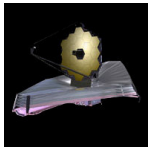

1714 - The Origin of the Crab Nebula

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	MIRI Imaging	MIRI Imaging	(1) CRAB-NEBULA
	2	MIRI Imaging	MIRI Imaging	(4) CRAB-NEBULA-BKG
	3	MIRI MRS Bkg	MIRI Medium Resolution Spectroscopy	(4) CRAB-NEBULA-BKG
	4	MIRI MRS Filament 1	MIRI Medium Resolution Spectroscopy	(2) CRAB-NEBULA-FIL1

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	5	MIRI MRS Filament 2	MIRI Medium Resolution Spectroscopy	(3) CRAB-NEBULA-FIL2
	6	NIRCam Imaging	NIRCam Imaging	(5) CRAB-NEBULA-NIRCAM

ABSTRACT

We propose NIRCam and MIRI imaging and MIRI MRS spectroscopy of the iconic Crab Nebula in order to test models of the progenitor and explosion mechanism by mapping the dust distribution, imaging the iron emission, measuring Ni/Fe ratios, and searching for dust compositional variations. The imaging requested will permit us to separate the bright line and synchrotron emission from dust emission and produce the first complete mapping of the dust distribution in the Crab Nebula. The [Fe II] emission will be used to study the spatial distribution of Fe in the remnant and derive its total mass. The MIRI MRS spectra will be used to measure the Ni/Fe ratios across the filaments and determine the dust composition at two positions that may have different ejecta and swept-up circumstellar contributions. These observational measurements can elucidate differences in predictions for the two competing explosion mechanisms for the Crab's progenitor (electron capture vs. Fe-core collapse) and determine whether a dense circumstellar medium, possibly distributed in a disk around the progenitor, has been important in shaping the Crab Nebula as it is observed today.

OBSERVING DESCRIPTION

We are obtaining MIRI and NIRCam mosaics of the Crab Nebula supernova remnant, as well us two pointings with MIRI MRS centered on two different ejecta filaments. The NIRCam mosaics are being carried out using the F160M and F480M filters and the MIRI mosaics using the F560W, F1800W, and F2100W filters. The pointings for the MRS were refined using HST imaging of the Crab Nebula. For the imaging mosaics, we do not require a dedicated backgound since there are source-free regions available in the mosaics for local background estimates. For MRS, we are obtaining a dedicated background in an adjecent field of view. Exposure times were all verified in the ETC. We have a special requirement in place to group the MIRI source and background observations as a non-interruptible sequence.

Proposal 1714 - Targets - The Origin of the Crab Nebula

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	CRAB-NEBULA	RA: 05 34 32.6519 (83.6360496d) Dec: +22 00 59.10 (22.01642d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=ISM* *Description=[Interstellar dust, Supernova remnants]* *Extended=YES*				
(2)	CRAB-NEBULA-FIL1	RA: 05 34 29.5592 (83.6231633d) Dec: +22 00 29.62 (22.00823d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=ISM* *Description=[Interstellar dust, Supernova remnants]* *Extended=YES*				
(3)	CRAB-NEBULA-FIL2	RA: 05 34 34.3578 (83.6431575d) Dec: +21 59 39.00 (21.99417d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=ISM* *Description=[Interstellar dust, Supernova remnants]* *Extended=YES*				
(4)	CRAB-NEBULA-BKG	RA: 05 34 38.3095 (83.6596229d) Dec: +21 55 53.53 (21.93154d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: *Category=ISM* *Description=[Interstellar dust, Supernova remnants]* *Extended=YES*				
(5)	CRAB-NEBULA-NIRCAM	RA: 05 34 32.6519 (83.6360496d) Dec: +22 00 59.10 (22.01642d) Equinox: J2000	Epoch of Position: 2015.5	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=ISM* *Description=[Interstellar dust, Supernova remnants]* *Extended=YES*				

Observation

Proposal 1714, Observation 1: MIRI Imaging Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Background Observations:[MIRI Imaging (Obs 2)]

Diagnostics

(MIRI Imaging (Obs 1)) Warning (Form): Target requiring background exposure selected for template that doesn't require background exposure

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

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

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

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

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

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

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

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

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

(Visit 1:10) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 1:11) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 1:12) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	CRAB-NEBULA	RA: 05 34 32.6519 (83.6360496d) Dec: +22 00 59.10 (22.01642d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Template

Subarray
FULL

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order
3	4	10.0	10.0	0.0	0.0	DEFAULT

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	4-Point-Sets				6	1	EXTENDED SOURCE	POSITIVE	DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	50	1	1	Dither 1	4	4	555.008	
2	F1130W	FASTR1	38	1	1	Dither 1	4	4	421.806	
3	F1800W	FASTR1	10	1	1	Dither 1	4	4	111.002	
4	F2100W	FASTR1	15	2	1	Dither 1	4	8	344.105	

