2589 - Atmospheric reconnaissance of the TRAPPIST-1 planets

Cycle: 1, Proposal Category: GO

INVESTIGATORS

Name	Institution
Olivia Lim (PI) (CSA Member)	**Universite de Montreal**
Dr. Rene Doyon (CoI) (CSA Member)	Universite de Montreal
Prof. Nicolas B Cowan (CoI) (CSA Member)	McGill University
Mr. Etienne Artigau (CoI) (CSA Member)	Universite de Montreal
Dr. Loic Albert (CoI) (CSA Member)	Universite de Montreal
Dr. David Lafreniere (CoI) (CSA Member)	Universite de Montreal
Prof. Bjorn Benneke (CoI) (CSA Member)	Universite de Montreal

OBSERVATIONS

Folder	Observation	Label	Observing Template	Science Target
TRAPPIST-1				
	1	TRAPPIST-1b	NIRISS Single-Object Slitless Spectroscopy	(1) TRAPPIST-1
	2	TRAPPIST-1b	NIRISS Single-Object Slitless Spectroscopy	(1) TRAPPIST-1
	3	TRAPPIST-1c	NIRISS Single-Object Slitless Spectroscopy	(1) TRAPPIST-1
	4	TRAPPIST-1c	NIRISS Single-Object Slitless Spectroscopy	(1) TRAPPIST-1
	5	TRAPPIST-1g	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	7	TRAPPIST-1g	NIRSpec Bright Object Time Series	(1) TRAPPIST-1
	6	TRAPPIST-1g	NIRSpec Bright Object Time Series	(1) TRAPPIST-1

ABSTRACT

We propose a medium, early-release program to secure 8 transits of the Earth-sized exoplanets TRAPPIST-1 (T-1) b, c, g, and h using NIRSpec and NIRISS, that is, 2 transits of each of the planets b and c with NIRISS, and 2 transits of each of the planets g, and h with NIRSpec. We aim to 1)

provide the community with the earliest possible data set for the atmospheric reconnaissance of all T-1 planets by complementing the GTO to prepare for a more ambitious legacy T-1 program, 2) characterize and assess the level of stellar contamination caused by the transit light source effect associated with unocculted spots, and 3) quantitatively compare the performance of NIRSpec and NIRISS for relatively faint targets like T-1. Considering state-of-the-art atmospheric models of T-1 planets, the proposed observations should detect/rule out several baseline model atmospheres for all planets and may enable the detection of CO_2 and H_2O on T-1b and c and CO_2 and O_3 on T-1g and h, given some specific atmospheric compositions. The wavelength coverage of NIRISS and NIRSpec can determine the nature of the stellar contamination if present (cold/hot spots). We will also take advantage of NIRISS' higher spectral resolution (and non-saturation) to probe temperature-sensitive stellar lines to further quantify the nature and level of contamination. The two-instrument strategy will provide a balanced data set of the T-1 planets to assess the relative performance of both instruments in terms of non-linearity, intra-pixel sensitivity, and slit loss/finite subarray effects. No proprietary period is requested for this program, the bulk of which can be scheduled early in Cycle 1.

OBSERVING DESCRIPTION

We propose to observe the following events.

2 transits of TRAPPIST-1b (4.39 h/visit) with NIRISS SOSS, substrip 256, readout mode NISRAPID, Ngroup = 24, Nint = 115
2 transits of TRAPPIST-1c (4.62 h/visit) with NIRISS SOSS, substrip 256, readout mode NISRAPID, Ngroup = 24, Nint = 121
2 transits of TRAPPIST-1g (4.95 h/visit) with NIRSpec BOTS Prism/Clear, subarray 512, readout mode NRSRAPID, Ngroup = 6, Nint = 11117
2 transits of TRAPPIST-1h (5.09 h/visit) with NIRSpec BOTS Prism/Clear, subarray 512, readout mode NRSRAPID, Ngroup = 6, Nint = 11417

Special requirements:

- For all observations:
-- All observations are transits, and are thus time series observations that require No Parallel. We also provide the timing requirement "phase" for each planet, based on the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

- For NIRISS observations:
-- For the special requirements "Aperture PA range", we used the ExoCTK Contamination & Visibility Calculator and constrained the PA to have 0%

contamination in orders 1 and 2. We only provided PA ranges where the target is visible. In some cases, the PA range that we provided slightly exceeds (by ~1 degree) the target visibility range. We do this to avoid further constraining the overall visibility range; in the end, observations will only be possible at the *intersection* of all constraints and therefore our ~1 degree excess will not count as a visible range.

