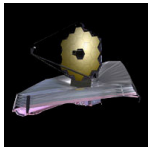

1312 - Transit and Eclipse Spectroscopy of a Warm Neptune

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
HAT-P-26b				
	1	SOSS Transit	NIRISS Single-Object Slitless Spectroscopy	(1) HAT-P-26
	3	G395H Transit	NIRSpec Bright Object Time Series	(1) HAT-P-26
	4	G395H Eclipse	NIRSpec Bright Object Time Series	(1) HAT-P-26
	104	G395H Eclipse	NIRSpec Bright Object Time Series	(1) HAT-P-26
	6	LRS Eclipse	MIRI Low Resolution Spectroscopy	(1) HAT-P-26

ABSTRACT

We will construct both transmission and emission spectra of this planet. Transmission studies will be conducted from 0.6-5 microns using two transit observations (when the planet passes in front of the host star). Emission studies will be conducted from 2.8-14 microns using two eclipse observations (when the planet passes behind the host star). The transmission for this planet's atmosphere will be obtained using a combination of NIRISS SOSS and NIRSpec SLIT1600 G395H. The emission from this planets atmosphere will be obtained using a combination of NIRSpec SLIT1600 G395H and MIRI LRS slitless mode.

OBSERVING DESCRIPTION

We observe two transits and two eclipses of HAT-P-26 b.

Obs 1 is the NIRISS/SOSS transit with SUBSTRIP256, 7 groups (72% saturation according to ETC), 483 ints, 21239 s. Minimum baseline before and after transit is expected to be 4400 s. F277W exposure with 10 ints follows transit exposure. TA uses SOSSFAINT and NISRAPID with 19 groups (ETC S/N 280).

Obs 3 is the NIRSpec/G395H transit with SUB2048, 48 groups (96% saturation according to ETC), 481 ints, 21269 s. Minimum baseline before and after transit is expcted to be 4415 s. Offset TA star (Gaia DR3 3668036421656699008) is 35 arcsec away from HAT-P-26 (Gaia DR3 3668036348641580288). TA uses SUB32, CLEAR, NRSRAPIDD6 (ETC S/N 141).

Obs 4 is the NIRSpec/G395H eclipse with SUB2048, 48 groups (96% saturation according to ETC), 563 ints, 24895 s. Minimum baseline before and after eclipse is expected to be 6228 s, assuming circular orbit. Baseline is sufficient to accommodate small postitive and negative time shifts reported in the literature, due to uncertain ecentricity. Offset TA star and exposure is identical to Obs 3.

Obs 6 is the MIRI/LRS eclipse with FASTR1, 115 groups (93% saturation according to ETC), 1414 ints, 26086 s. Minimum baseline before and after eclipse is expected to be 6824 s, assuming circular orbit. See eccentricity comment for Obs 4. TA uses F560W and FAST with 12 groups (S/N 347). LRS verification image uses F560W and FASTR1 with 12 groups (ETC S/N 347).

Special requirements. Our adopted orbital period (P=4.2345026 d) comes from Ivshina & Winn (2022ApJS..259...62I), who fitted 21 transits spanning 800 d. Our adopted zero phase (2459670.42417) is within 1 s of the Ivshina & Winn (2022) ephemeris evaluated at orbit 738 (2459670.4241588 = 2456545.361240 + 4.2345026 * 738). Aperture PA ranges for slitless modes (SOSS, LRS) come from ExoCTK tool.

Relevant ETC workbooks are 145716 and 153485.

2023-Jun-06: Added Obs 104, which is a copy of Obs 4. Obs 4 was skipped on 2023-Jun-05 at 01:48:21 UTC due to the guiders being unavailable.

