

# 1981 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-Dwarf Planet Atmospheres

Cycle: 1, Proposal Category: GO

# **INVESTIGATORS**

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JWST Proposal 1981 (Created: Monday, July 19, 2021 at 6:00:59 PM Eastern Standard Time) - Overview

## **OBSERVATIONS**

Folder Observation	Label	Observing Template	Science Target
WOLF 437b			
11	Visit 1	NIRSpec Bright Object Time Series	(1) WOLF-437
12	Visit 2	NIRSpec Bright Object Time Series	(1) WOLF-437
GJ 1132b			
21	Visit 1	NIRSpec Bright Object Time Series	(2) GJ-1132
22	Visit 2	NIRSpec Bright Object Time Series	(2) GJ-1132
GJ-341b			
31	Visit 1	NIRCam Grism Time Series	(3) GJ-341
32	Visit 2	NIRCam Grism Time Series	(3) GJ-341
33	Visit 3	NIRCam Grism Time Series	(3) GJ-341
GJ 4102b			
41	Visit 1	NIRSpec Bright Object Time Series	(4) GJ-4102
42	Visit 2	NIRSpec Bright Object Time Series	(4) GJ-4102
43	Visit 3	NIRSpec Bright Object Time Series	(4) GJ-4102
TRAPPIST-1h			
51	Visit 1	NIRSpec Bright Object Time Series	(5) TRAPPIST-1
52	Visit 2	NIRSpec Bright Object Time Series	(5) TRAPPIST-1
53	Visit 3	NIRSpec Bright Object Time Series	(5) TRAPPIST-1

## **ABSTRACT**

One of JWST's four pillars of science points to finding the building blocks of life elsewhere in the universe. Planets orbiting M-dwarf stars represent our best (and only) opportunity to measure the spectrum of a potentially-habitable planet in the next decade. The quest towards habitability begins with a simple question: Does this planet have an atmosphere? Whether or not terrestrial M-dwarf planets can retain their atmospheres is a hotly debated topic and only a large observational campaign acquiring exoplanet transmission spectra can provide unequivocal evidence of atmospheres. Understanding which M-dwarf planets have atmospheres will focus future theoretical efforts and could provide the first evidence of a "cosmic shoreline", a universal division between planets with and without substantial atmospheres. Even the population of planets with tenuous atmospheres will inform us about atmospheric escape processes.

In this study, we will obtain transmission spectra of nine terrestrial planets orbiting the nearest M dwarfs using instrument modes that are sensitive to

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CO2 at 4.3 microns and CH4 at 3.3 microns, the strongest such features in JWST's wavelength range. Upon successful completion of this campaign, we will know which transiting M-dwarf planets within 15 parsecs have atmospheres and, of those that do, the fundamental diversity in their basic atmospheric compositions. We will know how the presence of an atmosphere correlates with planet irradiation and escape velocity, and how the evolutionary history of M dwarfs shapes the atmospheres of the planets that orbit them. Ultimately, this study will generate new sparks of life in M-dwarf planet research.

## **OBSERVING DESCRIPTION**

We will perform time-series observations of five terrestrial exoplanets orbiting the nearest M dwarfs to determine which planets have atmospheres and, of those that do, the fundamental diversity in their basic atmospheric composition.

The fundamental parameter that determines the length of our time-series observations is the transit duration. Additionally, for each visit, we will require a few hours of baseline both before and after the transit to identify and effectively model any instrument systematics. We compute the exposure times, phase constraints, and signal-to-noise ratio (SNR) for each observation based on the JWST ETC, ExoCTK, and PandExo estimates. We require a total of 76 hours (including overheads) for the given primary targets. Below we provide details of each observation.

WOLF 347b: 2 transits, NIRSpec/G395

GJ 1132b: 2 transits, NIRSpec/G395

GJ 341b: 3 transits, NIRCam/F444W, PA constraints

GJ 4102b: 3 transits, NIRSpec/G395

TRAPPIST-1h: 3 transits, NIRSpec/PRISM, avoid multi-planet transits

All of the NIRSpec/G395H targets are too bright for TA and rely on a faint, nearby companion to avoid saturation. GJ 341 has PA constraints to avoid contamination from nearby targets. We will avoid TRAPPIST-1h transits that overlap with transits from other planets within the same system. The Visit Planner shows that there is a sufficient number of transit opportunities available for each target.

Proposal 1981 - Targets - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-Dwarf Pla...