Comments:

- For all observations:
-- For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month when the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in October-December and in June-July, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.
-- Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

- For NIRSpec observations:
-- The Target Acquisition partially saturates 1 pixel. This pixel saturates after 2 groups while the TA records 3 groups. We expect this partial saturation not to affect the TA too much; it should not change the centroid.
-- The Science observations partially saturate 39 pixels. The goal of using Ngroup=6 is to increase the precision of the transit spectrum. This is explained in Batalha et al. (2018) and in the scientific justification.

- For NIRISS observations:
-- For each observation, we programmed an F277W exposure to isolate order 1. We used the same number of groups per integration as for the GR700XD/Clear exposure and 10 integrations, following JDox recommendations. We linked an ETC Workbook calculation although that calculation is with the Clear filter: JDox says the SNR for the F277W filter can be estimated from that of the Clear filter as $SNR\_F277W = 0.95\ SNR\_Clear$.

Proposal 2589 - Targets - Atmospheric reconnaissance of the TRAPPIST-1 planets

<table>
<tr><th></th><th>#</th><th>Name</th><th>Target Coordinates</th><th>Targ. Coord. Corrections</th><th>Miscellaneous</th></tr>
<tr><td rowspan="2">Fixed Targets</td><td>(1)</td><td>TRAPPIST-1</td><td>RA: 23 06 30.3341 (346.6263921d)

Dec: -05 02 36.46 (-5.04346d)

Equinox: J2000</td><td>Proper Motion RA: 0.062299806210057845 sec of time/yr

Proper Motion Dec: -0.479402999985723 arcsec/yr

Epoch of Position: 2015.5</td><td></td></tr>
<tr><td colspan="4">Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M dwarfs]
Extended=NO</td></tr>
</table>

Observation

Proposal 2589, Observation 1: TRAPPIST-1b — Tue Jul 18 19:07:57 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Comments: We programmed an F277W exposure to isolate order 1. We used the same number of groups per integration as for the GR700XD/Clear exposure and 10 integrations, following JDox recommendations. We linked an ETC Workbook calculation although that calculation is with the Clear filter: JDox says the SNR for the F277W filter can be estimated from that of the Clear filter as SNR_F277W = 0.95 SNR_Clear.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

For the special requirements "Aperture PA range", we used the ExoCTK Contamination & Visibility Calculator and constrained the PA to have 0% contamination in orders 1 and 2. We only provided PA ranges where the target is visible. In some cases, the PA range that we provided slightly exceeds (by ~1 degree) the target visibility range. We do this to avoid further constraining the overall visibility range; in the end, observations will only be possible at the *intersection* of all constraints and therefore our ~1 degree excess will not count as a visible range.

Diagnostics

(TRAPPIST-1b (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)	TRAPPIST-1	RA: 23 06 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M dwarfs]
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	87242.2

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	18	153	1	153	15974.191	87242.1
2	NISRAPID	18	10	1	10	1044.065	87242.17

Proposal 2589 - Observation 1 - Atmospheric reconnaissance of the TRAPPIST-1 planets

Special Requirements

Between Dates 14-JUL-2022:01:12:41 and 14-JUL-2022:02:12:41
Between Dates 15-JUL-2022:13:28:01 and 15-JUL-2022:14:28:01
Between Dates 17-JUL-2022:01:43:33 and 17-JUL-2022:02:43:33
Between Dates 18-JUL-2022:14:00:06 and 18-JUL-2022:15:00:06
Between Dates 20-JUL-2022:02:15:42 and 20-JUL-2022:03:15:42
Between Dates 21-JUL-2022:14:31:03 and 21-JUL-2022:15:31:03
Between Dates 23-JUL-2022:02:46:35 and 23-JUL-2022:03:46:35
Aperture PA Range 239.5 to 241 Degrees (V3 238.93873283 to 240.43873283)
Time Series Observation
No Parallel Attachments