Filed WOPR 88797.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d) Dec: +04 03 33.83 (4.05940d) Equinox: J2000	Proper Motion RA: 37.735 mas/yr Proper Motion Dec: -142.816 mas/yr Parallax: 0.0069985" Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
Extended=NO

(2)	14123697+0404073	RA: 14 12 36.9616 (213.1540067d) Dec: +04 04 7.11 (4.06864d) Equinox: J2000	Proper Motion RA: -15.415 mas/yr Proper Motion Dec: -19.236 mas/yr Parallax: 0.0002791" Epoch of Position: 2016	

Comments: This target is an offset TA star for HAT-P-26
Name used above is from 2MASS.
All astrometric quantities from Gaia DR3 3668036421656699008.
Gaia DR3 3668036421656699008, bp=16.8223, g=16.5446, rp=16.0990
J141236.94+040407.1, W1=15.030, W2=15.055, W3>12.299, W4>9.439
2MASS 14123753+0403359, J=15.596, H=15.419, K=15.059
Proper motion checks:
2MASS coordinates at epoch=J2000.24 are 0.03 arcsec from Gaia EDR coordinates after applying Gaia PM, which is good.
AllWISE coordinates at epoch=J2010.56 are 0.38 arcsec from Gaia EDR coordinates after applying Gaia PM, which is a 5-sigma discrepancy.
Visual inspection of AllWISE image shows this TA star is sitting in far wings of HAT-P-26 PSF and a diffraction spike.
Calculated separation of this TA star from HAT-P-26 versus date:
32.41 arcsec at epoch=J2000.24 [2MASS]
33.79 arcsec at epoch=J2010.56 [AllWISE]
34.51 arcsec at epoch=J2016.00 [GAIA EDR3]
35.44 arcsec at epoch=J2023.00 [JWST Cycle 1]
Category=Star
Description=[F stars]
Extended=NO

Observation

Proposal 1312, Observation 1: SOSS Transit Tue Jun 06 23:01:10 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Comments: Planet parameters:
Transit duration (t14) : 2.4552 h = 8838.720 s
Orbital period : 4.2345026 d = 365861.025 s
JD at mid-transit : 2459670.42417

Observer-specified exposure parameters:
Total exposure time : 21238.708 s
Settling time : 0 s
Start window size : 3600 s

Computed exposure parameters:
Minimum baseline : 4400 s = 0.4978 x t14
Earliest start time : -12419 s = -(0 + 3600 + 4400 + 4419) s
Latest start time : -8819 s = -(0 + 4400 + 4419) s
Earliest end time : +8819 s = +(4419 + 4400) s
Latest end time : +12419 s = +(4419 + 4400 + 3600) s
Earliest start phase : 0.966054449 = 1.0 - 12419.354 / 365861.025
Latest start phase : 0.975894251 = 1.0 - 8819.354 / 365861.025
Earliest end phase : 0.024105749 = 0.0 + 8819.354 / 365861.025
Latest end phase : 0.033945551 = 0.0 + 12419.354 / 365861.025

Diagnostics

(SOSS 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.

(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
(1)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d) Dec: +04 03 33.83 (4.05940d) Equinox: J2000	Proper Motion RA: 37.735 mas/yr Proper Motion Dec: -142.816 mas/yr Parallax: 0.0069985" Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
Extended=NO

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	SOSSFAINT	F480M	NISRAPID	19	1	1	0.93	145716

Template

Subarray	Include F277W Exposure?
SUBSTRIP256	true

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	NISRAPID	7	483	1	483	21238.708	145716
2	NISRAPID	7	10	1	10	439.725	145716

Special Requirements

Phase 0.96605445 to 0.97589425 with period 4.2345026 Days and zero-phase 2459670.42417 HJD
Aperture PA Range 99 to 140 Degrees (V3 98.43873283 to 139.43873283)
Aperture PA Range 292 to 300 Degrees (V3 291.43873283 to 299.43873283)
Time Series Observation
No Parallel Attachments

Observation

Proposal 1312, Observation 3: G395H Transit Tue Jun 06 23:01:10 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Planet parameters:
Transit duration (t14) : 2.4552 h = 8838.720 s
Orbital period : 4.2345026 d = 365861.025 s
JD at mid-transit : 2459670.42417

