



# 1619 - Dust Formation in a Primitive Environment

Cycle: 1, Proposal Category: GO

## INVESTIGATORS

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Dr. Karl D. Gordon (CoI)	Space Telescope Science Institute

## OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
MIRI observations				
	2	MIRI Imaging	MIRI Imaging	(9) SEXA-MIRI
	5	LRS 90034-M	MIRI Low Resolution Spectroscopy	(36) 90034-M
	7	LRS 94328-M	MIRI Low Resolution Spectroscopy	(21) 94328-M
	8	LRS 94477-U	MIRI Low Resolution Spectroscopy	(22) 94477-U
	9	LRS 90428-U	MIRI Low Resolution Spectroscopy	(17) 90428-U
	10	LRS 86434-C	MIRI Low Resolution Spectroscopy	(14) 86434-C
	11	LRS 92104-C	MIRI Low Resolution Spectroscopy	(20) 92104-C
NIRCam observations				
	14	NIRCam Imaging POS 2	NIRCam Imaging	(41) SEXA-NRC-POS2
	15	NIRCam Imaging POS 1	NIRCam Imaging	(40) SEXA-NRC-POS1

## ABSTRACT

Observations suggest that Asymptotic Giant Branch (AGB) stars contribute significantly to the dust budgets of galaxies, from our own Presolar Nebula to the Magellanic Clouds. However, models suggest their contribution should decrease with metallicity, possibly becoming overshadowed by supernova and interstellar grain growth in primitive environments. Recent observations of nearby dwarf galaxies contradict this prediction, showing that AGB dust forms easily at low metallicity, which allows AGB stars to contribute dust as early as 30 Myr after they form in the early Universe. Because of limitations in sensitivity, absolutely nothing is known about the mineralogy, the grain properties, or the even the quantity of this extremely metal-poor dust. We propose observations of the nearby dwarf galaxy Sextans A, which is the Goldilocks galaxy for a comprehensive

assessment of the effect of primitive abundances on dust formation because it 1) is nearby enough to escape crowding and sensitivity limits at the longest wavelengths, 2) is extremely metal-poor (just ~7% solar or 2.5x lower than the SMC), 3) is known to harbor a large AGB population that spans the full AGB mass range, 4) many of these AGB stars are known to be dusty, and 5) dust has been detected in its interstellar medium. No other galaxy comes close to providing the opportunities afforded by Sextans A. We will image the star-forming disk with NIRCcam and MIRI from 0.9-25.5 microns, with careful filter selection to fully sample key molecular and dust features. We will also obtain LRS spectra of 6 known dusty stars to guide our interpretation of the photometry around the most prominent infrared features from 5-12 microns.

## **OBSERVING DESCRIPTION**

We will target Sextans A with NIRCcam imaging, MIRI imaging, and MIRI LRS spectroscopy. We have two NIRCcam pointings, one using the FULL array, and one using just Module B. Together, they cover the main body of the galaxy. We image in 5 filter pairs with the SHALLOW4 readout and 6 groups. We will do 3 subpixel dithers; there is no need for Primary dithers to cover the shortwave detector gaps. We split the NIRCcam pointings to keep the data rate low and to improve schedulability.

We are using a 2x2 MIRI mosaic with 5 filters, the FAST readout pattern, and a range of groups and integrations to meet the necessary exposure depth. We use the 4-point dither. The MIRI mosaic will cover approximately the same area as that covered by NIRCcam.

We will do LRS spectroscopy of 6 targets, each within the NIRCcam and MIRI imaging footprints. For each, we use the Full array, with a dither along the slit nod. We use the FAST readout with groups, integrations, and exposures adding up to ~1600s. We are obtaining verification images. Target acquisition will be performed on the target stars, with exposure parameters set so that  $S/N > 40$ . We have inspected the region around the target stars both in Spitzer 4.5 micron images and in HST F153M images, and find no other bright sources in the ROI.

Each of the NIRCcam pointings has an attached MIRI parallel that will serve as the background. The depth of these MIRI parallels matches that of the prime MIRI mosaic.

