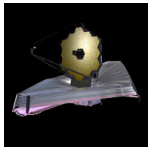

2122 - Dust, Mass Loss and Explosions of Massive Stars in the MIR

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
MIRI				
	1	MIRI 100d	MIRI Medium Resolution Spectroscopy	(2) 2022ACKO
	2	MIRI 150d	MIRI Medium Resolution Spectroscopy	(2) 2022ACKO
	3	MIRI 200d	MIRI Medium Resolution Spectroscopy	(2) 2022ACKO
NIRspec				
	4	NIRspec 100d	NIRSpec Fixed Slit Spectroscopy	(2) 2022ACKO
	5	NIRspec 150d	NIRSpec Fixed Slit Spectroscopy	(2) 2022ACKO
	6	NIRspec 200d	NIRSpec Fixed Slit Spectroscopy	(2) 2022ACKO

ABSTRACT

Core-collapse supernovae (CC SNe) are explosions of massive >10 Msun. CC SNe with hydrogen rich envelopes, type II SNe (SNe II), are the most common stellar explosions and are the main producers of heavy elements in the universe. As a result the study of these cosmic explosions probes the chemical evolution of the universe, sheds light on the composition of dust in our solar system, and ultimately the genesis of life. Moreover, molecules have been observed in the ejecta that form dust and determine which elements are present in interstellar gas and which are tied up in cosmic dust. Despite the prevalence of CC SNe, their physics is not well understood. The explosion of CC SNe takes seconds, whereas the SN light emitted and observed from the extended envelope evolves on timescales of weeks to years. However, the explosion mechanism can be determined by late-time observations of the SN when the core region is exposed. We request 22.1 h of non-disruptive ToO time to obtain 3 mid-infrared (MIR) and 3 near-infrared (NIR) spectra of a SN II between 50 and 200 days from explosion. This program will answer fundamental questions about the progenitor and explosion physics and the life-cycle of elements. The MIR has many isolated lines and JWST will obtain high resolution and signal-to-noise data which is necessary to determine: 1) the pre-explosion mass loss history, 2) the distribution of elements produced during the

stellar evolution and explosion, 3) the possible role of CC SNe in the production of r-process elements, 4) the formation of new, warm dust via SiO, 5) and whether the early cold carbon-dust is primordial or freshly formed.

OBSERVING DESCRIPTION

We request 21.1 h of non-disruptive ToO time to obtain 3 mid-infrared (MIR) and 3 near-infrared (NIR) spectra of a type II SNe between 50 and 200 days from explosion. Our target is not know yet but will be the closest type II supernova to explode in 2022. It will be located within 20 Mpc. The MRS spectrograph will be used in connection with MIRI and observations will be performed in all sub-bands (A, B and C) and channels. The third MIRI spectra will be split into two observations to ensure the data volume limits are not exceeded. For observations with NIRspec we will use the fixed slit spectroscopy mode with a 0.4” slit. For MIRI our target acquisition images will be taken in F1000W, and we will obtain simultaneous imaging in F770W, F1000W and F1130W. This program will provide an unprecedented dataset of the evolution of both CO and SiO in the ejecta of SNe II and enable a unique avenue to determine how SNe II explode to a degree that is not possible with existing facilities.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Observation

Proposal 2122, Observation 1: MIRI 100d Fri Nov 03 01:00:43 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
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F1000W	All MRS	YES	FULL	NEUTRAL

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	F1000W	FASTR1	10	1	1	Dither 1	4	4	111.002	61142
1	SHORT(A)	MRSLONG		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142
1	SHORT(A)	MRSSHORT		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142
2		IMAGER	F770W	FASTR1	10	1	1	Dither 1	4	4	111.002	61142
2	MEDIUM(B)	MRSLONG		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142
2	MEDIUM(B)	MRSSHORT		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142
3		IMAGER	F560W	FASTR1	10	1	1	Dither 1	4	4	111.002	61142
3	LONG(C)	MRSLONG		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142
3	LONG(C)	MRSSHORT		SLOWR1	36	1	1	Dither 1	4	4	3440.148	61142

Special Requirements	Before Date 01-MAR-2023:00:00:00

Observation

Proposal 2122, Observation 2: MIRI 150d Fri Nov 03 01:00:43 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)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F1000W	All MRS	YES	FULL	NEUTRAL