	#	Name	VIE HOW I'M SUPPOSED TO BREATNE VI Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	WOLF-437	RA: 12 47 55.5675 (191.9815313d) Dec: +09 44 57.91 (9.74942d) Equinox: J2000	Proper Motion RA: -0.06822546051816196 sec of time/yr Proper Motion Dec: -0.45979999993051024 arcsec/yr Epoch of Position: 2015.5	
	Category=U	This object was generated by the nidentified :[Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
	(2)	GJ-1132	RA: 10 14 50.1767 (153.7090696d) Dec: -47 09 17.77 (-47.15494d) Equinox: J2000	Proper Motion RA: -0.10332851021288136 sec of time/yr Proper Motion Dec: 0.4143 arcsec/yr Epoch of Position: 2015.5	
	Category=U	This object was generated by the nidentified :[Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
	(3)	GJ-341	RA: 09 21 35.8504 (140.3993767d) Dec: -60 16 52.21 (-60.28117d) Equinox: J2000	Proper Motion RA: -0.11297682918319278 sec of time/yr Proper Motion Dec: 0.18209 arcsec/yr Epoch of Position: 2015.5	
	Category=U	This object was generated by the nidentified -[Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
Targets	(4)	GJ-4102	RA: 19 20 57.1076 (290.2379483d) Dec: -82 33 35.24 (-82.55979d) Equinox: J2000	Proper Motion RA: 0.1761679932340912 sec of time/yr Proper Motion Dec: -1.2302199999567165 arcsec/yr Epoch of Position: 2015.5	
Fixed .	Category=U	This object was generated by the nidentified :[Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
_	(5)	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	
	Category=U	This object was generated by the nidentified :[Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
	(11)	WOLF437-TARGETAQ- OPTION1	RA: 12 47 50.8779 (191.9619912d) Dec: +09 45 39.47 (9.76096d) Equinox: J2000	Proper Motion RA: -4.221782721885151E-4 sec of time/yr Proper Motion Dec: -0.004376999959276873 arcsec/yr Epoch of Position: 2015.5	r
	Category=U	This object was generated by the nidentified :{Infrared sources, Visible sourc	targetselector and retrieved from the SIMBAD database.		
	(12)	WOLF437-TARGETAQ- OPTION2	RA: 12 48 0.4697 (192.0019571d) Dec: +09 45 9.17 (9.75255d) Equinox: J2000		
	Category=U	This object was generated by the nidentified :[Infrared sources]	targetselector and retrieved from the 2MASS database.		

Proposal 1981 - Targets - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-Dwarf Pla..

GJ1132-TARGETAQ RA: 10 14 47.5083 (153.6979512d)

Proper Motion RA: -0.007 arcsec/yr Dec: -47 08 56.17 (-47.14894d) Proper Motion Dec: 0.007931 arcsec/yr

Equinox: J2000

Epoch of Position: 2015.5

Comments: This object was generated by the targetselector and retrieved from the 2MASS database.

K=14.089J = 14.356

(21)

I recommend NRSRAPIDD6 with F140X for SNR~150.

Category=Unidentified

Description=[Infrared sources, Visible sources]

(41) GJ-4102-TARGETAQ RA: 19 21 4.4901 (290.2687087d)

Dec: -82 33 2.09 (-82.55058d)

Equinox: J2000

Proper Motion RA: -17.178 mas/yr

Proper Motion Dec: 12.029 mas/yr

Epoch of Position: 2015.5

Comments: Fairly high proper motions but not moving out of the FoV any time soon. Distance from target = 24.3"

2MASS 19210447-8233020

Jmag = 15.5

https://vizier.u-strasbg.fr/viz-bin/VizieR-5?-ref=VIZ5fb7e5325c20&-out.add=.&-source=II/246/out&2MASS===19210447-8233020

Gaia DR2 6347643492312233856

https://vizier.u-strasbg.fr/viz-bin/VizieR-5?-ref=VIZ5fb7e5325c20&-out.add=.&-source=I/345/gaia2&-c=290.26813836944%20-82.55052996389, eq=ICRS, rs=2&-out.orig=out.

