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EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Rocky Worlds Update
Community Initiatives for HST and JWST

Neill Reid, Multi-mission Project Scientist

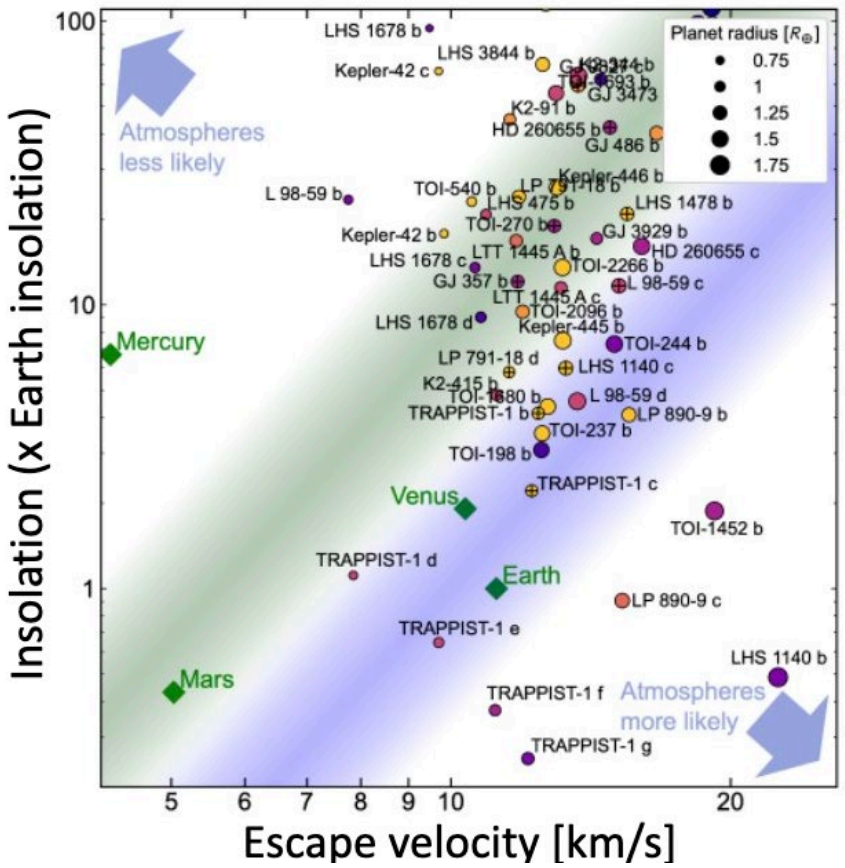
AAS 248 June 2026

Topics

- Update on the Rocky Worlds Director's Discretionary Time Program
- Community Initiatives
  - High redshift transient JWST DD program
  - Community Targets of Opportunity

Rocky Worlds Update

Rocky Worlds DD program - background



STScI Core Implementation Team Leads:
Néstor Espinoza and Hannah Diamond-Lowe

- Program recommended as a Strategic Exoplanet Initiative by a community working group
- Approved in 2024 as a DD program combining 500 JWST hours + 250 Hubble orbits to search for atmospheres of rocky planets around M-dwarfs
  - JWST 15-micron photometry of secondary eclipses measures the thermal emission of rocky exoplanets and identifies planets likely to have retained atmospheres
  - HST UV spectroscopy of host M dwarfs characterizes their level of activity and provides insight into mechanisms working against atmospheric retention

Link to Exoplanet Working Group Report

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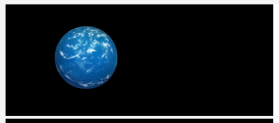
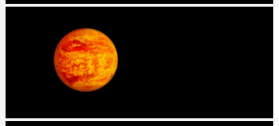
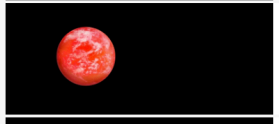
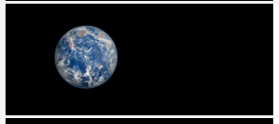
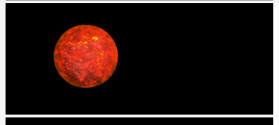
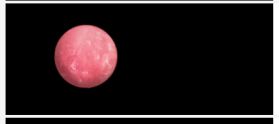
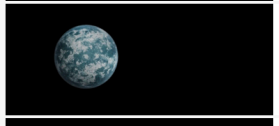
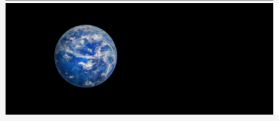
Execution