Observer-specified exposure parameters:
Total exposure time : 21269.089 s
Settling time : 0 s
Start window size : 3600 s

Computed exposure parameters:
Minimum baseline : 4415 s = 0.4995 x t14
Earliest start time : -12435 s = -(0 + 3600 + 4415 + 4419) s
Latest start time : -8835 s = -(0 + 4415 + 4419) s
Earliest end time : +8835 s = +(4419 + 4415) s
Latest end time : +12435 s = +(4419 + 4415 + 3600) s
Earliest start phase : 0.966012929 = 1.0 - 12434.5445 / 365861.025
Latest start phase : 0.975852731 = 1.0 - 8834.5445 / 365861.025
Earliest end phase : 0.024147269 = 0.0 + 8834.5445 / 365861.025
Latest end phase : 0.033987071 = 0.0 + 12434.5445 / 365861.025

Diagnostics

(G395H Transit (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)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d)	Proper Motion RA: 37.735 mas/yr	
		Dec: +04 03 33.83 (4.05940d)	Proper Motion Dec: -142.816 mas/yr	
		Equinox: J2000	Parallax: 0.0069985"	
			Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
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 14123697+0404073	WATA	SUB32	CLEAR	NRSRAPIDD6	3	1	1	0.26	145716

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	48	481	1	1	481	21269.089	145716

Special Requirements

Phase 0.96601293 to 0.97585273 with period 4.234502600 Days and zero-phase 2459670.42417 HJD
Time Series Observation
No Parallel Attachments

Observation

Proposal 1312, Observation 4: G395H Eclipse Tue Jun 06 23:01:10 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Planet parameters:
Transit duration (t14) : 2.4552 h = 8838.720 s
Orbital period : 4.2345026 d = 365861.025 s
JD at mid-transit : 2459670.42417

Observer-specified exposure parameters:
Total exposure time : 24895.004 s
Settling time : 0 s
Start window size : 3600 s

Computed exposure parameters:
Minimum baseline : 6228 s = 0.7046 x t14
Earliest start time : -14248 s = -(0 + 3600 + 6228 + 4419) s
Latest start time : -10648 s = -(0 + 6228 + 4419) s
Earliest end time : +10648 s = +(4419 + 6228) s
Latest end time : +14248 s = +(4419 + 6228 + 3600) s
Earliest start phase : 0.461057612 = 0.5 - 14247.502 / 365861.025
Latest start phase : 0.470897414 = 0.5 - 10647.502 / 365861.025
Earliest end phase : 0.529102586 = 0.5 + 10647.502 / 365861.025
Latest end phase : 0.538942388 = 0.5 + 14247.502 / 365861.025

Diagnostics

(G395H Eclipse (Obs 4)) 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 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d)	Proper Motion RA: 37.735 mas/yr	
		Dec: +04 03 33.83 (4.05940d)	Proper Motion Dec: -142.816 mas/yr	
		Equinox: J2000	Parallax: 0.0069985"	
			Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
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 14123697+0404073	WATA	SUB32	CLEAR	NRSRAPIDD6	3	1	1	0.26	145716

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	48	563	1	1	563	24895.004	145716

Special Requirements

Phase 0.46105761 to 0.47089741 with period 4.234502600 Days and zero-phase 2459670.42417 HJD
Time Series Observation
No Parallel Attachments

Observation

Proposal 1312, Observation 104: G395H Eclipse Tue Jun 06 23:01:10 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Planet parameters:
Transit duration (t14) : 2.4552 h = 8838.720 s
Orbital period : 4.2345026 d = 365861.025 s
JD at mid-transit : 2459670.42417

Observer-specified exposure parameters:
Total exposure time : 24895.004 s
Settling time : 0 s
Start window size : 3600 s