Instrument set-up: WATA, CLEAR, SUB32, NRSRAPID Category=Unidentified

Description=[Infrared sources, Visible sources]

#### Proposal 1981 - Observation 11 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-D. Proposal 1981, Observation 11: Visit 1 Mon Jul 19 23:00:59 GMT 202 Observation **Diagnostic Status: Warning** Observing Template: NIRSpec Bright Object Time Series (Visit 1 (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. (Visit 1 (Obs 11)) Warning (Form): The slew between the acquisition exposure and the farthest science exposure is 80.830 Arcsec (larger than the recommended limit of 38.000 Arcsec) and may result in reduced or no Diagnos schedulability. See more information in the diagnostic browser. (Visit 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. Targ. Coord. Corrections Name **Target Coordinates** Miscellaneous **Fixed Targets** WOLF-437 Proper Motion RA: -0.06822546051816196 sec of (1) RA: 12 47 55.5675 (191.9815313d) time/yr Dec: +09 44 57.91 (9.74942d) Proper Motion Dec: -0.4597999993051024 arcsec/yr Equinox: J2000 Epoch of Position: 2015.5 Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Unidentified Description=[Infrared sources, Visible sources] ETC Wkbk.Calc Acquisition Target TA Method Subarray Filter Readout Pattern Groups/Int Integrations/Exp Total Total Exposure Integrations Time ID 11 WOLF437-WATA SUB32 F140X NRSRAPIDD6 3 1 1 0.26 76169 TARGETAQ-OPTION1 Template Subarray SUB2048 Spectral Elements ETC Wkbk.Calc Total Exposure Grating/Filter Readout Pattern Groups/Int Integrations/Exp Exposures/Dith **Total Dithers Total Integrations** Time ID G395H/F290LP 3 3507 3507 12725.079 76169 NRSRAPID Special Requirements Phase 0.9288 to 0.9572 with period 1.4671 Days and zero-phase 2458928.2252 HJD Time Series Observation No Parallel

#### Proposal 1981 - Observation 12 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-D. Mon Jul 19 23:00:59 GMT 202 Observation Proposal 1981, Observation 12: Visit 2 Diagnostic Status: Warning Observing Template: NIRSpec Bright Object Time Series (Visit 2 (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. (Visit 2 (Obs 12)) Warning (Form): The slew between the acquisition exposure and the farthest science exposure is 80.830 Arcsec (larger than the recommended limit of 38.000 Arcsec) and may result in reduced or no Diagnos schedulability. See more information in the diagnostic browser. (Visit 12:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. Targ. Coord. Corrections Name **Target Coordinates** Miscellaneous **Fixed Targets** Proper Motion RA: -0.06822546051816196 sec of (1) WOLF-437 RA: 12 47 55.5675 (191.9815313d) time/yr Dec: +09 44 57.91 (9.74942d) Proper Motion Dec: -0.4597999993051024 arcsec/yr Equinox: J2000 Epoch of Position: 2015.5 Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Unidentified Description=[Infrared sources, Visible sources] ETC Wkbk.Calc Acquisition Target TA Method Subarray Filter Readout Pattern Groups/Int Integrations/Exp Total Total Exposure Integrations Time ID 11 WOLF437-WATA SUB32 F140X NRSRAPIDD6 3 1 1 0.26 76169 TARGETAQ-OPTION1 Template Subarray SUB2048 Spectral Elements ETC Wkbk.Calc Total Exposure Grating/Filter Readout Pattern Groups/Int Integrations/Exp Exposures/Dith **Total Dithers Total Integrations** Time ID G395H/F290LP 3 3507 3507 12725.079 76169 NRSRAPID Special Requirements Phase 0.9288 to 0.9572 with period 1.4671 Days and zero-phase 2458928.2252 HJD Time Series Observation No Parallel

Observation 3	Proposal 198 Diagnostic S	81 - Observation 21: Vistatus: Warning mplate: NIRSpec Bright	sit 1		n Suppose	<u>ed To Bre</u>	athe W	<u>ith No</u>	Air: Me	easuring th	<u>e Prevale</u>		rsity of M-D 23:00:59 GMT 2021
Diagnostics		21)) Warning (Form): Evarning (Form): Overhe	-				mit it is pos	ssible that a	High Gain	Antenna move m	ay occur during	g the exposure.	
Fixed Targets	Category=Ur	Name  GJ-1132  this object was generated identified [Infrared sources, Visib	RA: 10 1 Dec: -47 Equinox:		94d)		Proper Mo time/yr Proper Mo	tion RA: -0 tion Dec: 0 Position: 20	.103328510 .4143 arcse	)21288136 sec of	Miscella	neous	
Acquisition	# 1	Target  21 GJ1132- TARGETAQ	TA Method WATA	Subarray SUB32	Filter F140X	Readou NRSRA		Groups/In	<b>nt I</b>	ntegrations/Exp	Total Integrations	Total Exposure Time 0.26	ETC Wkbk.Calc ID 76169
Template	Subarray SUB2048												
Spectral Elements	1	Grating/Filter G395H/F290LF		tern Groups/	718	egrations/Exp	Exposur 1	res/Dith	Total Dit	hers Tota 718	l Integrations	Total Exposure Time 11024.517	ETC Wkbk.Calc ID 76169
Special Requirements	Phase 0.9200 Time Series ( No Parallel	to 0.9455 with period 1 Observation	.6289 Days and zer	o-phase 2457184.:	5576 HJD								

