



9233 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Cycle: 3, Proposal Category: DD

INVESTIGATORS

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Phase 1 - SNIc				
	1	NIRSPEC	NIRSpec Fixed Slit Spectroscopy	(1) 2024aecx
	2	MIRI/MRS	MIRI Medium Resolution Spectroscopy	(1) 2024aecx
Phase 2 - SNIc				
	3	NIRSPEC	NIRSpec Fixed Slit Spectroscopy	(2) 24aecx
	4	MIRI/MRS	MIRI Medium Resolution Spectroscopy	(2) 24aecx

ABSTRACT

This past week brought the discovery of SN 2024aecx, one of the closest stripped-envelope supernovae (SESNe) ever found, located just 11 Mpc away in NGC 3521. What makes this supernova truly extraordinary is its pre-explosion imaging, available from not only HST but also JWST, offering an unprecedented opportunity to study its progenitor system and environment in remarkable detail. Its rapid spectral evolution suggests it may be an ultra-stripped SN or a peculiar Type Ic, making it an ideal target to study progenitor systems, binary interactions, and dust formation. A carefully timed multi-epoch campaign with JWST will capture the formation of dust precursors, monitor dust evolution, and differentiate between freshly formed and pre-existing dust. These observations will also enable direct detection of the progenitor and any surviving companion, addressing key questions about mass-loss mechanisms, binary systems, and the contribution of SESNe to cosmic dust production. SN 2024aecx represents a rare and time-sensitive opportunity to construct a legacy dataset with transformative implications for stellar evolution and cosmic dust enrichment.

OBSERVING DESCRIPTION

We request a total of 32.5 hours charged time to obtain 3 sets of NIR+MIR spectral time-series and 1 set of photometric observations of SN 2024aecx between 30–500 days post-explosion.

Proposal 9233 - Targets - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	2024aecx	RA: 11 05 49.4573 (166.4560721d) Dec: -00 02 5.44 (-.03484d) Equinox: J2000 <i>Comments:</i> Category=Star Description=[Supernovae] Extended=NO	Epoch of Position: 2000	
(2)	24aecx	RA: 11 05 49.5500 (166.4564583d) Dec: -00 02 5.50 (-.03486d) Equinox: J2000 <i>Comments:</i> Category=Star Description=[Supernovae] Extended=NO	Epoch of Position: 2000		

Proposal 9233 - Observation 1 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Tue Apr 29 19:00:09 GMT 2025

Observation	Proposal 9233, Observation 1: NIRSPEC Diagnostic Status: Warning Observing Template: NIRSPEC Fixed Slit Spectroscopy											
	(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)	2024aecx	RA: 11 05 49.4573 (166.4560721d) Dec: -00 02 5.44 (-.03484d) Equinox: J2000			Epoch of Position: 2000						
<i>Comments:</i> 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	F110W	NRSRAPID	3	1	1	0.08	227468.2	
Template	HFF Readout Mode				Slit			Subarray				
	false				S200A1			SUBS200A1				
Dithers	#	Primary Dither Positions					Sub-Pixel Pattern					
	1	3					NONE					
Spectral Elements	#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Ex #	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
	1	G235M/F170LP	S200A1	NRSRAPID	4	1	1	NONE	3	3	23.431	227468.4
	2	G395M/F290LP	S200A1	NRSRAPID	10	1	2	NONE	3	3	51.475	227468.6

Proposal 9233 - Observation 1 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Special Requirements

Before Date 21-JAN-2025:00:00:00

Sequence Observations 1, 2 within 0.5 Days

Proposal 9233 - Observation 2 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Tue Apr 29 19:00:09 GMT 2025

Observation	Proposal 9233, Observation 2: MIRI/MRS Diagnostic Status: Warning Observing Template: MIRI Medium Resolution Spectroscopy												
	(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.												
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous				
	(1)	2024aecx	RA: 11 05 49.4573 (166.4560721d) Dec: -00 02 5.44 (-.03484d) Equinox: J2000			Epoch of Position: 2000							
Comments: Category=Star Description=[Supernovae] Extended=NO													
Acquisition	#	Target											
	1	NONE											
Template	AcqFilter	Primary Channel			Simultaneous Imaging		Imager Subarray		Grating Wheel Direction				
	F560W	All MRS			YES		FULL		Allow Auto Reorder				
Dithers	#	Dither Type			Optimized For			Direction					
	1	4-Point			POINT SOURCE			NEGATIVE					
Spectral Elements	#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/E xp	Exposures/Dit h	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1		IMAGER	F560W	FASTR1	5	1	1	Dither 1	4	4	55.501	
	1	SHORT(A)	MRSLONG		SLOWR1	20	2	1	Dither 1	4	8	3917.947	234905.14
	1	SHORT(A)	MRSSHORT		SLOWR1	20	2	1	Dither 1	4	8	3917.947	234905.14
	2		IMAGER	F770W	FASTR1	7	1	1	Dither 1	4	4	77.701	
	2	MEDIUM(B)	MRSLONG		SLOWR1	25	2	1	Dither 1	4	8	4873.544	234905.15
	2	MEDIUM(B)	MRSSHORT		SLOWR1	25	2	1	Dither 1	4	8	4873.544	234905.15
	3		IMAGER	F1000W	FASTR1	10	1	1	Dither 1	4	4	111.002	
	3	LONG(C)	MRSLONG		SLOWR1	30	3	1	Dither 1	4	12	8791.491	234905.16
	3	LONG(C)	MRSSHORT		SLOWR1	30	3	1	Dither 1	4	12	8791.491	234905.16