- The program is being implemented by an in-house team
  - Responsible for creating and executing APT files
  - Data reduction to produce high-level data products
  - Data and products are available immediately on production through MAST
  - Team led by Nestor Espinoza and Hannah Diamond-Lowe
- Scientific advice is provided by a Science Advisory Council
  - Rory Barnes, University of Washington; Natasha Batalha, NASA Ames; Bjorn Benneke, UCLA; Adina Feinstein, UC Boulder; Aishwarya Iyer, GSFC; Daniel Koll, Peking University; Laura Kreidberg, MPIA; Rafael Luque, Instituto Astrofisica de Andalucia; Megan Weiner Mansfield, University of Maryland; Kevin Stevenson, JHO/Applied Physics Laboratory; Allison Youngblood, GSFC.

Rocky Worlds DDT – JWST Status

See rockyworlds.stsci.edu : Targets, status, data products, etc.

	GJ-3929b	Done! Data products on MAST.
	LTT-1445Ac	Scheduling in progress
	LTT-1445Ab	Scheduling in progress
	LHS-1140b	Observations scheduled, coming soon
	TOI-198b	Observations on hold for better orbital parameters
	TOI-406c	Target will likely be swapped out
	TOI-771b	Observations scheduled, coming soon
	HD 260655c	Scheduling in progress
	TOI-244b	Scheduling in progress

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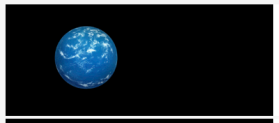
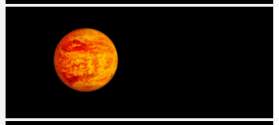
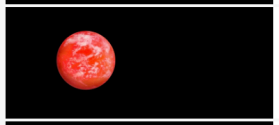
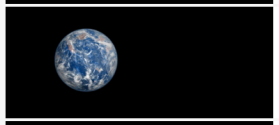
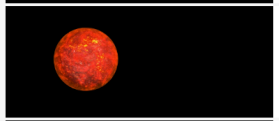
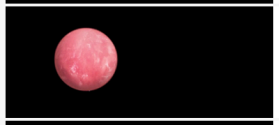
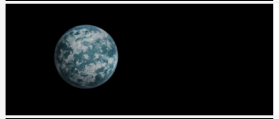
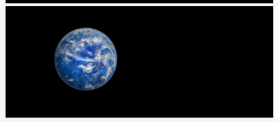
Rocky Worlds DDT – HST Status

See rockyworlds.stsci.edu : Targets, status, data products, etc.

	GJ-3929b	**Done! Data products on MAST.**
	LTT-1445Ac	**APT submitted, waiting on JWST to set observing windows.**
	LTT-1445Ab	
	LHS-1140b	**Observations scheduled, coming soon**
	TOI-198b	**Observations on hold for JWST**
	TOI-406c	**Target will likely be swapped out**
	TOI-771b	**Observations scheduled, coming soon**
	HD 260655c	**APT submitted, waiting on JWST to set observing windows.**
	TOI-244b	**Scheduling in progress**

