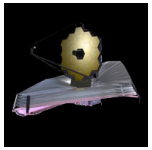

5531 - Contextualizing our solar-system: Atmospheric characterization of the Jupiter-analogue Kepler-167e

Cycle: 3, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1		NIRISS Single-Object Slitless Spectroscopy	(1) Kepler-167

ABSTRACT

Despite a large effort in the detection and characterization of exoplanets, only a few true Jupiter analogues exist and, so far, none have had their atmospheres observed. This is mainly due to their long orbital period and the difficulty in refining their bulk properties, such as the mass. For the first

time, Kepler-167 e provides this opportunity. With a planetary radius of about 0.9 RJ, and a planetary mass of about 1 MJ, this exoplanet orbits its K host star in every 1000 days.

Our observing program will use the NIRISS instrument onboard JWST to constrain the abundance of methane in Kepler-167 e. This constraint will enable us to estimate the atmospheric metallicity of the planet. Observations have claimed the existence of a correlation between atmospheric metallicity (i.e., bulk metal content) and planetary mass. Such trends, inherently arising from planetary formation and evolution processes, have not yet been verified for cooler planets. Here, our observations will provide a unique window into this currently unexplored planetary regime, allowing us to refine planetary formation and evolution processes, while putting our solar system into a wider context.

OBSERVING DESCRIPTION

This program consists in time-series observations of Kepler-167 e, a Jupiter analogue, to obtain the transit spectrum of the planet's atmosphere. We will conduct this observation with the NIRISS SOSS instrument using 30 groups and a total of 697 integrations. NIRISS is ideal to detect CH4, the main predicted observable in such a low temperature atmosphere. Due to the long orbital period of the planet, windows for this observation only occur every 1071 days.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Kepler-167	RA: 19 30 38.0262 (292.6584425d)	Proper Motion RA: 15.096999999999998 mas/yr	
		Dec: +38 20 43.44 (38.34540d)	Proper Motion Dec: 36.352 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[K stars]

Observation

Proposal 5531, Observation 1

Fri Mar 01 02:11:01 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Diagnostics

(Observation 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.

(Exposure) 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
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Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[K stars]

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	1 Kepler-167	SOSSFAINT	F480M	NIS	19	1	1	3.524	168234.3

Template

Subarray	Include Short First Exposure and F277W Exposure?
SUBSTRIP256	false

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	NISRAPID	30	696	1	696	118552.798	168234.2

Special Requirements

Phase 0.9993026565377066 to 0.9993415525609041 with period 1071.23205 Days and zero-phase 2455253.28756 HJD
Time Series Observation
No Parallel Attachments