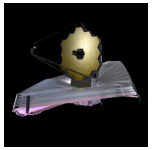

2488 - Real Time Exoplanet Meteorology: Direct Measurement of Cloud Dynamics on the High-Eccentricity Hot Jupiter HD80606 b

Cycle: 1, Proposal Category: GO

INVESTIGATORS

Name	*Institution*	*E-Mail*
James Sikora (PI) (CSA Member)	**Bishop's University**	**james.t.sikora@gmail.com**
Dr. Jason F Rowe (CoI) (CSA Member)	Bishop's University	jrowe@ubishops.ca
Dr. Knicole Colon (CoI) (US Admin CoI)	NASA Goddard Space Flight Center	knicole.colon@nasa.gov
Prof. Nicolas B Cowan (CoI) (CSA Member)	McGill University	nicolas.cowan@mcgill.ca
Prof. Keivan G. Stassun (CoI)	Vanderbilt University	keivan.stassun@vanderbilt.edu
Dr. Elisa V Quintana (CoI)	NASA Goddard Space Flight Center	elisa.quintana@nasa.gov
Dr. Thomas Barclay (CoI)	University of Maryland Baltimore County	barclay.astro@gmail.com
Ms. Lisa Dang (CoI) (CSA Member)	McGill University	lisa.dang@physics.mcgill.ca
Prof. Stephen Kane (CoI)	University of California - Riverside	skane@ucr.edu

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	HD80606b	NIRSpec Bright Object Time Series	(1) HD-80606

ABSTRACT

Clouds are found on all Solar System planets with substantial atmospheres and are likely prevalent amongst most exoplanets as well. Although it is clear that clouds have a signifant impact on observations of exoplanetary atmospheres, our understanding of the fundamental cloud physics that dictate their compositions, particle sizes, and formation/dissipation timescales is relatively poor. We are proposing to use NIRSpec to observe the eclipse and periapse passage (~18 hrs) of HD80606 b, a hot Jupiter characterized by one of the highest eccentricities (e=0.93) of any known

exoplanet, in order to study cloud dynamics. The planet's atmosphere undergoes dramatic temperature changes as it approaches periapsis (from <500 K to ~1400 K) and, as a result, the distribution of clouds is expected to vary rapidly due to evaporation/sublimation. The observations will place important constraints on cloud composition and condensation predictions as well as formation/dissipation timescales. The high brightness and extreme eccentricity of HD80606 b makes it an ideal laboratory for studying cloud dynamics and cloud properties as a function of incident radiation; the proposed observations have the potential to provide future atmospheric characterization studies with a powerful means by which "cloud-free" targets can be accurately identified.

OBSERVING DESCRIPTION

This proposal involves using NIRSpec to observe the eclipse and periapse passage of the highly-eccentric hot Jupiter, HD80606b. The observations will use the G395H/F290LP grating-filter combination (2.87-5.18 microns) and will span a period of 18 hrs encompasing the eclipse and periapsis.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HD-80606	RA: 09 22 37.6680 (140.6569500d) Dec: +50 36 13.60 (50.60378d) Equinox: J2000	Proper Motion RA: 0.005875195586551243 sec of time/yr Proper Motion Dec: 0.01034 arcsec/yr Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[G dwarfs]* *Extended=NO*				
(2)	GAIA-DR2-1019003226022658176	RA: 09 22 36.9385 (140.6539104d) Dec: +50 35 50.31 (50.59731d) Equinox: J2000	Proper Motion RA: 0.750195408 mas/yr Proper Motion Dec: -15.82107189 mas/yr Epoch of Position: 2015.5	
Comments: Acquisition target identifed in the Gaia DR2 catalog. *ETC uses a K2V 4750 4.5 Phoenix model based on G_bp-G_rp and G-G_rp; normalized to G-band flux (G=19.0 mag).* *Category=Star* *Description=[K dwarfs]* *Extended=NO*				

Observation

Proposal 2488, Observation 1: HD80606b Mon Oct 24 13:00:26 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(HD80606b (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)	HD-80606	RA: 09 22 37.6680 (140.6569500d) Dec: +50 36 13.60 (50.60378d) Equinox: J2000	Proper Motion RA: 0.005875195586551243 sec of time/yr Proper Motion Dec: 0.01034 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[G dwarfs]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	2 GAIA-DR2-1019003226022658176	WATA	SUB2048	F110W	NRSRAPID	3	1	1	3.628	50866.9

Template

Subarray
SUB2048

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSRAPID	5	13818	1	1	13818	75066.009	125883.6

Special Requirements

Between Dates 01-NOV-2022:06:15:00 and 01-NOV-2022:07:15:00
Time Series Observation
No Parallel