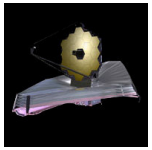

9256 - Using stellar contamination proxy TRAPPIST-1 b to search for an atmosphere on TRAPPIST-1 e

Cycle: 4, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
TRAPPIST-1 b + e				
	6	589	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	7	590	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	8	591	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	9	592	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	10	610	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	11	612	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	12	613*	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	13	615	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	14	616	NIRSpec Bright Object Time Series	(1) TRAPPIST-1

ABSTRACT

The detection of the atmosphere of a terrestrial planet in the habitable zone of its host star is one of the main goals of the exoplanet community. In order to see the small signals from terrestrial atmospheres using transmission spectroscopy, small host stars are necessary, as the transit depth is directly dependent on the relative size of the planet to the star. However, early observations of terrestrial planets around small stars with JWST have shown that these small M dwarfs are dangerous. Heterogeneities on the stellar surface, common for M dwarfs, can contaminate the transmission spectrum and cause variations on a level much larger than any atmospheric signals. However, the TRAPPIST-1 system contains a possible solution to overcome this stellar contamination. Using the multiplicative effect of the stellar contamination signal to our advantage, we propose to observe close (but not overlapping) transits of TRAPPIST-1 b and TRAPPIST-1 e. The ratio of the resulting transmission spectrum will correct for the signal from the stellar contamination, and leave only the ratio of their atmospheric opacities. Assuming little to no atmospheric signal from TRAPPIST-1 b based on the thermal emission observations, we expect this ratio to result in the transmission spectrum of TRAPPIST-1 e normalized by the flat transit depth of TRAPPIST-1 b. Using this method, we can detect an Earthlike atmosphere on TRAPPIST-1 e using 15 close transits of TRAPPIST-1 b and

e to 3 sigma significance.

OBSERVING DESCRIPTION

We will use NIRSpec/PRISM for our observations. Based on the results from GTO 1331 (priv. communication), we use 5 groups per integration, which is 1.377 seconds per integration, and use the 512 subarray. TRAPPIST-1 itself can be used for target acquisition, which has already had success with previous TRAPPIST-1 observations. The proposed lengths of all 15 stares, both science and charged in hours, are given in Table 1 in the proposal, and total 128.8 hours: 52.1 in Cycle 3 and 76.7 in Cycle 4.

August 14, 2025

Based on Change Request 89455, and given Observation 7 was skipped (see Change Request 89422), we have changed Observation 7's window to October 29. This required an additional 7.5-hours of charged time to accomodate obtaining enough baseline before and after the transits of planet c-e-d (a train of transits separated by about 10 minutes each) and the transit of planet b (happening about 7 hours after the transit of e).

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Observation

Proposal 9256, Observation 6: 589

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(589 (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.

(589 (Obs 6)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(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)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	11710	1	1	11710	16129.822	

Special Requirements	
	Between Dates 29-JUN-2025:21:22:11 and 29-JUN-2025:22:22:11 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 7: 590

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: Changed via TTRB Change Request 89455

Diagnostics

(590 (Obs 7)) 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.

(590 (Obs 7)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	32160	1	1	32160	44298.47	

Special Requirements	Between Dates 29-OCT-2025:21:00:53 and 29-OCT-2025:22:00:53 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 8: 591

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(591 (Obs 8)) 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.

(591 (Obs 8)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	18770	1	1	18770	25854.549	

Special Requirements	Between Dates 11-JUL-2025:23:27:08 and 12-JUL-2025:00:27:08 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 9: 592

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(592 (Obs 9)) 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.

(592 (Obs 9)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	22330	1	1	22330	30758.235	

Special Requirements	Between Dates 18-JUL-2025:00:29:56 and 18-JUL-2025:01:29:56 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 10: 610

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(610 (Obs 10)) 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.

(610 (Obs 10)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	22350	1	1	22350	30785.784	

Special Requirements	Between Dates 05-NOV-2025:01:33:16 and 05-NOV-2025:02:33:16 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 11: 612

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(612 (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.

(612 (Obs 11)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(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)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	15240	1	1	15240	20992.186	

Special Requirements	
	Between Dates 17-NOV-2025:06:21:05 and 17-NOV-2025:07:21:05 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 12: 613*

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(613* (Obs 12)) 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.

(613* (Obs 12)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 12:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	23308	1	1	23308	32105.372	

Special Requirements	Between Dates 23-NOV-2025:06:58:31 and 23-NOV-2025:07:58:31 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 13: 615

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(615 (Obs 13)) 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.

(615 (Obs 13)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 13:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 13:1) 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)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	21600	1	1	21600	29752.704	

Special Requirements	Between Dates 06-JUN-2026:08:12:06 and 06-JUN-2026:09:12:06 Time Series Observation No Parallel Attachments

Observation

Proposal 9256, Observation 14: 616

Thu Dec 18 22:00:16 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Diagnostics

(616 (Obs 14)) 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.

(616 (Obs 14)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

(Visit 14:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	TRAPPIST-1	RA: 23 06 30.3652 (346.6265217d) Dec: -05 02 36.70 (-5.04353d) Equinox: J2000	Proper Motion RA: 930.788 mas/yr Proper Motion Dec: -479.038 mas/yr Parallax: 0.0802123" Epoch of Position: 2016	

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

Taken from GTO 1331, updated based on Astrometry from Gaia DR3.
Category=Star
Description=[Exoplanet Systems, Exoplanets, M stars]
Extended=NO

Acquisition

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

Template

Subarray
SUB512

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRSRAPID	5	13692	1	1	13692	18859.908	

Special Requirements	
	Between Dates 11-DEC-2025:13:45:10 and 11-DEC-2025:14:45:10 Time Series Observation No Parallel Attachments