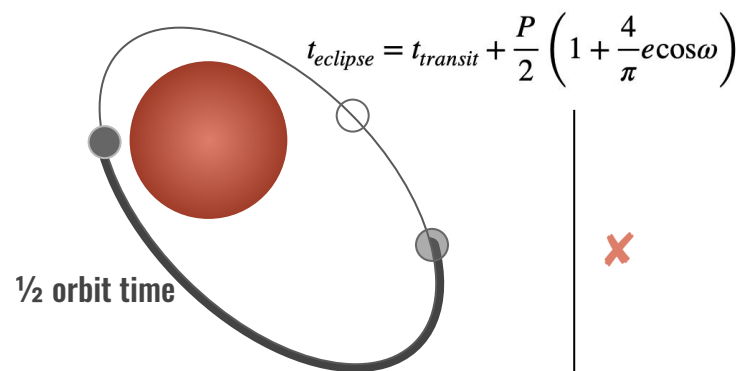
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Circular orbit



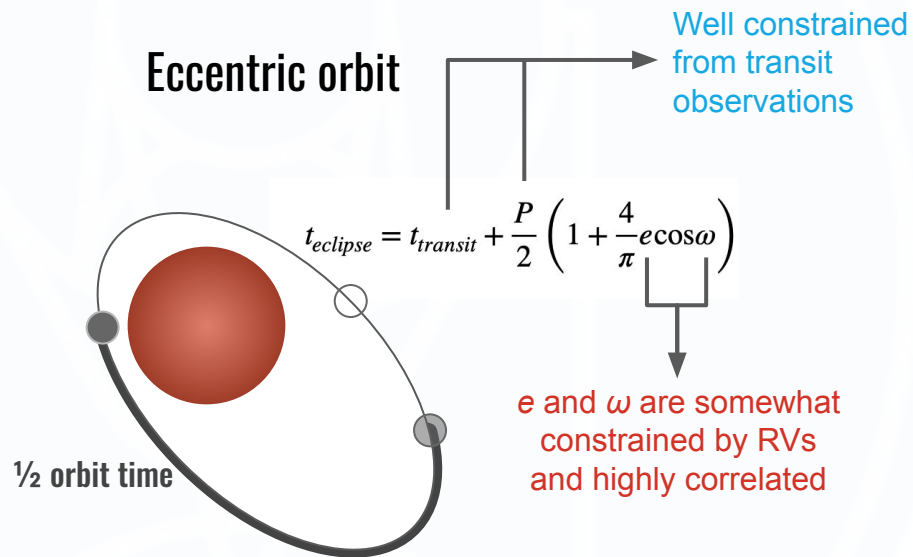
Eccentric orbit



**Need to calculate exact
time for JWST to look**

Scheduling Rocky Worlds targets

It's harder than it sounds!



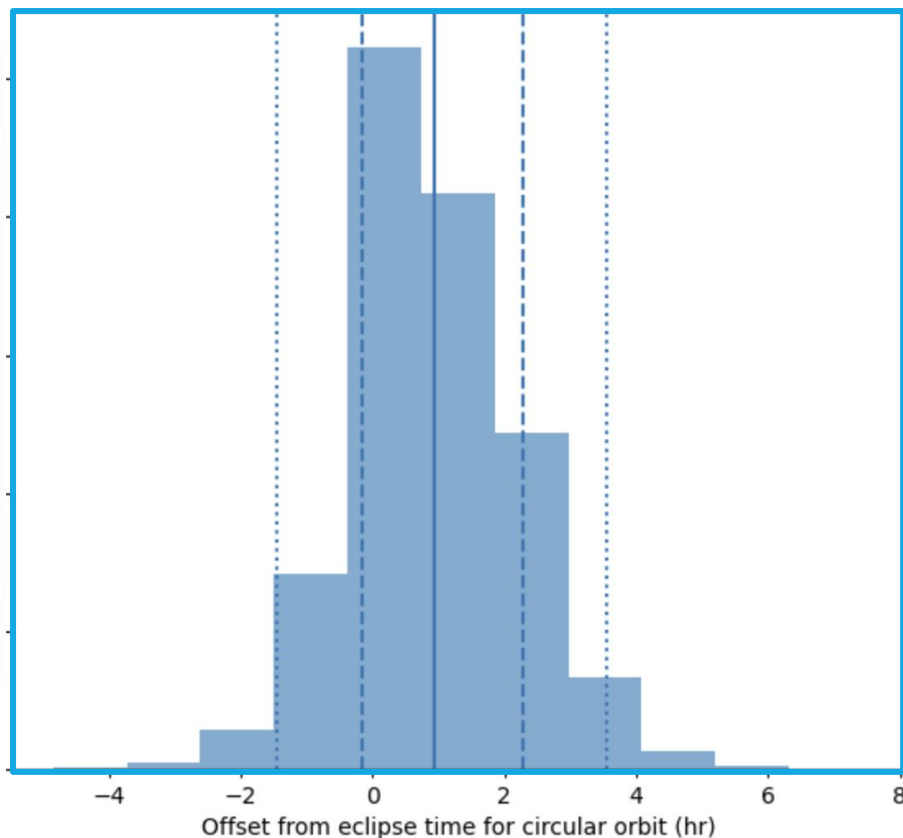
Scheduling Rocky Worlds targets

Target scheduling: GJ 3929 b

MAROOON-X RVs constrain the eccentricity to be consistent with 0 at 2-sigma.