Computed exposure parameters:
Minimum baseline : 6228 s = 0.7046 x t14
Earliest start time : -14248 s = -(0 + 3600 + 6228 + 4419) s
Latest start time : -10648 s = -(0 + 6228 + 4419) s
Earliest end time : +10648 s = +(4419 + 6228) s
Latest end time : +14248 s = +(4419 + 6228 + 3600) s
Earliest start phase : 0.461057612 = 0.5 - 14247.502 / 365861.025
Latest start phase : 0.470897414 = 0.5 - 10647.502 / 365861.025
Earliest end phase : 0.529102586 = 0.5 + 10647.502 / 365861.025
Latest end phase : 0.538942388 = 0.5 + 14247.502 / 365861.025

Diagnostics

(G395H Eclipse (Obs 104)) 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 104:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d)	Proper Motion RA: 37.735 mas/yr	
		Dec: +04 03 33.83 (4.05940d)	Proper Motion Dec: -142.816 mas/yr	
		Equinox: J2000	Parallax: 0.0069985"	
			Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
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 14123697+0404073	WATA	SUB32	CLEAR	NRSRAPIDD6	3	1	1	0.26	145716

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	48	563	1	1	563	24895.004	145716

Special Requirements

Phase 0.46105761 to 0.47089741 with period 4.234502600 Days and zero-phase 2459670.42417 HJD
Time Series Observation
No Parallel Attachments

Observation

Proposal 1312, Observation 6: LRS Eclipse Tue Jun 06 23:01:10 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Comments: Planet parameters:
Transit duration (t14) : 2.4552 h = 8838.720 s
Orbital period : 4.2345026 d = 365861.025 s
JD at mid-transit : 2459670.42417

Observer-specified exposure parameters:
Total exposure time : 26086.218 s
Settling time : 0 s
Start window size : 3600 s

Computed exposure parameters:
Minimum baseline : 6824 s = 0.7720 x t14
Earliest start time : -14843 s = -(0 + 3600 + 6824 + 4419) s
Latest start time : -11243 s = -(0 + 6824 + 4419) s
Earliest end time : +11243 s = +(4419 + 6824) s
Latest end time : +14843 s = +(4419 + 6824 + 3600) s
Earliest start phase : 0.459429652 = 0.5 - 14843.109 / 365861.025
Latest start phase : 0.469269454 = 0.5 - 11243.109 / 365861.025
Earliest end phase : 0.530730546 = 0.5 + 11243.109 / 365861.025
Latest end phase : 0.540570348 = 0.5 + 14843.109 / 365861.025

Diagnostics

(LRS Eclipse (Obs 6)) 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 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	HAT-P-26	RA: 14 12 37.5735 (213.1565562d)	Proper Motion RA: 37.735 mas/yr	
		Dec: +04 03 33.83 (4.05940d)	Proper Motion Dec: -142.816 mas/yr	
		Equinox: J2000	Parallax: 0.0069985"	
			Epoch of Position: 2016	

Comments: Astrometry from Gaia DR3 3668036348641580288.
2MASS: J=10.080+/-0.022, H=9.658+/-0.023, K=9.581+/-0.023 [via Vizier].
Simbad: spectral type K1 D
Category=Star
Description=[Exoplanets, K stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	12	1	1	1.908	145716

Template

Subarray	Obtain Verification Image?
SLITLESSPRISM	true

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	NONE				

Pointing Verification

#	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Integrations	PV Exposures/Dith	PV Total Dithers	PV Total Exposure Time	PV ETC Wkbk.Calc ID	Filter
1	FASTR1	12	1	1	1	1	1.908		F560W

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	115	1414	1414	1	1	26086.218	145716

Special Requirements

Phase 0.45942965 to 0.46926945 with period 4.234502600 Days and zero-phase 2459670.42417 HJD
Aperture PA Range 108.83425324 to 139.83425324 Degrees (V3 103.99880427 to 134.99880427)
Aperture PA Range 278.83425324 to 300.83425324 Degrees (V3 273.99880427 to 295.99880427)
Time Series Observation
No Parallel Attachments
No Parallel Attachments