Special Requirements	
	Group Visits within 53.0 Days Visits Same PA Sequence Observations 1, 2, Non-interruptible

Observation

Proposal 1714, Observation 2: MIRI Imaging Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Background Observation For: [MIRI Imaging (Obs 1)]

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
(4)	CRAB-NEBULA-BKG	RA: 05 34 38.3095 (83.6596229d) Dec: +21 55 53.53 (21.93154d) Equinox: J2000	Epoch of Position: 2015.5	

Comments:
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Template

Subarray
FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	4-Point-Sets	1	4		6	1	EXTENDED SOURCE	POSITIVE	LARGE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F560W	FASTR1	50	1	1	Dither 1	4	4	555.008	
2	F1130W	FASTR1	38	1	1	Dither 1	4	4	421.806	
3	F1800W	FASTR1	10	1	1	Dither 1	4	4	111.002	
4	F2100W	FASTR1	15	2	1	Dither 1	4	8	344.105	

Special Requirements

Sequence Observations 1, 2, Non-interruptible

Observation

Proposal 1714, Observation 3: MIRI MRS Bkg Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [MIRI MRS Filament 1 (Obs 4), MIRI MRS Filament 2 (Obs 5)]

Diagnostics

(MIRI MRS Bkg (Obs 3)) Warning (Form): Imager Filter overlap.

(MIRI MRS Bkg (Obs 3)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	CRAB-NEBULA-BKG	RA: 05 34 38.3095 (83.6596229d) Dec: +21 55 53.53 (21.93154d) Equinox: J2000	Epoch of Position: 2015.5	

Comments:
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
	ALL	YES	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		IMAGER	F770W	FASTR1	19	5	1	Dither 1	4	20	1098.916	
1	SHORT(A)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
1	SHORT(A)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2		IMAGER	F1500W	FASTR1	15	6	1	Dither 1	4	24	1054.515	
2	MEDIUM(B)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2	MEDIUM(B)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
3		IMAGER	F2550W	FASTR1	9	10	1	Dither 1	4	40	1098.916	
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	

Special Requirements	Sequence Observations 3, 4, 5, Non-interruptible

Observation

Proposal 1714, Observation 4: MIRI MRS Filament 1 Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[MIRI MRS Bkg (Obs 3)]

Diagnostics

(MIRI MRS Filament 1 (Obs 4)) Warning (Form): Imager Filter overlap.

(MIRI MRS Filament 1 (Obs 4)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	CRAB-NEBULA-FIL1	RA: 05 34 29.5592 (83.6231633d) Dec: +22 00 29.62 (22.00823d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F770W	FASTR1	19	5	1	Dither 1	4	20	1098.916	
1	SHORT(A)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
1	SHORT(A)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2		IMAGER	F1500W	FASTR1	15	6	1	Dither 1	4	24	1054.515	
2	MEDIUM(B)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2	MEDIUM(B)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
3		IMAGER	F2550W	FASTR1	9	10	1	Dither 1	4	40	1098.916	
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	

Special Requirements	Sequence Observations 3, 4, 5, Non-interruptible

Observation

Proposal 1714, Observation 5: MIRI MRS Filament 2 Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[MIRI MRS Bkg (Obs 3)]

Diagnostics

(MIRI MRS Filament 2 (Obs 5)) Warning (Form): Imager Filter overlap.

(MIRI MRS Filament 2 (Obs 5)) Warning (Form): Imager Filter overlap.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	CRAB-NEBULA-FIL2	RA: 05 34 34.3578 (83.6431575d) Dec: +21 59 39.00 (21.99417d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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		IMAGER	F770W	FASTR1	19	5	1	Dither 1	4	20	1098.916	
1	SHORT(A)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
1	SHORT(A)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2		IMAGER	F1500W	FASTR1	15	6	1	Dither 1	4	24	1054.515	
2	MEDIUM(B)	MRSLONG		FASTR1	100	1	1	Dither 1	4	4	1110.016	
2	MEDIUM(B)	MRSSHORT		FASTR1	100	1	1	Dither 1	4	4	1110.016	
3		IMAGER	F2550W	FASTR1	9	10	1	Dither 1	4	40	1098.916	
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	

Special Requirements	Sequence Observations 3, 4, 5, Non-interruptible

Observation

Proposal 1714, Observation 6: NIRCam Imaging Fri Mar 03 00:01:58 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 6:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 6:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 6:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 6:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 6:6) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	CRAB-NEBULA-NIRCAM	RA: 05 34 32.6519 (83.6360496d) Dec: +22 00 59.10 (22.01642d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=ISM
Description=[Interstellar dust, Supernova remnants]
Extended=YES

Template

Module	Subarray	Target Placement
ALL	FULL	Module Gap

Mosaic

Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order
3	1	10.0	10.0	0.0	0.0	DEFAULT

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	FULL	3TIGHT	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	F162M+F150W2	F480M	BRIGHT1	5	1	9	9	869.678	

Special Requirements	Group Visits within 53.0 Days Visits Same PA