Proposal 9233 - Observation 2 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Special Requirements

Before Date 21-JAN-2025:00:00:00

Sequence Observations 1, 2 within 0.5 Days

Proposal 9233 - Observation 3 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Tue Apr 29 19:00:09 GMT 2025

Observation	Proposal 9233, Observation 3: NIRSPEC Diagnostic Status: Warning Observing Template: NIRSPEC Fixed Slit Spectroscopy										
	(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)	24aecx	RA: 11 05 49.5500 (166.4564583d) Dec: -00 02 5.50 (-.03486d) Equinox: J2000			Epoch of Position: 2000					
<i>Comments:</i> 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	SUB2048	F140X	NRSRAPIDD6	3	1	1	14.452	227500.2
Template	HFF Readout Mode				Slit			Subarray			
	false				S400A1			SUBS400A1			
Dithers	#	Primary Dither Positions						Sub-Pixel Pattern			
	1	3						NONE			
Spectral Elements	#	Grating/Filter	Slit	Readout Pattern	Groups/Int	Integrations/Ex #	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	G235M/F170LP	S400A1	NRSRAPID	100	1	NONE	3	3	472.135	227500.4
	2	G395M/F290LP	S400A1	NRSRAPID	100	1	NONE	3	3	472.135	227500.6

Proposal 9233 - Observation 3 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Special Requirements

Between Dates 22-APR-2025 and 13-JUN-2025

Sequence Observations 3, 4 within 1 Days

Proposal 9233 - Observation 4 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Tue Apr 29 19:00:09 GMT 2025

Observation	Proposal 9233, Observation 4: MIRI/MRS Diagnostic Status: Warning Observing Template: MIRI Medium Resolution Spectroscopy												
	(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)	24aecx	RA: 11 05 49.5500 (166.4564583d) Dec: -00 02 5.50 (-.03486d) Equinox: J2000			Epoch of Position: 2000							
Comments: Category=Star Description=[Supernovae] Extended=NO													
Acquisition	#	Target											
	1	NONE											
Template	AcqFilter	Primary Channel			Simultaneous Imaging			Imager Subarray		Grating Wheel Direction			
	F560W	All MRS			YES			FULL		Allow Auto Reorder			
Dithers	#	Dither Type			Optimized For			Direction					
	1	4-Point			POINT SOURCE			NEGATIVE					
Spectral Elements	#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/E xp	Exposures/Dit h	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	
	1	LONG(C)	MRSLONG		SLOWR1	30	4	1	Dither 1	4	16	11753.841	234905.16
	1	LONG(C)	MRSSHORT		SLOWR1	30	4	1	Dither 1	4	16	11753.841	234905.16
	2		IMAGER	F770W	FASTR1	7	1	1	Dither 1	4	4	77.701	
	2	MEDIUM(B)	MRSLONG		SLOWR1	25	3	1	Dither 1	4	12	7358.095	234905.15
	2	MEDIUM(B)	MRSSHORT		SLOWR1	25	3	1	Dither 1	4	12	7358.095	234905.15
	3		IMAGER	F560W	FASTR1	5	1	1	Dither 1	4	4	55.501	
	3	SHORT(A)	MRSLONG		SLOWR1	20	3	1	Dither 1	4	12	5924.7	234905.14
	3	SHORT(A)	MRSSHORT		SLOWR1	20	3	1	Dither 1	4	12	5924.7	234905.14

Proposal 9233 - Observation 4 - SN 2024aecx: A Gateway to Understanding Massive Star Deaths, Cosmic Dust, and Binary Systems

Special Requirements

Between Dates 22-APR-2025:00:00:00 and 13-JUN-2025:00:00:00

Sequence Observations 3, 4 within 1 Days