Observation

Proposal 2589, Observation 2: TRAPPIST-1b   Tue Jul 18 19:07:57 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Comments: We programmed an F277W exposure to isolate order 1. We used the same number of groups per integration as for the GR700XD/Clear exposure and 10 integrations, following JDox recommendations. We linked an ETC Workbook calculation although that calculation is with the Clear filter: JDox says the SNR for the F277W filter can be estimated from that of the Clear filter as SNR_F277W = 0.95 SNR_Clear.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

For the special requirements "Aperture PA range", we used the ExoCTK Contamination & Visibility Calculator and constrained the PA to have 0% contamination in orders 1 and 2. We only provided PA ranges where the target is visible. In some cases, the PA range that we provided slightly exceeds (by ~1 degree) the target visibility range. We do this to avoid further constraining the overall visibility range; in the end, observations will only be possible at the *intersection* of all constraints and therefore our ~1 degree excess will not count as a visible range.

Diagnostics

(TRAPPIST-1b (Obs 2)) 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 2:1) 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 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M dwarfs]
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	87242.2

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	18	153	1	153	15974.191	87242.1
2	NISRAPID	18	10	1	10	1044.065	87242.17

Proposal 2589 - Observation 2 - Atmospheric reconnaissance of the TRAPPIST-1 planets

Special Requirements

Between Dates 14-JUL-2022:01:12:41 and 14-JUL-2022:02:12:41
Between Dates 15-JUL-2022:13:28:01 and 15-JUL-2022:14:28:01
Between Dates 17-JUL-2022:01:43:33 and 17-JUL-2022:02:43:33
Between Dates 18-JUL-2022:14:00:06 and 18-JUL-2022:15:00:06
Between Dates 20-JUL-2022:02:15:42 and 20-JUL-2022:03:15:42
Between Dates 21-JUL-2022:14:31:03 and 21-JUL-2022:15:31:03
Between Dates 23-JUL-2022:02:46:35 and 23-JUL-2022:03:46:35
Aperture PA Range 239.5 to 241 Degrees (V3 238.93873283 to 240.43873283)
Time Series Observation
No Parallel Attachments

Observation

Proposal 2589, Observation 3: TRAPPIST-1c Tue Jul 18 19:07:57 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Comments: We programmed an F277W exposure to isolate order 1. We used the same number of groups per integration as for the GR700XD/Clear exposure and 10 integrations, following JDox recommendations. We linked an ETC Workbook calculation although that calculation is with the Clear filter: JDox says the SNR for the F277W filter can be estimated from that of the Clear filter as SNR_F277W = 0.95 SNR_Clear.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

For the special requirements "Aperture PA range", we used the ExoCTK Contamination & Visibility Calculator and constrained the PA to have 0% contamination in orders 1 and 2. We only provided PA ranges where the target is visible. In some cases, the PA range that we provided slightly exceeds (by ~1 degree) the target visibility range. We do this to avoid further constraining the overall visibility range; in the end, observations will only be possible at the *intersection* of all constraints and therefore our ~1 degree excess will not count as a visible range.

Diagnostics

(TRAPPIST-1c (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.

(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 3:1) 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 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star Description=[Exoplanet Systems, M dwarfs] 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	87242.8

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	18	159	1	159	16600.63	87242.3
2	NISRAPID	18	10	1	10	1044.065	87242.17

