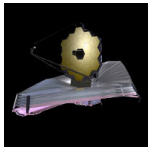

3010 - Spectroscopy of molecules and dust production in carbon stars

Cycle: 2, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	WBP 17 MRS	MIRI Medium Resolution Spectroscopy	(1) WBP17
	2	KDM 1691 MRS	MIRI Medium Resolution Spectroscopy	(2) KDM1691
	3	J050629 MRS	MIRI Medium Resolution Spectroscopy	(3) SAGEMCJ050629
	4	WBP 29 MRS	MIRI Medium Resolution Spectroscopy	(4) WBP29
	5	J051803 MRS	MIRI Medium Resolution Spectroscopy	(5) SAGE1CJ051803
	6	J053441 MRS	MIRI Medium Resolution Spectroscopy	(6) SAGEMCJ053441
	7	MSX LMC 220 MRS	MIRI Medium Resolution Spectroscopy	(7) MSXLMC220

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	8	MSX LMC 774 MRS	MIRI Medium Resolution Spectroscopy	(8) MSXLMC774
	9	MSX LMC 736 MRS	MIRI Medium Resolution Spectroscopy	(9) MSXLMC736

ABSTRACT

We will observe nine carbon stars in the Large Magellanic Cloud with the Medium-Resolution Spectrometer (MRS) on MIRI. The spectral resolution and sensitivity of the MRS, coupled with the knowledge gained from recent infrared space telescopes, have created a unique opportunity. The proposed spectra will resolve the line structure within the mid-infrared absorption bands from the carbon-rich molecules which are the building blocks of the dust these stars form. The spectra will probe the chemistry and physical conditions in the molecular layer around each star. The sample covers the full range of molecular band strengths in relatively dust-free stars and the full range of mass-loss rates in stars with strong dust excesses. The spectra will probe the properties of the material from which dust condenses and test possible triggers of the final phase of strong mass loss that ends the lives of most stars.

OBSERVING DESCRIPTION

The sample consists of 9 carbon stars in the LMC. The stars are chosen so that only one full-sky slew is required if they are observed together. All will be observed with the MIRI/MRS and have identical observing profiles: self-TA, and spectroscopy in all three grating settings with a four-point dither pattern (optimized for point sources).

The filter for TA varies depending on the brightness of the target. All observations utilize one integration and exposure per dither position, with the number of groups varying with the brightness of the target.

No simultaneous imaging or special requirements are requested.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	WBP17	RA: 05 26 19.8800 (81.5828333d) Dec: -69 41 37.33 (-69.69370d) Equinox: J2000	Parallax: 0"	
Comments: Coordinates from 2MASS. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(2)	KDM1691	RA: 05 03 36.9519 (75.9039662d) Dec: -68 33 38.54 (-68.56071d) Equinox: J2000	Proper Motion RA: 1.577 mas/yr Proper Motion Dec: -0.357 mas/yr Parallax: 0" Epoch of Position: 2000	
Comments: Coordinates from Gaia DR2. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(3)	SAGEMCJ050629	RA: 05 06 29.6030 (76.6233458d) Dec: -68 55 34.85 (-68.92635d) Equinox: J2000	Parallax: 0"	
Comments: Coordinates from 2MASS. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(4)	WBP29	RA: 05 26 40.9488 (81.6706200d) Dec: -69 23 11.40 (-69.38650d) Equinox: J2000	Proper Motion RA: 1.837 mas/yr Proper Motion Dec: 0.020 mas/yr Parallax: 0" Epoch of Position: 2000.0	
Comments: Coordinates from Gaia DR2. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(5)	SAGE1CJ051803	RA: 05 18 3.2240 (79.5134333d) Dec: -68 49 50.75 (-68.83076d) Equinox: J2000	Parallax: 0"	
Comments: Coordinates from 2MASS 6X. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(6)	SAGEMCJ053441	RA: 05 34 41.4210 (83.6725875d) Dec: -69 26 30.71 (-69.44186d) Equinox: J2000	Parallax: 0"	
Comments: Coordinates from 2MASS. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				
(7)	MSXLMC220	RA: 05 12 32.0700 (78.1336250d) Dec: -69 15 40.40 (-69.26122d) Equinox: J2000	Parallax: 0"	
Comments: Coordinates from 2MASS. *Category=Star* *Description=[Carbon stars]* *Extended=NO*				

	(8)	MSXLMC774	RA: 05 26 23.0970 (81.5962375d) Dec: -69 11 20.27 (-69.18896d) Equinox: J2000	Parallax: 0"
	Comments: Coordinates from 2MASS. *Category=Star* *Description=[Carbon stars]* *Extended=NO*			
	(9)	MSXLMC736	RA: 05 33 6.8040 (83.2783500d) Dec: -70 30 34.85 (-70.50968d) Equinox: J2000	Parallax: 0"
	Comments: Coordinates from 2MASS. Gaia DR2 coordinates in Simbad appear to be of a nearly coincident foreground source. *Category=Star* *Description=[Carbon stars]* *Extended=NO*			

Observation

Proposal 3010, Observation 1: WBP 17 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(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)	WBP17	RA: 05 26 19.8800 (81.5828333d) Dec: -69 41 37.33 (-69.69370d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F1500W	FAST	4	1	1	11.1	138657.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	140	1	1	Dither 1	4	4	1554.022	
1	SHORT(A)	MRSSHORT		FASTR1	140	1	1	Dither 1	4	4	1554.022	
2	MEDIUM(B)	MRSLONG		FASTR1	140	1	1	Dither 1	4	4	1554.022	
2	MEDIUM(B)	MRSSHORT		FASTR1	140	1	1	Dither 1	4	4	1554.022	
3	LONG(C)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
3	LONG(C)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	