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	F1000W	FASTR1	10	2	1	Dither 1	4	8	233.103	
1	LONG(C)	MRSLONG		SLOWR1	37	1	1	Dither 1	4	4	3535.708	
1	LONG(C)	MRSSHORT		SLOWR1	37	1	1	Dither 1	4	4	3535.708	
2		IMAGER	F770W	FASTR1	10	1	1	Dither 1	4	4	111.002	
2	MEDIUM(B)	MRSLONG		SLOWR1	37	1	1	Dither 1	4	4	3535.708	
2	MEDIUM(B)	MRSSHORT		SLOWR1	37	1	1	Dither 1	4	4	3535.708	
3		IMAGER	F560W	FASTR1	10	2	1	Dither 1	4	8	233.103	
3	SHORT(A)	MRSLONG		SLOWR1	36	1	1	Dither 1	4	4	3440.148	
3	SHORT(A)	MRSSHORT		SLOWR1	36	1	1	Dither 1	4	4	3440.148	

Special Requirements	
	Between Dates 01-AUG-2023:00:00:00 and 31-AUG-2023:00:00:00 Sequence Observations 2, 5, Non-interruptible

Observation

Proposal 2122, Observation 3: MIRI 200d Fri Nov 03 01:00:43 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
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F1000W	All MRS	YES	FULL	NEUTRAL

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	F560W	FASTR1	10	1	1	Dither 1	4	4	111.002	86807
1	SHORT(A)	MRSLONG		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807
1	SHORT(A)	MRSSHORT		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807
2		IMAGER	F770W	FASTR1	10	1	1	Dither 1	4	4	111.002	86807
2	MEDIUM(B)	MRSLONG		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807
2	MEDIUM(B)	MRSSHORT		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807
3		IMAGER	F1000W	FASTR1	10	1	1	Dither 1	4	4	111.002	86807
3	LONG(C)	MRSLONG		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807
3	LONG(C)	MRSSHORT		SLOWR1	37	2	1	Dither 1	4	8	7166.976	86807

Special Requirements	
	Between Dates 01-DEC-2023:00:00:00 and 01-JAN-2024:00:00:00 Sequence Observations 3, 6, Non-interruptible

Observation

Proposal 2122, Observation 4: NIRspec 100d Fri Nov 03 01:00:43 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	SUB32	CLEAR	NRSRAPID	3	1	1	0.08	62334

Template

Slit	Subarray
S400A1	SUBS400A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	NONE

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G235M/F170LP	S400A1	NRS	5	2	1	NONE	3	6	196.431	62334
2	G395M/F290LP	S400A1	NRS	7	2	2	NONE	3	6	271.215	62334

Special Requirements	Before Date 01-MAR-2023:00:00:00

Observation

Proposal 2122, Observation 5: NIRspec 150d Fri Nov 03 01:00:43 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	SUB32	F140X	NRSRAPID	3	1	1	0.08	62415

Template

Slit	Subarray
S400A1	SUBS400A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	NONE

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G235M/F170LP	S400A1	NRS	5	2	1	NONE	3	6	196.431	62415
2	G395M/F290LP	S400A1	NRS	7	2	2	NONE	3	6	271.215	62415

Special Requirements	
	Between Dates 01-AUG-2023:00:00:00 and 31-AUG-2023:00:00:00 Sequence Observations 2, 5, Non-interruptible

Observation

Proposal 2122, Observation 6: NIRspec 200d Fri Nov 03 01:00:43 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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
(2)	2022ACKO	RA: 03 19 38.9700 (49.9123750d) Dec: -19 23 42.87 (-19.39524d) Equinox: J2000		

Comments:
Category=Star
Description=[Type II supernovae]
Extended=NO

Acquisition

#	Target	TA Method	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	WATA	SUB2048	CLEAR	NRSRAPID	3	1	1	3.628	62415

Template

Slit	Subarray
S400A1	SUBS400A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	3	NONE

Spectral Elements

#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Exp	#	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G235M/F170LP	S400A1	NRS	10	2	1	NONE	3	6	383.391	62416
2	G395M/F290LP	S400A1	NRS	10	2	2	NONE	3	6	383.391	62416

Special Requirements	
	Between Dates 01-DEC-2023:00:00:00 and 01-JAN-2024:00:00:00 Sequence Observations 3, 6, Non-interruptible