Observation	Proposal 198 Diagnostic S Observing Te	081 - Observation B1, Observation 22: Visitatus: Warning emplate: NIRSpec Bright	<b>it 2</b> t Object Time Serie	s								Mon Jul 19	rsity of M-D 23:00:59 GMT 2021
Diagnostics		22)) Warning (Form): E Warning (Form): Overhea	-				nit it is pos	sible that a	High Gain <i>i</i>	Antenna move m	ay occur during	g the exposure.	
Fixed Targets	Category=U	Name  GJ-1132  This object was generated identified [Infrared sources, Visib.]	RA: 10 1 Dec: -47 Equinox:		94d)		Proper Mo time/yr Proper Mo		.103328510 .4143 arcsec	21288136 sec of	Miscella	neous	
Acquisition	1	Target  21 GJ1132- TARGETAQ	TA Method  WATA	Subarray SUB32	F140X	<b>Readou</b> NRSRA		Groups/In	<b>nt I</b> n	tegrations/Exp	Total Integrations	Total Exposure Time 0.26	ETC Wkbk.Calc ID 76169
Template	Subarray SUB2048												
Spectral Elements	1	Grating/Filter G395H/F290LF	Readout Pat  NRSRAPID	ttern Groups/	718	grations/Exp	1	es/Dith	Total Dit	ners Tota	ll Integrations	Total Exposure Time 11024.517	ETC Wkbk.Calc ID 76169
Special Requirements	Phase 0.9200 Time Series ( No Parallel	to 0.9455 with period 1. Observation	.6289 Days and zer	o-phase 2457184.	5576 HJD								

#### Proposal 1981 - Observation 31 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-D. Proposal 1981, Observation 31: Visit 1 Mon Jul 19 23:00:59 GMT 202 Observation **Diagnostic Status: Warning** Observing Template: NIRCam Grism Time Series Diagnostics (Visit 1 (Obs 31)) 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 31:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. Targ. Coord. Corrections Name **Target Coordinates** Miscellaneous **Fixed Targets** (3) GJ-341 RA: 09 21 35.8504 (140.3993767d) Proper Motion RA: -0.11297682918319278 sec of time/yr Dec: -60 16 52.21 (-60.28117d) Proper Motion Dec: 0.18209 arcsec/yr Equinox: J2000 Epoch of Position: 2015.5 Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Unidentified Description=[Infrared sources, Visible sources] Acquisition Target Subarray Filter Readout Pattern Groups/Int Integrations/Exp **Total Integrations** Total Exposure ETC Wkbk.Calc Time ID SAME SUB32TATSGRIS F405N+F444W **RAPID** 3 1 0.062 76169 **Template** No. of Output Channels Subarray SUBGRISM128 4 Spectral Elements ETC Wkbk.Calc Short Pupil+Filter Long Pupil+Filter Readout Pattern Groups/Int Integrations/Exp Exposures/Dith **Total Integrations** Total Exposure Time ID WLP8+F212N 3 4652 4652 18891.493 76169 GRISMR+F444W BRIGHT1 Phase 0.9815 to 0.9870 with period 7.5763 Days and zero-phase 2458544.0874 HJD Aperture PA Range 5 to 35 Degrees (V3 5.30737728 to 35.30737728) Aperture PA Range 75 to 110 Degrees (V3 75.30737728 to 110.30737728) Aperture PA Range 135 to 175 Degrees (V3 135.30737728 to 175.30737728) Aperture PA Range 185 to 215 Degrees (V3 185.30737728 to 215.30737728) Aperture PA Range 255 to 290 Degrees (V3 255.30737728 to 290.30737728) Aperture PA Range 315 to 355 Degrees (V3 315.30737728 to 355.30737728) Time Series Observation No Parallel Special