Special Requirements

Between Dates 14-JUL-2022:05:07:55 and 14-JUL-2022:06:07:55
Between Dates 16-JUL-2022:15:15:31 and 16-JUL-2022:16:15:31
Between Dates 21-JUL-2022:11:29:16 and 21-JUL-2022:12:29:16
Between Dates 23-JUL-2022:21:36:59 and 23-JUL-2022:22:36:59
Between Dates 26-JUL-2022:07:44:48 and 26-JUL-2022:08:44:48
Between Dates 23-OCT-2022:21:56:16 and 23-OCT-2022:22:56:16
Between Dates 26-OCT-2022:08:04:10 and 26-OCT-2022:09:04:10
Between Dates 28-OCT-2022:18:11:52 and 28-OCT-2022:19:11:52
Between Dates 31-OCT-2022:04:18:24 and 31-OCT-2022:05:18:24
Between Dates 02-NOV-2022:14:25:53 and 02-NOV-2022:15:25:53
Between Dates 05-NOV-2022:00:33:16 and 05-NOV-2022:01:33:16
Between Dates 07-NOV-2022:10:41:10 and 07-NOV-2022:11:41:10
Between Dates 09-NOV-2022:20:48:48 and 09-NOV-2022:21:48:48
Between Dates 12-NOV-2022:06:55:16 and 12-NOV-2022:07:55:16
Between Dates 14-NOV-2022:17:02:43 and 14-NOV-2022:18:02:43
Between Dates 17-NOV-2022:03:10:17 and 17-NOV-2022:04:10:17
Between Dates 19-NOV-2022:13:18:09 and 19-NOV-2022:14:18:09
Between Dates 21-NOV-2022:23:25:46 and 22-NOV-2022:00:25:46
Between Dates 24-NOV-2022:09:32:06 and 24-NOV-2022:10:32:06
Between Dates 26-NOV-2022:19:39:35 and 26-NOV-2022:20:39:35
Between Dates 29-NOV-2022:05:47:18 and 29-NOV-2022:06:47:18
Between Dates 01-DEC-2022:15:55:09 and 01-DEC-2022:16:55:09
Between Dates 04-DEC-2022:02:02:40 and 04-DEC-2022:03:02:40
Between Dates 06-DEC-2022:12:08:56 and 06-DEC-2022:13:08:56
Between Dates 08-DEC-2022:22:16:29 and 08-DEC-2022:23:16:29
Between Dates 11-DEC-2022:08:24:20 and 11-DEC-2022:09:24:20
Between Dates 13-DEC-2022:18:32:06 and 13-DEC-2022:19:32:06
Aperture PA Range 72.5 to 74 Degrees (V3 71.93873283 to 73.43873283)
Aperture PA Range 239.5 to 242 Degrees (V3 238.93873283 to 241.43873283)
Time Series Observation
No Parallel Attachments

Observation

Proposal 2589, Observation 4: TRAPPIST-1c   Tue Jul 18 19:07:57 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRISS Single-Object Slitless Spectroscopy

Comments: We programmed an F277W exposure to isolate order 1. We used the same number of groups per integration as for the GR700XD/Clear exposure and 10 integrations, following JDox recommendations. We linked an ETC Workbook calculation although that calculation is with the Clear filter: JDox says the SNR for the F277W filter can be estimated from that of the Clear filter as SNR_F277W = 0.95 SNR_Clear.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

For the special requirements "Aperture PA range", we used the ExoCTK Contamination & Visibility Calculator and constrained the PA to have 0% contamination in orders 1 and 2. We only provided PA ranges where the target is visible. In some cases, the PA range that we provided slightly exceeds (by ~1 degree) the target visibility range. We do this to avoid further constraining the overall visibility range; in the end, observations will only be possible at the *intersection* of all constraints and therefore our ~1 degree excess will not count as a visible range.

Diagnostics

(TRAPPIST-1c (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.

(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 4:1) 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 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M dwarfs]
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	87242.8

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	18	159	1	159	16600.63	87242.3
2	NISRAPID	18	10	1	10	1044.065	87242.17

