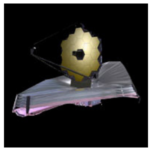

4227 - Chemistry and Clouds of a Temperate Jupiter

Cycle: 2, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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Dr. Jake Taylor (CoI) (ESA Member)	University of Oxford
Ms. Michelle Fabienne Bieger (CoI) (ESA Member)	University of Exeter
Dr. Vatsal Panwar (CoI) (ESA Member)	University of Warwick

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	Transit	NIRSpec Bright Object Time Series	(1) TOI-1899
	11	Transit - Repeat of obs 1	NIRSpec Bright Object Time Series	(1) TOI-1899

ABSTRACT

We propose to measure the first transmission spectrum of a temperate extrasolar gas giant (Teq=360 K) in order to understand the chemistry and cloud formation active in atmospheres at habitable temperatures. Using NIRSpec Prism to measure the abundances of methane, ammonia, and water in the atmosphere of TOI-1899b, we can probe the chemical diversity of the gas giant population by sampling an as-yet unobserved part of the exoplanet atmosphere parameter space. In this temperature range we can directly measure the C/N/O ratios, and hence constrain the formation and

migration history of the planet. By measuring the level of muting of spectral features, we can study the cloud and haze formation processes at work in atmospheres at habitable temperatures, taking advantage of TOI-1899's similarity in gravity and instellation to terrestrial planets that will be characterized with JWST. By testing for muting of spectral features, which can only be due to clouds or hazes in TOI-1899b, we will inform the studies of temperate terrestrial planets where flat spectra can be caused by multiple degenerate processes.

OBSERVING DESCRIPTION

We will observe the temperate Jupiter TOI-1899b for a single transit, using the NIRSpec PRISM instrument in BOTS mode to obtain a transmission spectrum from 0.5 to 5 microns.

We will use the SUB512 subarray with the NRSRAPID readout pattern, with 5 groups per integration.

Proposal 4227 - Targets - Chemistry and Clouds of a Temperate Jupiter

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TOI-1899	RA: 19 57 42.3954 (299.4266475d) Dec: +40 08 35.75 (40.14326d) Equinox: J2000	Proper Motion RA: 35.423 mas/yr Proper Motion Dec: 18.843 mas/yr Parallax: 0.0077823" 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.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanets]

Observation

Proposal 4227, Observation 1: Transit

Mon Dec 02 16:01:02 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Using 5 groups per integration in a partial saturation strategy following ERS-1366 WASP-39 PRISM observations. This causes partial saturation of 79 pixels from 1.03 to 1.9 microns, as calculated by the ETC. This increases the observing efficiency from 32% (2 groups, no saturation) to 67% (5 groups, partial saturation from 1-2 microns), greatly improving signal to noise in the unsaturated regions.

Diagnostics

(Transit (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.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TOI-1899	RA: 19 57 42.3954 (299.4266475d)	Proper Motion RA: 35.423 mas/yr	
		Dec: +40 08 35.75 (40.14326d)	Proper Motion Dec: 18.843 mas/yr	
		Equinox: J2000	Parallax: 0.0077823"	
			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.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	133514.2

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	PRISM/CLEAR	NRSRAPID	5	26136	1	1	26136	36000.772	133514.1

Special Requirements	Phase 0.9921222341421891 to 0.9935545552072457 with period 29.090312000 Days and zero-phase 2458711.959171 HJD Time Series Observation No Parallel Attachments

Observation

Proposal 4227, Observation 11: Transit - Repeat of obs 1

Mon Dec 02 16:01:02 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Using 5 groups per integration in a partial saturation strategy following ERS-1366 WASP-39 PRISM observations. This causes partial saturation of 79 pixels from 1.03 to 1.9 microns, as calculated by the ETC. This increases the observing efficiency from 32% (2 groups, no saturation) to 67% (5 groups, partial saturation from 1-2 microns), greatly improving signal to noise in the unsaturated regions.

Diagnostics

(Transit - Repeat of obs 1 (Obs 11)) 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 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TOI-1899	RA: 19 57 42.3954 (299.4266475d) Dec: +40 08 35.75 (40.14326d) Equinox: J2000	Proper Motion RA: 35.423 mas/yr Proper Motion Dec: 18.843 mas/yr Parallax: 0.0077823" 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.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanets]

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	133514.2

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	PRISM/CLEAR	NRSRAPID	5	26136	1	1	26136	36000.772	133514.1

Special Requirements	
	Phase 0.9921222341421891 to 0.9935545552072457 with period 29.090312000 Days and zero-phase 2458711.959171 HJD Time Series Observation No Parallel Attachments