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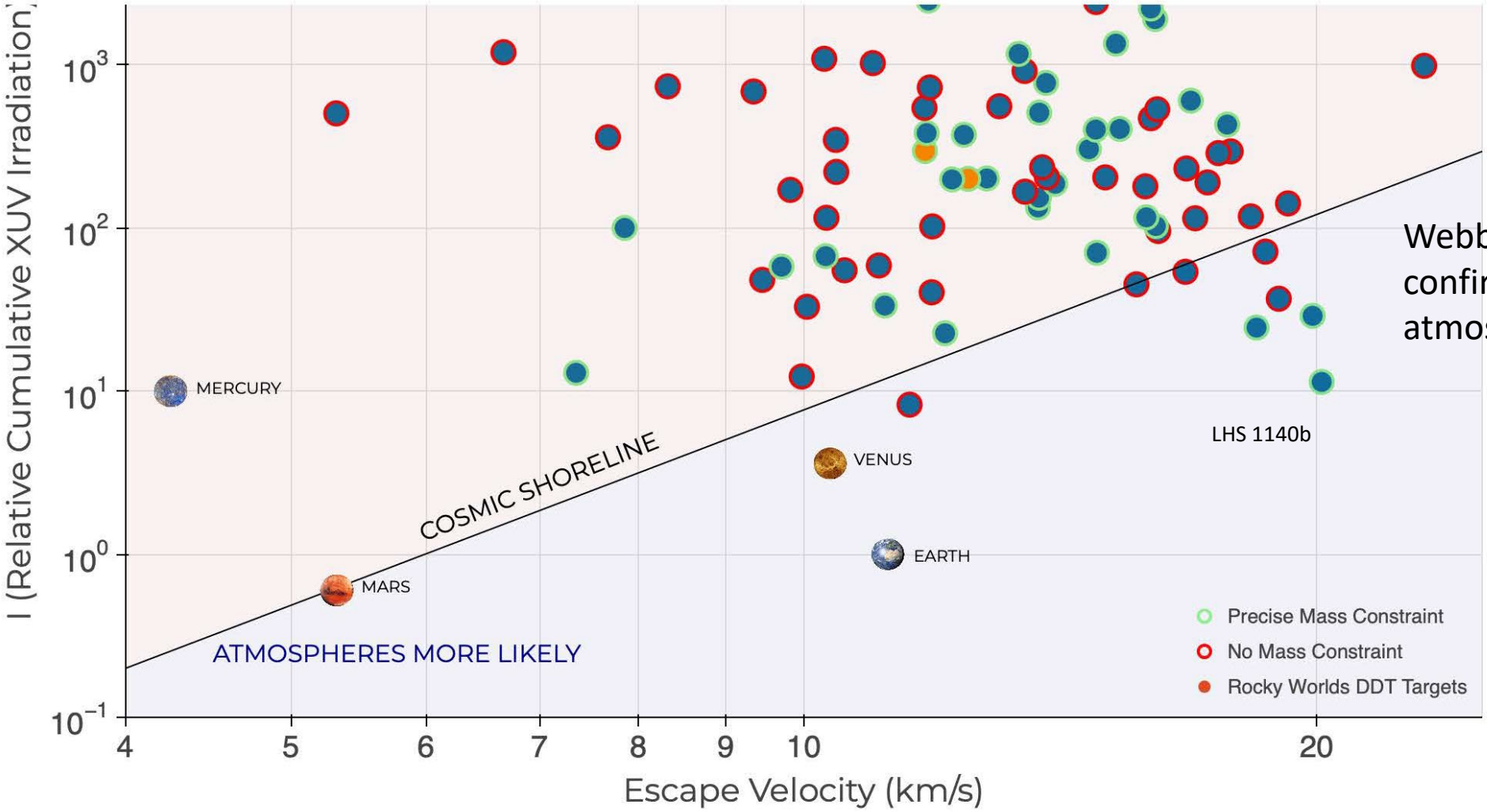
Scheduled for observations soon: LHS 1140b

From HST & Chandra



Webb observations confirm/reject atmospheres

From ground-based observations

Rocky Worlds Data Challenge and Workshop

- Announced on May 20th
- Participants submit results of their analyses of two datasets:
  - 4 real eclipse observations of GJ 3929 b, gathered by JWST-DDT-9235 as part of the Rocky Worlds DDT.
  - 9 simulated eclipse observations of LHS 1140 b, designed to closely follow the planned observing strategy for JWST-DDT-12498 as part of the Rocky Worlds DDT.
- Goal:
  - compare analysis methodologies,
  - identify best practices, and
  - help interpret rocky exoplanet atmosphere observations with JWST
- Team members may be invited to participate in a workshop
  - STScI, November 16-18, 2026