Special Requirements

Between Dates 14-JUL-2022:05:07:55 and 14-JUL-2022:06:07:55
Between Dates 16-JUL-2022:15:15:31 and 16-JUL-2022:16:15:31
Between Dates 21-JUL-2022:11:29:16 and 21-JUL-2022:12:29:16
Between Dates 23-JUL-2022:21:36:59 and 23-JUL-2022:22:36:59
Between Dates 26-JUL-2022:07:44:48 and 26-JUL-2022:08:44:48
Between Dates 23-OCT-2022:21:56:16 and 23-OCT-2022:22:56:16
Between Dates 26-OCT-2022:08:04:10 and 26-OCT-2022:09:04:10
Between Dates 28-OCT-2022:18:11:52 and 28-OCT-2022:19:11:52
Between Dates 31-OCT-2022:04:18:24 and 31-OCT-2022:05:18:24
Between Dates 02-NOV-2022:14:25:53 and 02-NOV-2022:15:25:53
Between Dates 05-NOV-2022:00:33:16 and 05-NOV-2022:01:33:16
Between Dates 07-NOV-2022:10:41:10 and 07-NOV-2022:11:41:10
Between Dates 09-NOV-2022:20:48:48 and 09-NOV-2022:21:48:48
Between Dates 12-NOV-2022:06:55:16 and 12-NOV-2022:07:55:16
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Between Dates 29-NOV-2022:05:47:18 and 29-NOV-2022:06:47:18
Between Dates 01-DEC-2022:15:55:09 and 01-DEC-2022:16:55:09
Between Dates 04-DEC-2022:02:02:40 and 04-DEC-2022:03:02:40
Between Dates 06-DEC-2022:12:08:56 and 06-DEC-2022:13:08:56
Between Dates 08-DEC-2022:22:16:29 and 08-DEC-2022:23:16:29
Between Dates 11-DEC-2022:08:24:20 and 11-DEC-2022:09:24:20
Between Dates 13-DEC-2022:18:32:06 and 13-DEC-2022:19:32:06
Between Dates 24-OCT-2023:14:33:37 and 24-OCT-2023:15:33:37
Between Dates 27-OCT-2023:00:41:50 and 27-OCT-2023:01:41:50
Between Dates 29-OCT-2023:10:49:33 and 29-OCT-2023:11:49:33
Between Dates 31-OCT-2023:20:55:52 and 31-OCT-2023:21:55:52
Between Dates 03-NOV-2023:07:03:17 and 03-NOV-2023:08:03:17
Between Dates 05-NOV-2023:17:10:50 and 05-NOV-2023:18:10:50
Between Dates 08-NOV-2023:03:18:57 and 08-NOV-2023:04:18:57
Aperture PA Range 72.5 to 74 Degrees (V3 71.93873283 to 73.43873283)
Aperture PA Range 239.5 to 242 Degrees (V3 238.93873283 to 241.43873283)
Time Series Observation
No Parallel Attachments

<table>
<tr><td rowspan="2">Observation</td><td colspan="2">Proposal 2589, Observation 5: TRAPPIST-1g</td><td>Tue Jul 18 19:07:57 GMT 2023</td></tr>
</table>

Observation	**Proposal 2589, Observation 5: TRAPPIST-1g** Tue Jul 18 19:07:57 GMT 2023 **Diagnostic Status: Warning** Observing Template: NIRSpec Bright Object Time Series *Comments: The Target Acquisition partially saturates 1 pixel. This pixel saturates after 2 groups while the TA records 3 groups. We expect this partial saturation not to affect the TA too much; it should not change the centroid.* *The Science observations partially saturate 39 pixels. The goal of using Ngroup=6 is to increase the precision of the transit spectrum. This is explained in Batalha et al. (2018) and in the scientific justification.* *For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.* *Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.*
Diagnostics	(TRAPPIST-1g (Obs 5)) 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 5:1) 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 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M 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	SAME	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	87242.12

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	6	11117	1	1	11117	17827.221	87242.11

Special Requirements

Between Dates 28-MAY-2022:18:43:39 and 28-MAY-2022:19:43:39
Between Dates 10-JUN-2022:03:15:39 and 10-JUN-2022:04:15:39
Between Dates 04-JUL-2022:20:09:33 and 04-JUL-2022:21:09:33
Between Dates 17-JUL-2022:04:41:12 and 17-JUL-2022:05:41:12
Between Dates 29-JUL-2022:12:57:50 and 29-JUL-2022:13:57:50
Between Dates 11-OCT-2022:15:33:42 and 11-OCT-2022:16:33:42
Between Dates 05-NOV-2022:08:36:40 and 05-NOV-2022:09:36:40
Between Dates 12-DEC-2022:09:55:32 and 12-DEC-2022:10:55:32
Between Dates 24-DEC-2022:18:14:59 and 24-DEC-2022:19:14:59
Time Series Observation
No Parallel Attachments

Proposal 2589, Observation 7: TRAPPIST-1g	Tue Jul 18 19:07:57 GMT 2023

Observation

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: The Target Acquisition partially saturates 1 pixel. This pixel saturates after 2 groups while the TA records 3 groups. We expect this partial saturation not to affect the TA too much; it should not change the centroid.
The Science observations partially saturate 39 pixels. The goal of using Ngroup=6 is to increase the precision of the transit spectrum. This is explained in Batalha et al. (2018) and in the scientific justification.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

Diagnostics

(TRAPPIST-1g (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.