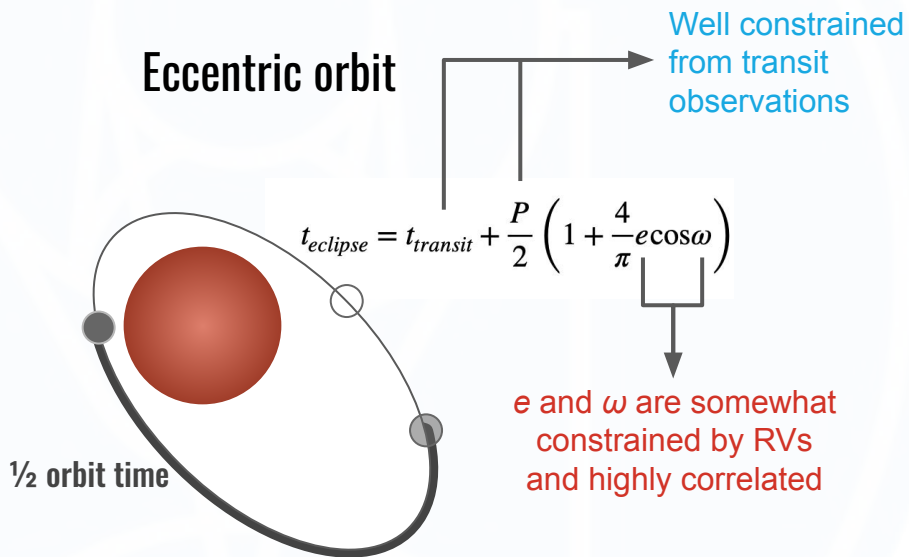
(Thank you to Madison Brady and Jacob Bean for sharing proprietary MAROOON-X RVs and analyses; results now published in Xue et al., 2025, arXiv:2508.12516)

ExofastV2 global fits (that include MAROOON-X RVs) favor a slightly eccentric orbit consistent with $e=0$ at 1-sigma.



Scheduling Rocky Worlds targets

It's harder than it sounds!



CIT Scheduling Team performs global fits using all available

- Radial velocities*
- Transit lightcurves*

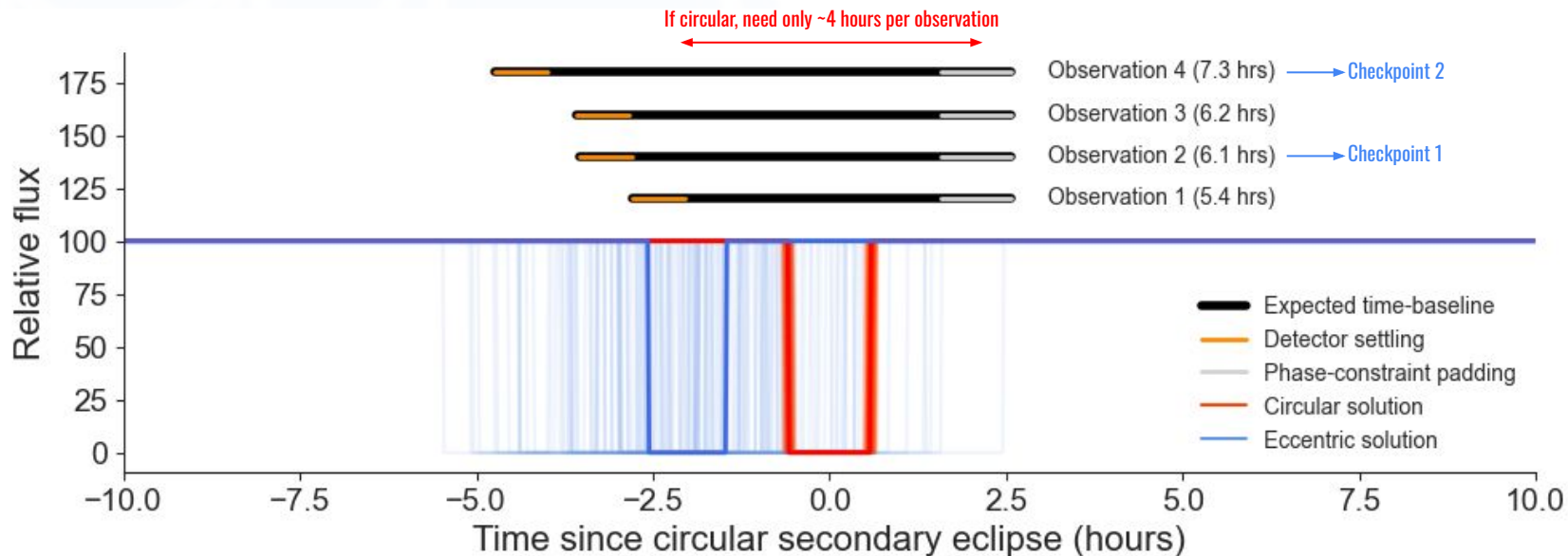
to constrain orbital parameters.

***High-precision data is the most effective.**

Scheduling Rocky Worlds targets

Mitigate uncertain eclipse times: tinker scheduling and checkpoints

Tinker Scheduling strategy: GJ 3929 b



Scheduling Rocky Worlds targets

Try for simultaneous **JWST** + **HST** observations, if feasible