We have set a number of Special Requirements:

- 1) All observations to occur within 15 days to mitigate issues with AGB variability.
- 2) We have scheduled the MIRI and NIRCcam imaging observations to be non-interruptible to minimize background variability between the prime MIRI observations and the parallel backgrounds.
- 3) We restrict the PA of our MIRI map and one of our NIRCcam fields to ensure that all of the LRS targets are covered. (The other NIRCcam field can

be observed at any angle.)

4) We have set the Background limited option to remain no more than 20% above the minimum.

5) We have set a target offset for observation 14 to ensure that the field rotates around the center of a module instead of rotating around the module gap.

# Proposal 1619 - Targets - Dust Formation in a Primitive Environment

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(9)	SEXA-MIRI	RA: 10 10 58.8068 (152.7450283d) Dec: -04 42 4.43 (-4.70123d) Equinox: J2000		
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>  <i>Category=Galaxy</i>  <i>Description=[Dwarf irregular galaxies]</i></p>				
(14)	86434-C	RA: 10 11 0.7947 (152.7533113d) Dec: -04 41 54.67 (-4.69852d) Equinox: J2000		
<p><i>Comments: K-magnitude = 15.88</i>  <i>spectrum?</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Carbon stars, Circumstellar dust, Mira variables]</i></p>				
(17)	90428-U	RA: 10 10 59.4324 (152.7476350d) Dec: -04 42 49.30 (-4.71369d) Equinox: J2000		
<p><i>Comments: K-magnitude = 16.96</i>  <i>faint_HST_spec</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Circumstellar dust, Mira variables]</i></p>				
(20)	92104-C	RA: 10 10 58.8391 (152.7451629d) Dec: -04 43 14.50 (-4.72069d) Equinox: J2000		
<p><i>Comments: K-magnitude = 16.05</i>  <i>spectrum?</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Carbon stars, Circumstellar dust, Mira variables]</i></p>				
(21)	94328-M	RA: 10 10 58.0591 (152.7419129d) Dec: -04 43 4.15 (-4.71782d) Equinox: J2000		
<p><i>Comments: K-magnitude = 16.77</i>  <i>spectrum</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Circumstellar dust, M giants, Mira variables]</i></p>				
(22)	94477-U	RA: 10 10 58.0078 (152.7416992d) Dec: -04 43 26.23 (-4.72395d) Equinox: J2000		
<p><i>Comments: K-magnitude = 16.68</i>  <i>faint_HST_spec</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Circumstellar dust, Mira variables]</i></p>				
(36)	90034-M	RA: 10 10 59.5569 (152.7481538d) Dec: -04 40 58.68 (-4.68297d) Equinox: J2000		
<p><i>Comments: K-magnitude = 16.21</i>  <i>spectrum</i>  <i>Category=Star</i>  <i>Description=[Asymptotic giant branch, Circumstellar dust, M giants, Mira variables]</i></p>				

Fixed Targets

## Proposal 1619 - Targets - Dust Formation in a Primitive Environment

(40)	SEXA-NRC-POS1	RA: 10 11 2.1130 (152.7588042d) Dec: -04 42 49.55 (-4.71376d) Equinox: J2000
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*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*  
*Category=Galaxy*  
*Description=[Dwarf irregular galaxies]*

(41)	SEXA-NRC-POS2	RA: 10 10 56.6657 (152.7361071d) Dec: -04 41 15.02 (-4.68751d) Equinox: J2000
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*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*  
*Category=Galaxy*  
*Description=[Dwarf irregular galaxies]*

