



1234 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
NGC 6822				
NGC 6822 NIRCam Mosaic Group				
	6	NGC 6822 NIRCam	NIRCam Imaging	(3) NGC-6822-NIRCAM
	10	NGC 6822 NIRCam Copy of Tile-1	NIRCam Imaging	(6) NGC-6822-NIRCAM-TILE-1
NGC 6822 MIRI Mosaic Group				
	7	NGC 6822 MIRI	MIRI Imaging	(2) NGC-6822-MIRI
	9	NGC 6822 MIRI Split off Tile-2	MIRI Imaging	(5) NGC-6822-MIRI-TILE-2-COPY

ABSTRACT

JWST Proposal 1234 (Created: Tuesday, August 16, 2022 at 11:00:28 AM Eastern Standard Time) - Overview

JWST MIRI and NIRCам will be used to study the life cycle of dust in NGC 6822, in a manner comparable to Spitzer studies of the life cycle of dust in the Large and Small Magellanic clouds (e.g., Meixner et al. 2006; Gordon et al. 2011; Meixner et al. 2013), and I Zw 18. With the spatial resolution and sensitivity afforded by JWST, we will be able to study individual objects in the galaxy NGC 6822 which has a metallicity ($[Fe/H] = -1.2$) comparable to that of the SMC. NGC 6822 has been the subject of an HST and ALMA study that detects both post-main sequence and young stars. Conditions in this galaxy are thought to be similar to galaxies at the peak star formation epoch in the Universe and our study will shed light on the dust life cycle in the early universe. With NIRCам and MIRI, we will be able to study dusty objects, which were not detected by HST. Of particular interest are dust producers. Unlike our galaxy where low- and intermediate mass stars provide substantial dust via mass loss during the asymptotic giant branch (AGB), high redshift galaxies with known large dust content do not have time for stars with masses below 5 solar masses to evolve onto the AGB and produce dust. Recent works show that supernova can produce substantial amount of dust but it is not clear if that will survive the passages of shocks. Hence studies of intermediate-mass and high-mass stars towards the end of their evolution may be key to understanding dust formation in galaxies. NGC 6822 has the brightest HII regions in the nearby universe. The detection of the massive young stellar objects in NGC 6822 will provide insight into the formation of massive stars at low metallicity. Together with the star formation history determinations from HST and the dust mass measurements from the Herschel Space Observatory, we will be able to construct a dust evolution model of this important galaxy.

OBSERVING DESCRIPTION

NIRCам & MIRI imaging of NGC 6822

We plan to use the MIRI/NIRCам with parallel imaging mode as follows: NIRCам prime with filters F115W/F356W and F200W/F444W (SW/LW) and MIRI parallel (F1000W, F1500W). MIRI prime with filters F770W, F1000W, F1500W and F2100W and NIRCам parallel (F115W/F356W, F150W /F444W, F200W /F277W, F150W, F140M /F335M). These MIRI filter selections are guided by our study of predicted fluxes of dusty objects (Jones et al. 2017). The NIRCам filters are selected based on prior work on stellar populations and theoretical models convolved with the NIRCам filters.

The depths for the integration were to reach magnitudes of 19.4 at 7.7 microns, 14.4 at 21 microns, and 22.4 at 3.56 microns [vegamags] to match a comparable depth in NGC 6822 as the SAGE project did in the Large and Small Magellanic Clouds. The wavelengths at 3.56 and 7.77 reach below the tip of the red giant branch, and at 21 microns reaches the most massive young stellar objects in this galaxy.

Proposal 1234 - Targets - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	NGC-6822-MIRI	RA: 19 44 58.0949 (296.2420621d) Dec: -14 48 20.62 (-14.80573d) Equinox: J2000	Epoch of Position: 2015.5	
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=Galaxy Description=[Irregular galaxies]</p>				
(3)	NGC-6822-NIRCAM	RA: 19 44 56.1990 (296.2341625d) Dec: -14 47 51.29 (-14.79758d) Equinox: J2000	Epoch of Position: 2015.5	
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=Galaxy Description=[Irregular galaxies]</p>				
(5)	NGC-6822-MIRI-TILE-2-COPY	RA: 19 44 58.4923 (296.2437179d) Dec: -14 46 40.85 (-14.77801d) Equinox: J2000	Epoch of Position: 2015.5	
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=Galaxy Description=[Irregular galaxies]</p>				
(6)	NGC-6822-NIRCAM-TILE-1	RA: 19 45 0.2644 (296.2511017d) Dec: -14 47 55.23 (-14.79868d) Equinox: J2000	Epoch of Position: 2015.5	
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=Galaxy Description=[Irregular galaxies]</p>				

