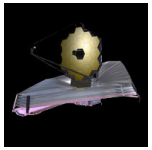

11831 - FOURCAST: FOUR-planet Comparative AtmoSpheric Escape in a benchmark young multi-planet system

Cycle: 5, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	V1298 Tau b	NIRISS Single-Object Slitless Spectroscopy	(1) V-V1298-Tau
	3	V1298 Tau e	NIRISS Single-Object Slitless Spectroscopy	(1) V-V1298-Tau

ABSTRACT

The existence of the radius-valley strongly advocates for early atmospheric mass loss (<100 Myr timescale) processes which sculpt the sub-Neptune population. Although there are two competing theories which can explain the exoplanet demographics equally well, it is difficult to determine which mechanism dominates at young ages due to large model uncertainties (mass loss efficiency, stellar flux) and existing challenges of measuring atmospheric mass loss rates in young planets from the ground (limited baseline, low precision, high vsini of young stars).

We propose an experiment to leverage the high precision and longer baseline observations of JWST to observe transmission spectra of two young planets in the same young (20-30 Myr old) system: V1298 Tau b and e with NIRISS SOSS. Identical observations of of two inner planets in the same system have revealed strong He triplet and H-Paschen alpha planetary absorption features, highlighting the necessity of higher precision and baseline coverage compared to ground based studies to resolve stellar and planetary signals in time.

This will allow us to constrain and compare mass loss rates between four planets with shared evolution history. These observations will allow us to test the impact of mass loss processes across an order of magnitude of stellar insolation and distinguish between competing theories of early mass loss (photoevaporation v/s core-powered mass loss) through its dependence on orbital distance, and determine the final outcome for these sub-Neptune progenitors (mini-Neptunes or stripped rocky cores).

OBSERVING DESCRIPTION

We propose to observe 1 primary transit each for V1298 Tau b and e to constrain their atmospheric mass loss rates.

We will observe using NIRISS SOSS SUBSTRIP96. 5 groups per integration will be used resulting in 8.8 seconds integrations.

V1298 Tau will be used for target acquisition and a F277W image will be taken to correct for 0th order contaminanats.

We will require 13.8 hours of science observations for V1298 Tau b and 16.6 hours for the visit of V1298 Tau e.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	V-V1298-Tau	RA: 04 05 19.5910 (61.3316292d) Dec: +20 09 25.56 (20.15710d) Equinox: J2000	Proper Motion RA: 5.413 mas/yr Proper Motion Dec: -16.052000023591972 mas/yr Parallax: 0.0092577" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Observation

Proposal 11831, Observation 1: V1298 Tau b

Fri Apr 17 23:00:10 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Diagnostics

(V1298 Tau b (Obs 1)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 1:1) Informational (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	V-V1298-Tau	RA: 04 05 19.5910 (61.3316292d)	Proper Motion RA: 5.413 mas/yr	
		Dec: +20 09 25.56 (20.15710d)	Proper Motion Dec: -16.052000023591972 mas/yr	
		Equinox: J2000	Parallax: 0.0092577"	
			Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	SAME	SOSSFAINT	F480M	NISRAPID	3	1	1	0.202	298812

Template

Subarray	Include Short First Exposure and F277W Exposure?
SUBSTRIP96	true

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	NISRAPID	1	1	1	1	1	4.448	
2	NISRAPID	5	3690	1	1	3690	49093.531	298812
3	NISRAPID	5	10	1	1	10	133.045	298812

Special Requirements	
	Between Dates 07-SEP-2026:20:07:00 and 08-SEP-2026:09:55:00 Between Dates 01-OCT-2026:23:33:00 and 02-OCT-2026:13:21:00 Between Dates 04-SEP-2027:22:51:00 and 05-SEP-2027:12:39:00 Between Dates 29-SEP-2027:02:13:00 and 29-SEP-2027:16:01:00 Aperture PA Range 72 to 76 Degrees (V3 71.43873283 to 75.43873283) Aperture PA Range 252 to 253 Degrees (V3 251.43873283 to 252.43873283) Aperture PA Range 255 to 258 Degrees (V3 254.43873283 to 257.43873283) Time Series Observation No Parallel Attachments

Observation

Proposal 11831, Observation 3: V1298 Tau e

Fri Apr 17 23:00:10 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Diagnostics

(V1298 Tau e (Obs 3)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	V-V1298-Tau	RA: 04 05 19.5910 (61.3316292d) Dec: +20 09 25.56 (20.15710d) Equinox: J2000	Proper Motion RA: 5.413 mas/yr Proper Motion Dec: -16.052000023591972 mas/yr Parallax: 0.0092577" Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Star
Description=[Exoplanet Systems, Exoplanets]

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	SAME	SOSSFAINT	F480M	NISRAPID	3	1	1	0.202	298812

Template

Subarray	Include Short First Exposure and F277W Exposure?
SUBSTRIP96	true

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	NISRAPID	1	1	1	1	1	4.448	
2	NISRAPID	5	4110	1	1	4110	54681.413	298812
3	NISRAPID	5	10	1	1	10	133.045	298812

Special Requirements	
	Between Dates 29-AUG-2026:00:25:00 and 30-AUG-2026:16:19:00 Between Dates 23-JAN-2027:01:01:00 and 23-JAN-2027:16:55:00 Between Dates 23-SEP-2027:10:14:00 and 24-SEP-2027:02:08:00 Phase 0.993187 to 0.993587 with period 48.677714 Days and zero-phase 2458313.543883 HJD Aperture PA Range 72 to 76 Degrees (V3 71.43873283 to 75.43873283) Aperture PA Range 252 to 253 Degrees (V3 251.43873283 to 252.43873283) Aperture PA Range 255 to 258 Degrees (V3 254.43873283 to 257.43873283) Time Series Observation No Parallel Attachments