#### Proposal 1981 - Observation 32 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-D. Proposal 1981, Observation 32: Visit 2 Mon Jul 19 23:00:59 GMT 202 Observation **Diagnostic Status: Warning** Observing Template: NIRCam Grism Time Series Diagnostics (Visit 2 (Obs 32)) 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 32:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. Targ. Coord. Corrections Name **Target Coordinates** Miscellaneous **Fixed Targets** (3) GJ-341 RA: 09 21 35.8504 (140.3993767d) Proper Motion RA: -0.11297682918319278 sec of time/yr Dec: -60 16 52.21 (-60.28117d) Proper Motion Dec: 0.18209 arcsec/yr Equinox: J2000 Epoch of Position: 2015.5 Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Unidentified Description=[Infrared sources, Visible sources] Acquisition Target Subarray Filter Readout Pattern Groups/Int Integrations/Exp **Total Integrations** Total Exposure ETC Wkbk.Calc Time ID SAME SUB32TATSGRIS F405N+F444W **RAPID** 3 1 0.062 76169 **Template** No. of Output Channels Subarray SUBGRISM128 4 Spectral Elements ETC Wkbk.Calc Short Pupil+Filter Long Pupil+Filter Readout Pattern Groups/Int Integrations/Exp Exposures/Dith **Total Integrations** Total Exposure Time ID WLP8+F212N 3 4652 4652 18891.493 76169 GRISMR+F444W BRIGHT1 Phase 0.9815 to 0.9870 with period 7.5763 Days and zero-phase 2458544.0874 HJD Aperture PA Range 5 to 35 Degrees (V3 5.30737728 to 35.30737728) Aperture PA Range 75 to 110 Degrees (V3 75.30737728 to 110.30737728) Aperture PA Range 135 to 175 Degrees (V3 135.30737728 to 175.30737728) Aperture PA Range 185 to 215 Degrees (V3 185.30737728 to 215.30737728) Aperture PA Range 255 to 290 Degrees (V3 255.30737728 to 290.30737728) Aperture PA Range 315 to 355 Degrees (V3 315.30737728 to 355.30737728) Time Series Observation No Parallel Special

#### Proposal 1981 - Observation 33 - Tell Me How I'm Supposed To Breathe With No Air: Measuring the Prevalence and Diversity of M-D. Proposal 1981, Observation 33: Visit 3 Mon Jul 19 23:00:59 GMT 202 Observation **Diagnostic Status: Warning** Observing Template: NIRCam Grism Time Series Diagnostics (Visit 3 (Obs 33)) 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 33:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. Targ. Coord. Corrections Name **Target Coordinates** Miscellaneous **Fixed Targets** (3) GJ-341 RA: 09 21 35.8504 (140.3993767d) Proper Motion RA: -0.11297682918319278 sec of time/yr Dec: -60 16 52.21 (-60.28117d) Proper Motion Dec: 0.18209 arcsec/yr Equinox: J2000 Epoch of Position: 2015.5 Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Unidentified Description=[Infrared sources, Visible sources] Acquisition Target Subarray Filter Readout Pattern Groups/Int Integrations/Exp **Total Integrations** Total Exposure ETC Wkbk.Calc Time ID SAME SUB32TATSGRIS F405N+F444W **RAPID** 3 1 0.062 76169 **Template** No. of Output Channels Subarray SUBGRISM128 4 Spectral Elements ETC Wkbk.Calc Short Pupil+Filter Long Pupil+Filter Readout Pattern Groups/Int Integrations/Exp Exposures/Dith **Total Integrations** Total Exposure Time ID WLP8+F212N 3 4652 4652 18891.493 76169 GRISMR+F444W BRIGHT1 Phase 0.9815 to 0.9870 with period 7.5763 Days and zero-phase 2458544.0874 HJD Aperture PA Range 5 to 35 Degrees (V3 5.30737728 to 35.30737728) Aperture PA Range 75 to 110 Degrees (V3 75.30737728 to 110.30737728) Aperture PA Range 135 to 175 Degrees (V3 135.30737728 to 175.30737728) Aperture PA Range 185 to 215 Degrees (V3 185.30737728 to 215.30737728) Aperture PA Range 255 to 290 Degrees (V3 255.30737728 to 290.30737728) Aperture PA Range 315 to 355 Degrees (V3 315.30737728 to 355.30737728) Time Series Observation No Parallel Special