Rocky Worlds Community Involvement Initiative

- Announced on June 4
- Aims to provide a forum to “enable collaboration and coordination around Rocky Worlds DDT science”
- Modeled on TESS Follow-up Observing Program
- For more information, see →

Community Initiatives

High Redshift Transient DD program

- In parallel with the Exoplanet WG, the STScI Director chartered a community working group to consider strategies that could take advantage of Hubble's existing and Webb's predicted longevity of performance
- As part of that process, the WG was invited to consider options for a DD program to investigate transients in the high redshift universe
- The WG identified possible options but did not coalesce around a recommendation
- A follow-up WG has been chartered to consider
  - Program feasibility
  - Quantify likely results

High-redshift transients DD Feasibility Working Group

Members of the FWG: **Jennifer Andrews** (NOIRLab, chair), **John Chisholm** (U. Texas Austin), **Mansi Kasliwal** (CalTech), **Andrew Levan** (Radboud U.), **Takisha Moriya** (NAOJ), **Robert Quimby** (SDSU), **Adam Riess** (STSCI/JHU), **Yue Shen** (UoI Urbana-Champaign), **Mercedes López-Morales** (STScI, ex-officio).

- Suggested total amount of time: 250-300 hours.

- The FWG will present their findings in a report to the STScI Director and a presentation to the JSTUC.

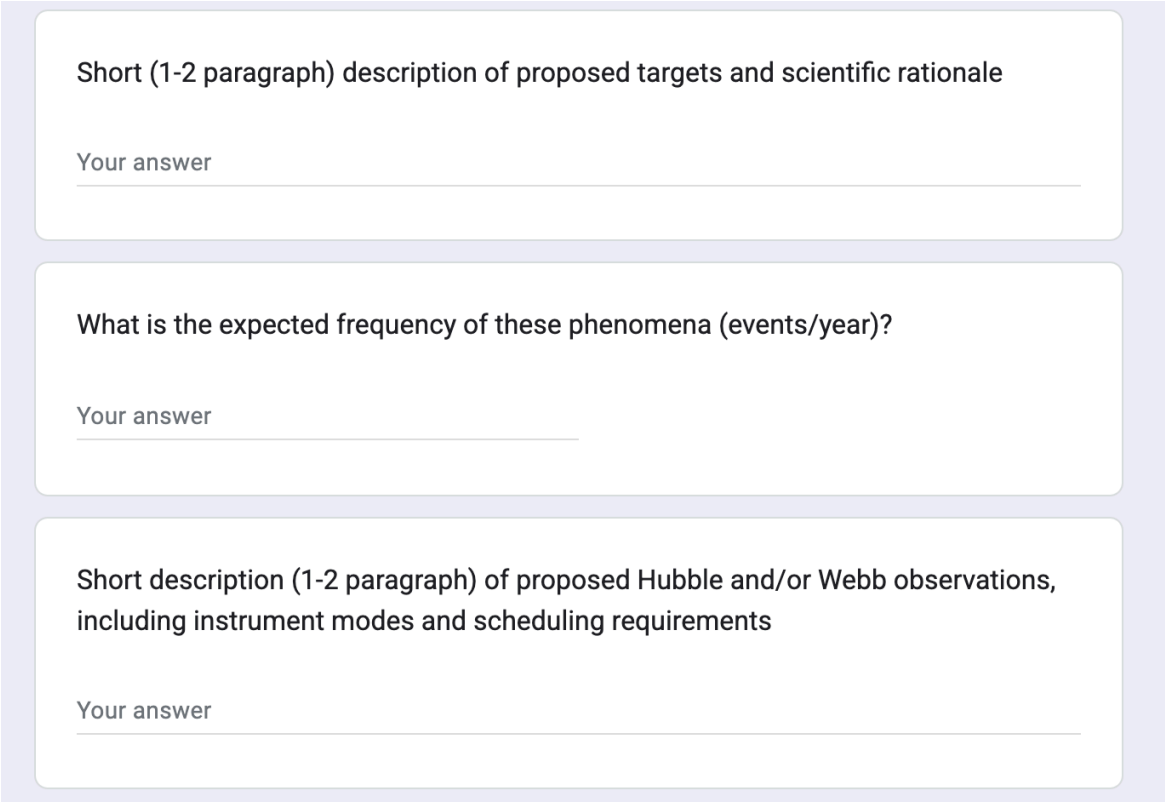
- The report is due August 2026.