# Proposal 1619 - Observation 2 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<b>Proposal 1619, Observation 2: MIRI Imaging</b> <b>Diagnostic Status: Warning</b> Observing Template: MIRI Imaging																																																																											
<b>Diagnostics</b>	(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 2:2) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 2:3) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 2:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.																																																																											
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(9)</td> <td>SEXA-MIRI</td> <td>RA: 10 10 58.8068 (152.7450283d) Dec: -04 42 4.43 (-4.70123d) Equinox: J2000</td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>  <i>Category=Galaxy</i>  <i>Description=[Dwarf irregular galaxies]</i></p>										#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous	(9)	SEXA-MIRI	RA: 10 10 58.8068 (152.7450283d) Dec: -04 42 4.43 (-4.70123d) Equinox: J2000																																																										
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<b>Template</b>	<b>Subarray</b> FULL																																																																											
<b>Mosaic</b>	<table border="1"> <thead> <tr> <th>Rows</th> <th>Columns</th> <th>Row Overlap %</th> <th>Column Overlap %</th> <th>Row shift</th> <th>Column shift</th> <th>Tile Order</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>2</td> <td>1.0</td> <td>4.0</td> <td>26.0</td> <td>0.0</td> <td>HILBERT_CURVE</td> </tr> </tbody> </table>										Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order	2	2	1.0	4.0	26.0	0.0	HILBERT_CURVE																																																				
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<b>Dithers</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Dither Type</th> <th>Starting Point</th> <th>Number of Points</th> <th>Points</th> <th>Starting Set</th> <th>Number of Sets</th> <th>Optimized For</th> <th>Direction</th> <th>Pattern Size</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CYCLING</td> <td>5</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>LARGE</td> </tr> </tbody> </table>										#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size	1	CYCLING	5	4						LARGE																																														
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<b>Spectral Elements</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Filter</th> <th>Readout Pattern</th> <th>Groups/Int</th> <th>Integrations/Exp</th> <th>Exposures/Dith</th> <th>Dither</th> <th>Total Dithers</th> <th>Total Integrations</th> <th>Total Exposure Time</th> <th>ETC Wkbk.Calc ID</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>F770W</td> <td>FASTR1</td> <td>20</td> <td>3</td> <td>1</td> <td>Dither 1</td> <td>4</td> <td>12</td> <td>688.21</td> <td></td> </tr> <tr> <td>2</td> <td>F1000W</td> <td>FASTR1</td> <td>25</td> <td>4</td> <td>1</td> <td>Dither 1</td> <td>4</td> <td>16</td> <td>1143.316</td> <td></td> </tr> <tr> <td>3</td> <td>F1130W</td> <td>FASTR1</td> <td>25</td> <td>4</td> <td>1</td> <td>Dither 1</td> <td>4</td> <td>16</td> <td>1143.316</td> <td></td> </tr> <tr> <td>4</td> <td>F1280W</td> <td>FASTR1</td> <td>25</td> <td>4</td> <td>1</td> <td>Dither 1</td> <td>4</td> <td>16</td> <td>1143.316</td> <td></td> </tr> <tr> <td>5</td> <td>F2550W</td> <td>FASTR1</td> <td>25</td> <td>15</td> <td>1</td> <td>Dither 1</td> <td>4</td> <td>60</td> <td>4317.962</td> <td></td> </tr> </tbody> </table>										#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	1	F770W	FASTR1	20	3	1	Dither 1	4	12	688.21		2	F1000W	FASTR1	25	4	1	Dither 1	4	16	1143.316		3	F1130W	FASTR1	25	4	1	Dither 1	4	16	1143.316		4	F1280W	FASTR1	25	4	1	Dither 1	4	16	1143.316		5	F2550W	FASTR1	25	15	1	Dither 1	4	60	4317.962	
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5	F2550W	FASTR1	25	15	1	Dither 1	4	60	4317.962																																																																			
<b>Special Requirements</b>	Group Visits within 53.0 Days Aperture PA Range 101 to 116 Degrees (V3 96.16455103 to 111.16455103) Aperture PA Range 286.5 to 313.8 Degrees (V3 281.66455103 to 308.96455103) Visits Same PA Background Limited. Background no more than 20th percentile above minimum Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days Group Observations 2, 14, 15, Non-interruptible																																																																											