				<u>Me How I'r</u>	<u>n Suppo</u>	sed To Bre	athe W	<u>ith No</u>	Air: M	<u>leasuring th</u>	<u>e Prevale</u>	ence and Dive	
Observation	-	Observation 41: Vis	sit 1									Mon Jul 19	23:00:59 GMT 2021
ati	Diagnostic Statu	_											
<u>S</u>	Observing Temp	late: NIRSpec Brigh	nt Object Time Series	3									
ps													
0													
cs	(Visit 1 (Obs 41)	) Warning (Form): I	Exposure Duration ex	xceeds the limit of	f 10000.0 seco	onds. Above this l	imit it is po	sible that a	High Gai	in Antenna move m	nay occur during	g the exposure.	
sti	(Visit 41:1) Warr	ning (Form): Overhe	eads are provisional	until the Visit Plan	nner has been	run.							
Diagnostics													
iag													
Ω													
ß		ame		oordinates				rd. Correc			Miscella	ineous	
Fixed Targets	(4) G.	J-4102		) 57.1076 (290.23 33 35.24 (-82.559			Proper Mo time/yr	tion RA: 0.	.17616799	932340912 sec of			
Та			Equinox:		,		Proper Mo	tion Dec: -	1.2302199	9999567165 arcsec	/yr		
eq			•				Epoch of I	Position: 20	15.5				
Ϋ́	Comments: This Category=Unide	object was generate	d by the targetselect	or and retrieved f	rom the SIMB	AD database.							
_	Description=[Inf	niijiea rared sources, Visil	ole sources]										
Acquisition	#	Target	TA Method	Subarray	Filter	Reado	ut Pattern	Groups/I	nt	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
sit	1	41 GJ-4102-	WATA	SUB32	CLEAR	NRSR	APIDD6	3		1	1	0.26	76169
ä		TARGETAQ											
δC													
	Subarray												
lat	SUB2048												
η	SCB2040												
Template													
Spectral Elements	#	Grating/Filter	Readout Pat	tern Groups/	Int I	ntegrations/Exp	Exposu	es/Dith	Total I	Dithers Tota	al Integrations	Total Exposure Time	ETC Wkbk.Calc
ne	1	G395H/F290L	P NRSRAPID	9	1	158	1		1	1158	3	10468.876	76169
<u>le</u>													
E E													
tra													
Sec													
S													
ınts			2.029 Days and zero-	phase 2458626.20	)55 HJD								
Jer	Time Series Obse No Parallel	ervation											
en	- 10 - 11-11-1												
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cia													
Special Requireme													
S													

Observation	Proposal 19 Diagnostic S Observing T	981 - Observation 42: Vis Status: Warning emplate: NIRSpec Bright	<b>it 2</b> t Object Time Series	;								Mon Jul 19	rsity of M-D 9 23:00:59 GMT 2021
Diagnostics	(Visit 2 (Obs (Visit 42:1)	s 42)) Warning (Form): E Warning (Form): Overhe	-				nit it is pos	sible that a	High Gain Anten	na move may	occur during	the exposure.	
Fixed Targets	Category=U	Name  GJ-4102  This object was generated indentified =[Infrared sources, Visib	RA: 19 20 Dec: -82 3 Equinox: I by the targetselector		79d)		Proper Mo time/yr Proper Mo		.2302199999567		Miscella	neous	
Acquisition	1	Target 41 GJ-4102- TARGETAQ	TA Method WATA	Subarray SUB32	<b>Filter</b> CLEAR	Readou NRSRA		Groups/In	t Integra	tions/Exp T I	ntegrations	Total Exposure Time 0.26	ETC Wkbk.Calc ID 76169
Template	Subarray SUB2048												
Spectral Elements	1	Grating/Filter G395H/F290LF	Readout Patr	dern Groups/I	int Inte	grations/Exp	Exposur 1	es/Dith	Total Dithers	1158	ntegrations	Total Exposure Time 10468.876	ETC Wkbk.Calc ID 76169
Special Requirements	Phase 0.9544 Time Series No Parallel	3 to 0.9754 with period 2 Observation	.029 Days and zero-	phase 2458626.20	055 HJD								