Community Targets of Opportunity - status

- **Community ToOs** are defined as *standing* ToO programs with activation lifetimes longer than 2 years.
- Qualifying events should have occurrence rates of less than 1 event every 2 years (< 0.5 events/yr) and/or require rapid (10s of hours) execution
- The JSTUC and STUC recommended the implementation of *Community ToOs* to facilitate observations of variable and transient phenomena that can be problematic under review by the TAC
- Community ToOs do not preclude submission of GO programs, which would have priority if recommended by the TAC

Community ToO Programs Status Update: Call for Ideas

- On November 6, 2025 STScI issued a call for *Community ToOs* suggestions with JWST and HST
- Members of the community submitted their ideas via an online form, that included the following questions:



- Requirements:
  - Rare phenomena, with occurrence likelihood of less than 0.5/year
  - Observations need to be scheduled on rapid timescales (<5 days)

The deadline for submissions was January 31, 2026

71 responses received

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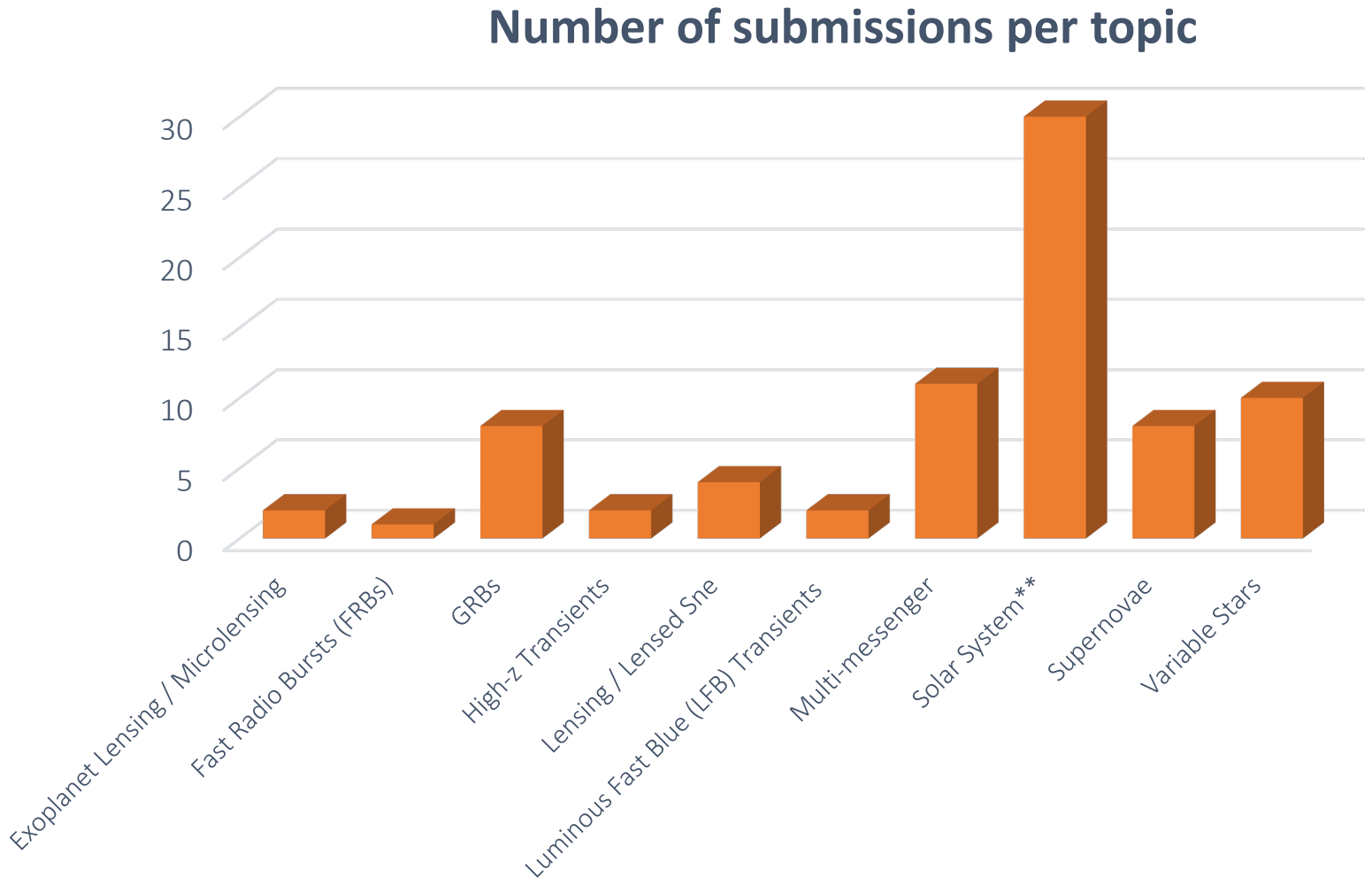
Community ToO Programs Status Update: Summary of submissions