Proposal 1619 - Observation 5 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<p><b>Proposal 1619, Observation 5: LRS 90034-M</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: MIRI Low Resolution Spectroscopy</p>									
<b>Diagnostics</b>	(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>			
	(36)	90034-M	RA: 10 10 59.5569 (152.7481538d) Dec: -04 40 58.68 (-4.68297d) Equinox: J2000							
	<p><i>Comments: K-magnitude = 16.21 spectrum</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Asymptotic giant branch, Circumstellar dust, M giants, Mira variables]</i></p>									
<b>Acquisition</b>	<b>#</b>	<b>Target</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	SAME	F560W	FAST	8	1	1	22.2	14339.8	
<b>Template</b>	<b>Subarray</b>				<b>Obtain Verification Image?</b>					
	FULL				true					
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>	<b>No. Spectral Steps</b>	<b>Spectral Step Offset</b>	<b>No. Spatial Steps</b>	<b>Spatial Step Offset</b>				
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	<b>#</b>	<b>PV Readout Pattern</b>	<b>PV Groups/Int</b>	<b>PV Integrations/Exp</b>	<b>PV Total Integrations</b>	<b>PV Exposures/Dith</b>	<b>PV Total Dithers</b>	<b>PV Total Exposure Time</b>	<b>PV ETC Wkbk.Calc ID</b>	<b>Filter</b>
	1	FASTR1	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 5 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
		1	FASTR1	50	6	12	1	2
Special Requirements	Background Limited. Background no more than 20th percentile above minimum							
	Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

Proposal 1619 - Observation 7 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<b>Proposal 1619, Observation 7: LRS 94328-M</b> <b>Diagnostic Status: Warning</b> Observing Template: MIRI Low Resolution Spectroscopy									
	(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>		<b>Targ. Coord. Corrections</b>		<b>Miscellaneous</b>			
	(21)	94328-M	RA: 10 10 58.0591 (152.7419129d) Dec: -04 43 4.15 (-4.71782d) Equinox: J2000							
<i>Comments: K-magnitude = 16.77 spectrum Category=Star Description=[Asymptotic giant branch, Circumstellar dust, M giants, Mira variables]</i>										
<b>Acquisition</b>	<b>#</b>	<b>Target</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	SAME	F560W	FAST	8	1	1	22.2	14339.8	
<b>Template</b>	<b>Subarray</b>				<b>Obtain Verification Image?</b>					
	FULL				true					
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>		<b>No. Spectral Steps</b>	<b>Spectral Step Offset</b>		<b>No. Spatial Steps</b>		<b>Spatial Step Offset</b>	
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	<b>#</b>	<b>PV Readout Pattern</b>	<b>PV Groups/Int</b>	<b>PV Integrations/Exp</b>	<b>PV Total Integrations</b>	<b>PV Exposures/Dith</b>	<b>PV Total Dithers</b>	<b>PV Total Exposure Time</b>	<b>PV ETC Wkbk.Calc ID</b>	<b>Filter</b>
	1	FASTR1	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 7 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
		1	FASTR1	50	6	12	1	2
Special Requirements	Background Limited. Background no more than 20th percentile above minimum							
	Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

Proposal 1619 - Observation 8 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<p><b>Proposal 1619, Observation 8: LRS 94477-U</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: MIRI Low Resolution Spectroscopy</p>									
<b>Diagnostics</b>	(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections			Miscellaneous			
	(22)	94477-U	RA: 10 10 58.0078 (152.7416992d) Dec: -04 43 26.23 (-4.72395d) Equinox: J2000							
	<p><i>Comments: K-magnitude = 16.68</i></p> <p><i>faint_HST_spec</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Asymptotic giant branch, Circumstellar dust, Mira variables]</i></p>									
<b>Acquisition</b>	#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	SAME	F560W	FAST	6	1	1	16.65	14339.16	
<b>Template</b>	Subarray				Obtain Verification Image?					
	FULL				true					
<b>Dithers</b>	#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset				
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	#	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	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 8 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
		1	FASTR1	50	6	12	1	2
Special Requirements	Background Limited. Background no more than 20th percentile above minimum							
	Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

Proposal 1619 - Observation 9 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<b>Proposal 1619, Observation 9: LRS 90428-U</b> <b>Diagnostic Status: Warning</b> Observing Template: MIRI Low Resolution Spectroscopy									
<b>Diagnostics</b>	(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections			Miscellaneous			
	(17)	90428-U	RA: 10 10 59.4324 (152.7476350d) Dec: -04 42 49.30 (-4.71369d) Equinox: J2000							
	<i>Comments: K-magnitude = 16.96</i> <i>faint_HST_spec</i> <i>Category=Star</i> <i>Description=[Asymptotic giant branch, Circumstellar dust, Mira variables]</i>									
<b>Acquisition</b>	#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	SAME	F560W	FAST	6	1	1	16.65	14339.15	
<b>Template</b>	Subarray				Obtain Verification Image?					
	FULL				true					
<b>Dithers</b>	#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset				
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	#	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	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 9 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
		1	FASTR1	50	6	12	1	2
Special Requirements	Background Limited. Background no more than 20th percentile above minimum							
	Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