Observation 3	Proposal 198 Diagnostic S	81 - Observation 43: Vis tatus: Warning emplate: NIRSpec Bright	it 3		n Supposed	d To Brea	athe W	<u>'ith No</u>	Air: Mea	asuring the	e Prevale		rsity of M-D 9 23:00:59 GMT 2021
Diagnostics C		43)) Warning (Form): E Varning (Form): Overhe	-			Above this lin	nit it is pos	sible that a	High Gain A	Antenna move m	ay occur during	g the exposure.	
Fixed Targets	Category=U1	Name  GJ-4102  This object was generated identified [Infrared sources, Visib	RA: 19 2 Dec: -82 Equinox: I by the targetselect		79d)	]   	Proper Mo time/yr Proper Mo		1761679932 1.230219999	340912 sec of 9567165 arcsec/	<b>Miscella</b> yr	neous	
Acquisition	# 1	Target  41 GJ-4102- TARGETAQ	TA Method  WATA	Subarray SUB32	Filter CLEAR	Readou		Groups/In	nt In	tegrations/Exp	Total Integrations	Total Exposure Time 0.26	ETC Wkbk.Calc ID 76169
Template	Subarray SUB2048												
Spectral Elements	1	Grating/Filter G395H/F290LF	Readout Pat  NRSRAPID	g Groups/	Int Integr	rations/Exp	Exposur 1	res/Dith	Total Dith	ers Tota	l Integrations	Total Exposure Time 10468.876	ETC Wkbk.Calc ID 76169
Special Requirements	Phase 0.9548 Time Series 0 No Parallel	to 0.9754 with period 2 Observation	.029 Days and zero-	phase 2458626.20	055 HJD								