Observation

Proposal 3010, Observation 2: KDM 1691 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	KDM1691	RA: 05 03 36.9519 (75.9039662d) Dec: -68 33 38.54 (-68.56071d) Equinox: J2000	Proper Motion RA: 1.577 mas/yr Proper Motion Dec: -0.357 mas/yr Parallax: 0" Epoch of Position: 2000	

Comments: Coordinates from Gaia DR2.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F1500W	FAST	4	1	1	11.1	138728.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	40	1	1	Dither 1	4	4	444.006	
1	SHORT(A)	MRSSHORT		FASTR1	40	1	1	Dither 1	4	4	444.006	
2	MEDIUM(B)	MRSLONG		FASTR1	50	1	1	Dither 1	4	4	555.008	
2	MEDIUM(B)	MRSSHORT		FASTR1	50	1	1	Dither 1	4	4	555.008	
3	LONG(C)	MRSLONG		FASTR1	30	1	1	Dither 1	4	4	333.005	
3	LONG(C)	MRSSHORT		FASTR1	30	1	1	Dither 1	4	4	333.005	

Observation

Proposal 3010, Observation 3: J050629 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	SAGEMCJ050629	RA: 05 06 29.6030 (76.6233458d) Dec: -68 55 34.85 (-68.92635d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F1500W	FAST	6	1	1	16.65	138729.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	200	1	1	Dither 1	4	4	2220.032	
1	SHORT(A)	MRSSHORT		FASTR1	200	1	1	Dither 1	4	4	2220.032	
2	MEDIUM(B)	MRSLONG		FASTR1	200	1	1	Dither 1	4	4	2220.032	
2	MEDIUM(B)	MRSSHORT		FASTR1	200	1	1	Dither 1	4	4	2220.032	
3	LONG(C)	MRSLONG		FASTR1	120	1	1	Dither 1	4	4	1332.019	
3	LONG(C)	MRSSHORT		FASTR1	120	1	1	Dither 1	4	4	1332.019	

Observation

Proposal 3010, Observation 4: WBP 29 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	WBP29	RA: 05 26 40.9488 (81.6706200d) Dec: -69 23 11.40 (-69.38650d) Equinox: J2000	Proper Motion RA: 1.837 mas/yr Proper Motion Dec: 0.020 mas/yr Parallax: 0" Epoch of Position: 2000.0	

Comments: Coordinates from Gaia DR2.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F1500W	FAST	6	1	1	16.65	138730.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	180	1	1	Dither 1	4	4	1998.029	
1	SHORT(A)	MRSSHORT		FASTR1	180	1	1	Dither 1	4	4	1998.029	
2	MEDIUM(B)	MRSLONG		FASTR1	180	1	1	Dither 1	4	4	1998.029	
2	MEDIUM(B)	MRSSHORT		FASTR1	180	1	1	Dither 1	4	4	1998.029	
3	LONG(C)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
3	LONG(C)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	

Observation

Proposal 3010, Observation 5: J051803 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	SAGE1CJ051803	RA: 05 18 3.2240 (79.5134333d) Dec: -68 49 50.75 (-68.83076d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS 6X.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F1500W	FAST	4	1	1	11.1	138734.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	50	1	1	Dither 1	4	4	555.008	
1	SHORT(A)	MRSSHORT		FASTR1	50	1	1	Dither 1	4	4	555.008	
2	MEDIUM(B)	MRSLONG		FASTR1	60	1	1	Dither 1	4	4	666.01	
2	MEDIUM(B)	MRSSHORT		FASTR1	60	1	1	Dither 1	4	4	666.01	
3	LONG(C)	MRSLONG		FASTR1	30	1	1	Dither 1	4	4	333.005	
3	LONG(C)	MRSSHORT		FASTR1	30	1	1	Dither 1	4	4	333.005	

Observation

Proposal 3010, Observation 6: J053441 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	SAGEMCJ053441	RA: 05 34 41.4210 (83.6725875d) Dec: -69 26 30.71 (-69.44186d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	FND	FAST	10	1	1	27.75	138735.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Observation

Proposal 3010, Observation 7: MSX LMC 220 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(7)	MSXLMC220	RA: 05 12 32.0700 (78.1336250d) Dec: -69 15 40.40 (-69.26122d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	FND	FAST	10	1	1	27.75	138736.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Observation

Proposal 3010, Observation 8: MSX LMC 774 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(8)	MSXLMC774	RA: 05 26 23.0970 (81.5962375d) Dec: -69 11 20.27 (-69.18896d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	FND	FAST	10	1	1	27.75	138737.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
1	SHORT(A)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	

Observation

Proposal 3010, Observation 9: MSX LMC 736 MRS Wed May 10 23:10:28 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(9)	MSXLMC736	RA: 05 33 6.8040 (83.2783500d) Dec: -70 30 34.85 (-70.50968d) Equinox: J2000	Parallax: 0"	

Comments: Coordinates from 2MASS. Gaia DR2 coordinates in Simbad appear to be of a nearly coincident foreground source.
Category=Star
Description=[Carbon stars]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	FND	FAST	10	1	1	27.75	138738.13

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	NO	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	24	1	1	Dither 1	4	4	266.404	
1	SHORT(A)	MRSSHORT		FASTR1	24	1	1	Dither 1	4	4	266.404	
2	MEDIUM(B)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
2	MEDIUM(B)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSLONG		FASTR1	16	1	1	Dither 1	4	4	177.603	
3	LONG(C)	MRSSHORT		FASTR1	16	1	1	Dither 1	4	4	177.603	