Proposal 1619 - Observation 10 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<p><b>Proposal 1619, Observation 10: LRS 86434-C</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: MIRI Low Resolution Spectroscopy</p>									
<b>Diagnostics</b>	(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections			Miscellaneous			
	(14)	86434-C	RA: 10 11 0.7947 (152.7533113d) Dec: -04 41 54.67 (-4.69852d) Equinox: J2000							
	<p><i>Comments: K-magnitude = 15.88</i></p> <p><i>spectrum?</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Asymptotic giant branch, Carbon stars, Circumstellar dust, Mira variables]</i></p>									
<b>Acquisition</b>	#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	SAME	F560W	FAST	8	1	1	22.2	14339.14	
<b>Template</b>	Subarray				Obtain Verification Image?					
	FULL				true					
<b>Dithers</b>	#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset				
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	#	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	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 10 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
	Special Requirements	1	FASTR1	50	6	12	1	2
	Background Limited. Background no more than 20th percentile above minimum Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

Proposal 1619 - Observation 11 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<p><b>Proposal 1619, Observation 11: LRS 92104-C</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: MIRI Low Resolution Spectroscopy</p>									
<b>Diagnostics</b>	<p>(Visit 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>									
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>			
	(20)	92104-C	RA: 10 10 58.8391 (152.7451629d) Dec: -04 43 14.50 (-4.72069d) Equinox: J2000							
	<p><i>Comments: K-magnitude = 16.05 spectrum? Category=Star Description=[Asymptotic giant branch, Carbon stars, Circumstellar dust, Mira variables]</i></p>									
<b>Acquisition</b>	<b>#</b>	<b>Target</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	SAME	F560W	FASTGRPAVG	4	1	1	44.401	14339.13	
<b>Template</b>	<b>Subarray</b>				<b>Obtain Verification Image?</b>					
	FULL				true					
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>	<b>No. Spectral Steps</b>	<b>Spectral Step Offset</b>	<b>No. Spatial Steps</b>	<b>Spatial Step Offset</b>				
	1	ALONG SLIT NOD								
<b>Pointing Verification</b>	<b>#</b>	<b>PV Readout Pattern</b>	<b>PV Groups/Int</b>	<b>PV Integrations/Exp</b>	<b>PV Total Integrations</b>	<b>PV Exposures/Dith</b>	<b>PV Total Dithers</b>	<b>PV Total Exposure Time</b>	<b>PV ETC Wkbk.Calc ID</b>	<b>Filter</b>
	1	FASTR1	10	1	1	1	1	27.75		F560W

Proposal 1619 - Observation 11 - Dust Formation in a Primitive Environment

Spectral Elements	#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time ETC Wkbk.Calc ID
	Spectral Requirements	1	FASTR1	50	6	12	1	2
	Background Limited. Background no more than 20th percentile above minimum Group Observations 2, 5, 7, 8, 9, 10, 11 within 15 Days							