		<u>81 - Observation</u>		e How I'm	Supposed	<u>d To Bre</u>	athe W	/ith No	Air: N	<u>/leasuring tl</u>	<u>ne Prevale</u>		
Observation	_	1, Observation 51: Visi	it 1									Mon Jul 19	23:00:59 GMT 2021
ati	_	atus: Warning											
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S	(Visit 1 (Obs	51)) Warning (Form): E	xposure Duration excee	eds the limit of 1	10000.0 seconds.	Above this li	mit it is pos	ssible that a	a High Ga	ain Antenna move	may occur during	g the exposure.	
Diagnostics	(Visit 51:1) W	Varning (Form): Overhea	ads are provisional until	l the Visit Plann	er has been run.								
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l o	#	Name	Target Coor	dinates			Targ. Coo	rd. Correc	ctions		Miscella	neous	
Targets	(5)	TRAPPIST-1		.3341 (346.626) 66.46 (-5.04346)			Proper Mo time/yr	tion RA: 0.	.0622998	806210057845 sec	of		
<u>a</u>			Equinox: J20		1)		Proper Mo	tion Dec: -(	0.479402	2999985723 arcsec	/yr		
g			Equiliox. 320	00			Epoch of I	Position: 20	15.5				
Fixed		his object was generated	l by the targetselector a	nd retrieved fro	om the SIMBAD o	latabase.							
Щ	Category=Un Description=	identified [Infrared sources, Visibl	le sources l										
uc	#	Target		ubarray	Filter	Readou	ıt Pattern	Groups/I	<b>int</b>	Integrations/Exp		Total Exposure	
Acquisition	_	5 mp + pprom 4	****				DYD				Integrations	Time	ID .
lis	1	5 TRAPPIST-1	WATA S	UB32	F110W	NRSRA	APID	3		1	1	0.08	76169
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ate	Subarray												
ם	SUB512												
Template													
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Spectral Elements	#	Grating/Filter	Readout Patterr	n Groups/In	t Integ	rations/Exp	Exposu	res/Dith	Total 1	Dithers To	tal Integrations	Total Exposure Time	ETC Wkbk.Calc ID
μ	1	PRISM/CLEAR	R NRSRAPID	5	10550	)	1		1	105	550	14531.992	76169
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	Dhaga 0 0020	to 0.0061 with 1.10	0 773066 D 1	mbaga 2457246	0.60676 1110								
ınt	Time Series C	to 0.9961 with period 18 Observation	8.772800 Days and zero	o-pnase 245/249	9.000/0 HJD								
me	No Parallel												
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Special Requirements													
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Pro		981 - Observation		How I'm	Suppose	ed To Bre	athe W	/ith No	Air: N	<u>/leasuring th</u>	<u>ne Prevale</u>	ence and Dive	rsity of M-D
Observation	_	81, Observation 52: Visi	it 2									Mon Jul 19	23:00:59 GMT 2021
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<u>`</u>	Observing T	emplate: NIRSpec Bright	Object Time Series										
ps(													
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cs	(Visit 2 (Obs	52)) Warning (Form): E	xposure Duration excee	ds the limit of 1	10000.0 second	s. Above this li	mit it is pos	ssible that a	ı High Ga	ain Antenna move i	nay occur during	g the exposure.	
Diagnostics	(Visit 52:1)	Warning (Form): Overhea	ads are provisional until	the Visit Plann	er has been run	ı <b>.</b>							
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S	#	Name	Target Coord	linates			Targ. Coo	rd. Correc	ctions		Miscella	neous	
Targets	(5)	TRAPPIST-1		3341 (346.6263			Proper Mo time/yr	tion RA: 0.	.0622998	306210057845 sec	of		
ar				6.46 (-5.043460	d)		•	tion Dec: -	0 479402	2999985723 arcsec/	×7+		
ΙT			Equinox: J200	00			_	Position: 20		2777703123 aresec	yı.		
Fixed	Comments: T	This object was generated	I by the targetselector as	nd retrieved fro	om the SIMRAD	datahase	Lpoch of 1	Osition. 20	113.3				
Ξ	Category=U	nidentified		ia reirievea jro	m me simbilis	darabase.							
_	Description=	[Infrared sources, Visibi		nhamar.	Filter	Doodoo	t Dattaun	C mounts/I		Integrations/Eve	Total	Total Exposure	ETC Wkbk.Calc
Acquisition	#	Target	TA Method So	ubarray	rmer	Keauoi	ii raiierii	Groups/I	ш	Integrations/Exp	Integrations	Time	ID
isi	1	5 TRAPPIST-1	WATA S	UB32	F110W	NRSRA	APID	3		1	1	0.08	76169
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Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/In	t Inte	grations/Exp	Exposui	es/Dith	Total 1	Dithers Tot	al Integrations	Total Exposure Time	ETC Wkbk.Calc ID
me	1	PRISM/CLEAR	R NRSRAPID	5	105:	50	1		1	105	50	14531.992	76169
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Special Requirements	Phase 0.9939 Time Series	to 0.9961 with period 18	8.767 Days and zero-pha	ase 2457662.55	28 HJD								
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Pro			<u>on 53 - Tell Me</u>	How I'm	Suppose	ed To Bre	athe W	/ith No	Air: N	<u>/leasuring th</u>	<u>ne Prevale</u>	ence and Dive	rsity of M-D
Observation	_	, Observation 53: Vis	it 3									Mon Jul 19	23:00:59 GMT 2021
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≥	Observing Ten	nplate: NIRSpec Bright	t Object Time Series										
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cs	(Visit 3 (Obs 5	3)) Warning (Form): E	xposure Duration excee	ds the limit of 1	0000.0 second	s. Above this li	mit it is po	ssible that a	a High Ga	ain Antenna move i	nay occur during	g the exposure.	
Diagnostics	(Visit 53:1) W	arning (Form): Overhea	ads are provisional until	the Visit Plann	er has been run								
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ဟ	#	Name	Target Coord	dinates			Targ. Coo	ord. Correc	ctions		Miscella	neous	
Targets	(5)	TRAPPIST-1		.3341 (346.6263 6.46 (-5.043466			Proper Mo time/yr	otion RA: 0	.0622998	806210057845 sec	of		
_a ∐a			Equinox: J200		1)		Proper Mo	otion Dec: -	0.479402	2999985723 arcsec/	yr		
ğ			Equitox. \$200	30			Epoch of I	Position: 20	15.5				
Fixed			d by the targetselector a	nd retrieved fro	m the SIMBAD	database.							
I۳	Category=Uni Description=[	dentified Infrared sources, Visib	le sources]										
Acquisition	#	Target		ubarray	Filter	Readou	ıt Pattern	Groups/I	Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
SE	1	5 TRAPPIST-1	WATA S	UB32	F110W	NRSRA	APID	3		1	1	0.08	76169
ĮΞ̈́		J IKAI I ISI-I	WAIA 5	OB32	1110W	NKSKA	M ID	3		1	1	0.08	70109
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ate	Subarray												
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_	#	Grating/Filter	Readout Pattern	Groups/In	t Inte	grations/Exp	Exposu	res/Dith	Total 1	Dithers Tot	al Integrations	Total Exposure	ETC Wkbk.Calc
Spectral Elements	1	PRISM/CLEAR	R NRSRAPID	5	1055	50	1		1	105	50	Time 14531.992	<b>ID</b> 76169
len	1	PRISM/CLEAR	NKSKAPID	3	103.	00	1		1	103	30	14331.992	/0109
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_	Phase 0.9939 t	o 0.9961 with period 13	8.767 Days and zero-ph	ase 2457662.55	28 HJD								
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Special Requirements													
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