** Solar System submissions include:

- Asteroids
- Comets
- Interstellar objects
- Kuiper Belt Objects (KBOs)
- Main Belt objects
- Near Earth Objects (NEOs)
- Planets and moons

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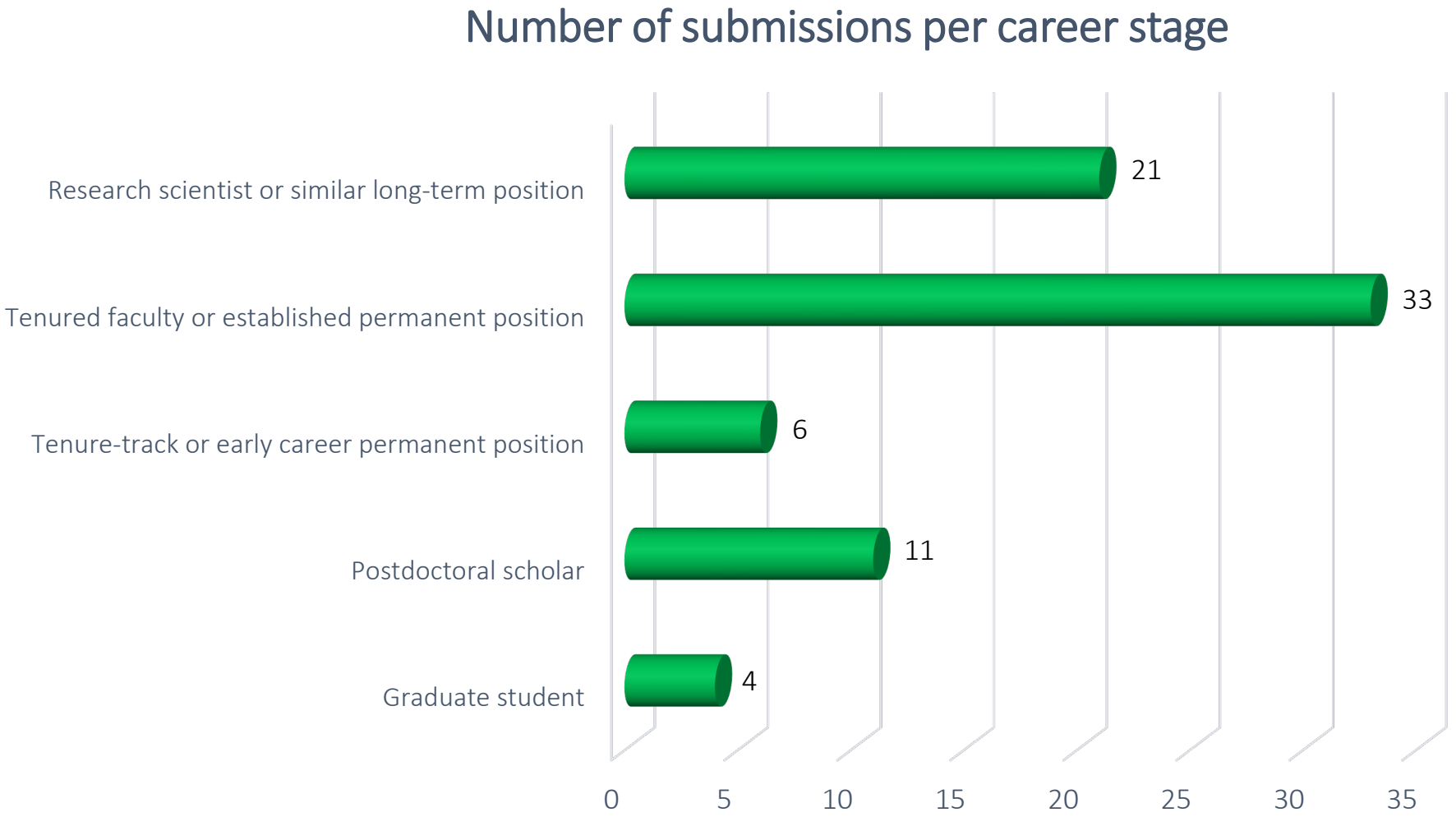
Community ToO Programs Status Update: Summary of submissions