Fixed Targets

Proposal 1234 - Observation 6 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Tue Aug 16 16:00:28 GMT 2022

Observation	Proposal 1234, Observation 6: NGC 6822 NIRCcam Diagnostic Status: Warning Observing Template: NIRCcam Imaging									
	(Visit 6:1) Warning (Form): Data Excess over lower threshold (Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
Diagnosics										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections		Miscellaneous		
	(3)	NGC-6822-NIRCAM	RA: 19 44 56.1990 (296.2341625d) Dec: -14 47 51.29 (-14.79758d) Equinox: J2000			Epoch of Position: 2015.5				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=Galaxy Description=[Irregular galaxies]										
Template	Module					Subarray				
	ALL					FULL				
Mosaic	Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order			
	2	1	10.0	10.0	0.0	0.0	ROW_ORDER			
Dithers	#	Primary Dither Type		Primary Dithers	Subpixel Dither Type		Dither Size	Subpixel Positions		
	1	FULLBOX		4TIGHT	STANDARD			3		
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F115W	F356W	BRIGHT2	7	1	12	12	1803.777	
	2	F200W	F444W	BRIGHT2	7	1	12	12	1803.777	
Special Requirements	Aperture PA Range 92.5 to 93 Degrees (V3 92.59730273 to 93.09730273) No Parallel									
	Group Observations 6, 10, Non-interruptible									

Proposal 1234 - Observation 10 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Tue Aug 16 16:00:28 GMT 2022

Observation	Proposal 1234, Observation 10: NGC 6822 NIRCam Copy of Tile-1 Diagnostic Status: Warning Observing Template: NIRCam Imaging Coordinated Parallel Template(s): MIRI Imaging																																										
	(Visit 10:1) Warning (Form): Data Excess over lower threshold (Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.																																										
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Proposal 1234 - Observation 10 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Special Requirements

Aperture PA Range 92.5 to 93 Degrees (V3 92.59730273 to 93.09730273)
No Parallel

Group Observations 6, 10, Non-interruptible

Proposal 1234 - Observation 7 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Tue Aug 16 16:00:28 GMT 2022

Observation	Proposal 1234, Observation 7: NGC 6822 MIRI Diagnostic Status: Warning Observing Template: MIRI Imaging																																																																
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Proposal 1234 - Observation 7 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 93 to 93 Degrees (V3 88.16455103 to 88.16455103)
Visits Same PA
No Parallel
Group Observations 7, 9 within 53 Days

Proposal 1234 - Observation 9 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Tue Aug 16 16:00:28 GMT 2022

Observation	Proposal 1234, Observation 9: NGC 6822 MIRI Split off Tile-2 Diagnostic Status: Warning Observing Template: MIRI Imaging Coordinated Parallel Template(s): NIRCam Imaging										
	(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous			
	(5)	NGC-6822-MIRI-TILE-2-COPY	RA: 19 44 58.4923 (296.2437179d) Dec: -14 46 40.85 (-14.77801d) Equinox: J2000		Epoch of Position: 2015.5						
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> <i>Category=Galaxy</i> <i>Description=[Irregular galaxies]</i>											
Template	MIRI Imaging					NIRCam Imaging					
	Subarray: FULL					Module: ALL Subarray: FULL					
Dithers	#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size	
	1	4-POINT-MIRI-F770W-WITH-NIRCam	1	4						SMALL	
	2	4-POINT-MIRI-F1000W-WITH-NIRCam	1	4						SMALL	
	3	4-POINT-MIRI-F1500W-WITH-NIRCam	1	4						SMALL	
	4	4-POINT-MIRI-F2100W-WITH-NIRCam	1	4						SMALL	
Spectral Elements	MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	F770W	FASTR1	55	1	1	Dither 1	4	4	610.509	
	2	F1000W	FASTR1	36	2	1	Dither 2	4	8	810.312	
	3	F1500W	FASTR1	15	8	1	Dither 3	4	32	1409.72	
	4	F2100W	FASTR1	20	9	1	Dither 4	4	36	2086.83	

Proposal 1234 - Observation 9 - NGC 6822: Dust Life Cycle Study of a Nearby Low Metallicity Galaxy

Spectral Elements	NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID	
	1		F115W	F356W	SHALLOW2	3	1	4	4	515.365	
	2		F150W	F277W	SHALLOW2	4	1	4	4	730.1	
	3		F200W	F444W	SHALLOW4	4	1	4	4	815.995	
	4		F140M	F335M	SHALLOW4	8	1	4	4	1674.936	
Special Requirements	Aperture PA Range 93 to 93 Degrees (V3 88.16455103 to 88.16455103) No Parallel Group Observations 7, 9 within 53 Days										