# Proposal 1619 - Observation 14 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<b>Proposal 1619, Observation 14: NIRCam Imaging POS2</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRCam Imaging Coordinated Parallel Template(s): MIRI Imaging										
	(Visit 14:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>		
	(41)	SEXA-NRC-POS2	RA: 10 10 56.6657 (152.7361071d) Dec: -04 41 15.02 (-4.68751d) Equinox: J2000  <i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> <i>Category=Galaxy</i> <i>Description=[Dwarf irregular galaxies]</i>								
<b>Template</b>	<b>NIRCam Imaging</b>					<b>MIRI Imaging</b>					
	Module: ALL Subarray: FULL Target Placement: Module Gap					Subarray: FULL					
<b>Dithers</b>	<b>#</b>	<b>Primary Dither Type</b>		<b>Primary Dithers</b>	<b>Dither Size</b>	<b>Subpixel Positions</b>		<b>Coordinated Parallel Subpixel Selector</b>		<b>Dither Direct Images Primes</b>	
	1	NONE				1		4-POINT-WITH-MIRI-F2550W		NO_DITHERING	
<b>Spectral Elements</b>	<b>NIRCam Imaging</b>	<b>Short Filter</b>	<b>Long Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Dithers</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	F090W	F300M	SHALLOW4	6	1	4	4	1245.465		
	2	F150W	F335M	SHALLOW4	6	1	4	4	1245.465		
	3	F140M	F444W	SHALLOW4	6	1	4	4	1245.465		
	4	F200W	F277W	SHALLOW4	6	1	4	4	1245.465		
<b>Spectral Elements</b>	<b>MIRI Imaging</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Exposures/Dith</b>	<b>Dither</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	F1000W	FASTR1	25	4	1		4	16	1143.316	
	2	F1280W	FASTR1	25	4	1		4	16	1143.316	
	3	F1130W	FASTR1	25	4	1		4	16	1143.316	
	4	F770W	FASTR1	20	3	1		4	12	688.21	

## Proposal 1619 - Observation 14 - Dust Formation in a Primitive Environment

### Special Requirements

Offset 89.0 arcsec, 0.0 arcsec  
No Parallel Attachments  
Background Limited. Background no more than 20th percentile above minimum  
Group Observations 2, 14, 15, Non-interruptible

# Proposal 1619 - Observation 15 - Dust Formation in a Primitive Environment

Fri Mar 10 21:00:34 GMT 2023

<b>Observation</b>	<b>Proposal 1619, Observation 15: NIRCam Imaging POS1</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRCam Imaging Coordinated Parallel Template(s): MIRI Imaging										
	(Visit 15:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>		<b>Miscellaneous</b>			
	(40)	SEXA-NRC-POS1	RA: 10 11 2.1130 (152.7588042d) Dec: -04 42 49.55 (-4.71376d) Equinox: J2000								
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> <i>Category=Galaxy</i> <i>Description=[Dwarf irregular galaxies]</i>											
<b>Template</b>	<b>NIRCam Imaging</b>					<b>MIRI Imaging</b>					
	Module: B Subarray: FULL Target Placement: Module Gap					Subarray: FULL					
<b>Dithers</b>	<b>#</b>	<b>Primary Dither Type</b>		<b>Primary Dithers</b>	<b>Dither Size</b>	<b>Subpixel Positions</b>		<b>Coordinated Parallel Subpixel Selector</b>		<b>Dither Direct Images Primes</b>	
	1	NONE				1		4-POINT-WITH-MIRI-F2550W		NO_DITHERING	
<b>Spectral Elements</b>	<b>NIRCam Imaging</b>	<b>Short Filter</b>	<b>Long Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Dithers</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>	
	1	F090W	F300M	SHALLOW4	6	1	4	4	1245.465		
	2	F150W	F335M	SHALLOW4	6	1	4	4	1245.465		
	3	F140M	F444W	SHALLOW4	6	1	4	4	1245.465		
	4	F200W	F277W	SHALLOW4	6	1	4	4	1245.465		
<b>Spectral Elements</b>	<b>MIRI Imaging</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Exposures/Dith</b>	<b>Dither</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	F2550W	FASTR1	25	4	1		4	16	1143.316	
	2	F2550W	FASTR1	25	3	1		4	12	854.712	
	3	F2550W	FASTR1	25	4	1		4	16	1143.316	
	4	F2550W	FASTR1	25	4	1		4	16	1143.316	

## Proposal 1619 - Observation 15 - Dust Formation in a Primitive Environment

### Special Requirements

Aperture PA Range 100 to 116 Degrees (V3 99.94416471 to 115.94416471)  
Aperture PA Range 289 to 296 Degrees (V3 288.94416471 to 295.94416471)  
No Parallel Attachments  
Background Limited. Background no more than 20th percentile above minimum  
Group Observations 2, 14, 15, Non-interruptible