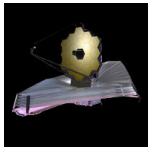

4217 - Probing Early Dust Formation in the Universe via Stripped-Envelope Supernovae

Cycle: 2, Proposal Category: GO

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OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
Phase 1				
	1	NIRSPEC	NIRSpec Fixed Slit Spectroscopy	(2) 2024ahv
	2	MIRI/LRS	MIRI Low Resolution Spectroscopy	(2) 2024ahv
Phase 2				
	3	NIRSPEC	NIRSpec Fixed Slit Spectroscopy	(2) 2024ahv
	4	MIRI/LRS	MIRI Low Resolution Spectroscopy	(2) 2024ahv
Phase 3				
	5	NIRSPEC	NIRSpec Fixed Slit Spectroscopy	(2) 2024ahv
	6	MIRI/LRS	MIRI Low Resolution Spectroscopy	(2) 2024ahv

ABSTRACT

Details of dust formation in the early Universe are unknown. While AGB stars are considered to be primary dust producers, the first dust in the local Universe may have formed before AGB stars had time to make it. Core-collapse supernovae (CCSNe) are expected to play an important role in dust

production since their current formation rate predominates all other types of supernovae. To date, the community has been fixated on dust formation in CCSNe with intact hydrogen-rich envelopes. However, stripped-envelope supernovae (SESNe) come from the death of massive, shorter-lived stars, and are therefore one of the earliest possible sources of early Universe cosmic dust. We request 16.58 hr of non-disruptive ToO time to obtain an NIR+MIR spectral time-series of one SESN at four key epochs between ~70-300 days past-maximum luminosity to investigate: 1) the formation of CO at ~70 days past-maximum, 2) the formation of SiO precipitated by CO cooling (or rapid adiabatic cooling) at ~100 days, 3) the condensation of SiO to dust at ~200 days, 4) the growth of dust and obtaining its temperature at ~300 days, and 5) constraining the ejecta mass. The third and fourth epochs will allow us to determine the location of the dust and understand its origin, whether in-situ, in the circumstellar medium (CSM), or pre-existing in a molecular cloud. Following a SESN all the way from the formation of dust precursors CO and SiO through the dust formation phases will provide unprecedented insight into the deaths of a range of massive stars and how they might contribute to the total dust budget of the ISM.

OBSERVING DESCRIPTION

We request a non-disruptive ToO trigger, to obtain a spectroscopic sequence of one stripped-envelope supernova from ~70-300 d past maximum light. Data will be taken at four epochs 70, 100, 200, and 300 d. At each epoch, we will use the low resolution spectral mode on MIRI, and the CLEAR/PRISM mode with the S400A1 slit on NIRSpec.

Proposal 4217 - Targets - Probing Early Dust Formation in the Universe via Stripped-Envelope Supernovae

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Supernovae]
Extended=NO

Observation

Proposal 4217, Observation 1: NIRSPEC

Tue Jul 30 19:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[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	NRSRAPIDD6	3	1	1	0.26	143916.2

Template

Slit	Subarray
S400A1	SUBS400A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	2	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	NRSRAPID	4	1	1	NONE	2	2	15.621	
2	G395M/F290LP	S400A1	NRSRAPID	6	1	2	NONE	2	2	21.853	

Special Requirements	
	Between Dates 01-MAR-2024:00:00:00 and 30-MAR-2024:00:00:00 Group Observations 1, 2 within 1 Days

Observation

Proposal 4217, Observation 2: MIRI/LRS Tue Jul 30 19:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Low 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)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Supernovae]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FAST	10	1	1	27.75	143916.1

Template

Subarray	Obtain Verification Image?
FULL	true

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	ALONG SLIT NOD				

Pointing Verification

#	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	5	1	1	1	1	13.875		F560W

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	100	1	2	1	2	555.008	143916.3

Special Requirements

Between Dates 01-MAR-2024:00:00:00 and 30-MAR-2024:00:00:00

Group Observations 1, 2 within 1 Days

Observation

Proposal 4217, Observation 3: NIRSPEC

Tue Jul 30 19:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec Fixed Slit 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)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[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	NRSRAPIDD6	3	1	1	0.26	205972.2

Template

Slit	Subarray
S400A1	SUBS400A1

Dithers

#	Primary Dither Positions	Sub-Pixel Pattern
1	2	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	15	1	1	NONE	2	2	190.117	205972.4
2	G395M/F290LP	S400A1	NRS	20	1	2	NONE	2	2	252.437	205972.6

Special Requirements	Before Date 17-JUL-2024:00:00:00 Group Observations 3, 4 within 1 Days

Observation

Proposal 4217, Observation 4: MIRI/LRS

Tue Jul 30 19:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Low 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
(2)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Supernovae]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FASTGRPAVG	4	1	1	44.401	205972.1

Template

Subarray	Obtain Verification Image?
FULL	true

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	ALONG SLIT NOD				

Pointing Verification

#	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	15	1	1	1	1	41.626		F770W

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	100	5	10	1	2	2797.24	205972.3

Special Requirements

Before Date 17-JUL-2024:00:00:00

Group Observations 3, 4 within 1 Days

Observation

Proposal 4217, Observation 5: NIRSPEC Tue Jul 30 19:00:32 GMT 2024

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)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[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	NRSRAPIDD6	3	1	1	0.26	210137.2

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	NRSRAPID	100	1	1	NONE	3	3	472.135	209618.4
2	G395M/F290LP	S400A1	NRSRAPID	100	2	2	NONE	3	6	944.271	209618.6

Special Requirements	
	Between Dates 15-AUG-2024:00:00:00 and 28-AUG-2024:00:00:00 Group Observations 5, 6 within 1 Days

Observation

Proposal 4217, Observation 6: MIRI/LRS

Tue Jul 30 19:00:32 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Low 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
(2)	2024ahv	RA: 16 18 46.3100 (244.6929583d) Dec: +07 24 44.84 (7.41246d) Equinox: J2000	Epoch of Position: 2000	

Comments:
Category=Star
Description=[Supernovae]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	F560W	FASTGRPAVG16	6	1	1	266.404	209618.1

Template

Subarray	Obtain Verification Image?
FULL	true

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	ALONG SLIT NOD				

Pointing Verification

#	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	50	1	1	1	1	138.752		F1000W

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	FASTR1	100	15	30	1	2	8402.821	209618.3

Special Requirements

Between Dates 15-AUG-2024:00:00:00 and 28-AUG-2024:00:00:00

Group Observations 5, 6 within 1 Days