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Community ToO Programs Status Update: Current Status

- Submissions were sent for evaluation to 8 experts of the community spanning a range of expertise.
- We received feedback from 7 of the 8 experts, resulting in recommendations for four types of targets that have been approved for observation by the Director

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Community ToO Programs Status Update: Recommended Topics

- Multi-messenger kilonova events

Broad support for a program to obtain rapid follow-up imaging and spectra with both HST (UVO) and JWST. Focus on observations to cover initial phases, allowing DD for longer-term monitoring.

- Luminous Fast Blue Transients

Rare phenomena only recently discovered and with few extant observations. Program would cover initial observations with HST (UVO), with opportunity for longer-term standard DD follow-up.

- Interstellar interlopers

Rare objects with each new discovery likely to provide new insights in multi-dimensional phase space. Imaging and spectroscopy with HST and JWST. Likely only require observations to cover initial phases, allowing DD for longer-term monitoring.

- Near-Earth asteroids

Rare objects with potential life-threatening implications. Observations with both HST and JWST; may need to plan for multiple epochs but could cede later follow-up to DDs.

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Community ToO Programs Status Update: Current Status

- Submissions were sent for evaluation to 8 experts of the community spanning a range of expertise.
- We received feedback from 7 of the 8 experts, resulting in recommendations for four types of targets that have been approved for observation by the Director
- Next steps:
  - Community experts will be asked to help design the observing programs and
  - Define appropriate trigger criteria
  - Working on defining the appropriate avenues for the community to submit alerts
  - NB strong similarities between this program and the Rubin Gems DD program on Gemini
- Data collected under these programs will be immediately made available to the community
- We are not allocating funding directly associated with the observations, but we are exploring options to enable AR programs that would be allocated in advance through the standard TAC (as with other DD programs)

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Summary

- The Rocky Worlds DD program is well under way
- Feasibility studies are underway for a high-redshift transients DD program
- Four Community ToO programs have been identified and will be implemented based on community input

For further information on all these topics, see the recent STUC and JSTUC meetings

STUC

JSTUC