(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 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M 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	SAME	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	87242.12

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	6	11117	1	1	11117	17827.221	87242.11

Proposal 2589 - Observation 7 - Atmospheric reconnaissance of the TRAPPIST-1 planets

Special Requirements

Between Dates 28-MAY-2022:18:43:39 and 28-MAY-2022:19:43:39
Between Dates 10-JUN-2022:03:15:39 and 10-JUN-2022:04:15:39
Between Dates 04-JUL-2022:20:09:33 and 04-JUL-2022:21:09:33
Between Dates 17-JUL-2022:04:41:12 and 17-JUL-2022:05:41:12
Between Dates 29-JUL-2022:12:57:50 and 29-JUL-2022:13:57:50
Between Dates 11-OCT-2022:15:33:42 and 11-OCT-2022:16:33:42
Between Dates 05-NOV-2022:08:36:40 and 05-NOV-2022:09:36:40
Between Dates 12-DEC-2022:09:55:32 and 12-DEC-2022:10:55:32
Between Dates 24-DEC-2022:18:14:59 and 24-DEC-2022:19:14:59
Time Series Observation
No Parallel Attachments

Observation

Proposal 2589, Observation 6: TRAPPIST-1g	Tue Jul 18 19:07:57 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Bright Object Time Series

Comments: The Target Acquisition partially saturates 1 pixel. This pixel saturates after 2 groups while the TA records 3 groups. We expect this partial saturation not to affect the TA too much; it should not change the centroid.
The Science observations partially saturate 39 pixels. The goal of using Ngroup=6 is to increase the precision of the transit spectrum. This is explained in Batalha et al. (2018) and in the scientific justification.

For the special requirement "phase", the zero-phase may have to be adjusted depending on the year and month in which the observations will be scheduled. This is because TRAPPIST-1 planets interact with each other and thus induce transit timing variations. These variations have an amplitude of ~10-75 minutes over a year, depending on the planet, but over the very short observability windows of TRAPPIST-1 in Oct-Dec and in Jun-Jul, those transit timing variations are smaller. We used the parameters given by the ExoCTK Phase Constraint Calculator, with planetary parameters from Agol et al. (2020) and the default window size of 1 hour.

Some transits may have to be avoided due to a simultaneous transit of another planet in the system. We can compute when these types of events are expected to occur and provide a list of transits to avoid.

Diagnostics

(TRAPPIST-1g (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)	TRAPPIST-1	RA: 23 06 30.3341 (346.6263921d) Dec: -05 02 36.46 (-5.04346d) Equinox: J2000	Proper Motion RA: 0.062299806210057845 sec of time/yr Proper Motion Dec: -0.479402999985723 arcsec/yr Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Exoplanet Systems, M 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	SAME	WATA	SUB32	F110W	NRSRAPID	3	1	1	0.08	87242.12

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	6	11117	1	1	11117	17827.221	87242.11

Proposal 2589 - Observation 6 - Atmospheric reconnaissance of the TRAPPIST-1 planets

Special Requirements

Between Dates 28-MAY-2022:18:43:39 and 28-MAY-2022:19:43:39
Between Dates 10-JUN-2022:03:15:39 and 10-JUN-2022:04:15:39
Between Dates 04-JUL-2022:20:09:33 and 04-JUL-2022:21:09:33
Between Dates 17-JUL-2022:04:41:12 and 17-JUL-2022:05:41:12
Between Dates 29-JUL-2022:12:57:50 and 29-JUL-2022:13:57:50
Between Dates 11-OCT-2022:15:33:42 and 11-OCT-2022:16:33:42
Between Dates 05-NOV-2022:08:36:40 and 05-NOV-2022:09:36:40
Between Dates 12-DEC-2022:09:55:32 and 12-DEC-2022:10:55:32
Between Dates 24-DEC-2022:18:14:59 and 24-DEC-2022:19:14:59
Time Series Observation
No Parallel Attachments