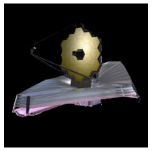

7575 - Shocks and destruction of dust in the ring of Supernova 1987A

Cycle: 4, Proposal Category: GO

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OBSERVATIONS

Folder	***Observation***	***Label***	***Observing Template***	***Science Target***
NIRCam				
	1	NICam	NIRCam Imaging	(1) SN-1987A
	3	NICam	NIRCam Imaging	(1) SN-1987A
MIRI				
	2	MIRI Imaging	MIRI Imaging	(1) SN-1987A

ABSTRACT

Dust grains present in the circumstellar and interstellar medium are destroyed by shocks generated by their interaction with fast-expanding supernovae (SNe).
The current theoretical estimates of SN dust destruction rates are uncertain, ranging from 1% to nearly 100%, requiring a better constraint.
SN 1987A has ongoing shocks against the circumstellar ring, which was expelled by the red-supergiant progenitor about 20,000 years ago. Spitzer's spatially unresolved observations have shown that the total brightness of the ring declined on a yearly time scale, suggesting shock destruction of dust grains.
Now, spatially resolved NIRCam and MIRI imaging can pinpoint the ongoing shocked regions and dust destruction sites. The physical properties of shocks can be measured in a spatially resolved manner for the first time. By comparing cycle 1 and the requested cycle 4 observations, the reduction of the dust mass and the cooling rate of the dust emission will be measured. This cooling rate will allow us to evaluate the dust grain size, as smaller dust grains cool more rapidly than larger grains due to their lower heat capacity. This experiment is possible in a unique target SN 1987A, which is only 50 kpc away so that the progress of shocks can be spatially resolved with JWST. Its shocks are about to exit from the circumstellar ring, and this will be one of the last chances to assess the dust destruction rate in SNe.

OBSERVING DESCRIPTION

We request observations of SN 1987A, with NIRCam, MIRI imaging.

NIRCam F300M, F356W and F444W imaging are for synchrotron continuum from the ring. F444W might have some contamination of dust emissions. F150W, F200W and F210M imaging come as a bonus, without any additional observing time. They will capture [Fe II], He I and H2 emissions from the ejecta.

For MIRI, seven filter bands are requested in order to cover the spectral energy distribution of the silicate dust. The five bands between F1000W and F2550W will be used to trace the shape of the silicate emission, determining the dust temperature and mass. F560W and F770W will be used to constrain the Wien's tail of the Planck Function, giving the limits to the contamination of the dust into NIRCam F444W.

Both NIRCam and MIRI observations request parallel observations.

Proposal 7575 - Targets - Shocks and destruction of dust in the ring of Supernova 1987A

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SN-1987A	RA: 05 35 27.9875 (83.8666146d)	Epoch of Position: 2015	
		Dec: -69 16 11.11 (-69.26975d)		
		Equinox: J2000		

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae]
Extended=YES

Observation

Proposal 7575, Observation 1: NICam Tue Sep 23 20:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: PA range set to nominal ERS visibility window

Diagnostics

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

(NICam (Obs 1)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SN-1987A	RA: 05 35 27.9875 (83.8666146d) Dec: -69 16 11.11 (-69.26975d) Equinox: J2000	Epoch of Position: 2015	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae]
Extended=YES

Template

Module	Subarray
B	FULLP

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		9

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
1	F150W	F356W	RAPID	10	1	9	9	966.309	223876
2	F200W	F444W	RAPID	10	1	9	9	966.309	223876
3	F210M	F300M	RAPID	10	2	18	9	2029.25	223876

Special Requirements

After Date 2023.233:00:00:00
Aperture PA Range 280.26109763 to 280.26109763 Degrees (V3 280.0 to 280.0)
Offset -11.8 arcsec, -13.7 arcsec

Sequence Observations 1, 3 within 7 Days
Aperture PA Offset 3 from 1 by 15 to 30 Degrees (Same offsets in V3)

Observation

Proposal 7575, Observation 3: NICam

Tue Sep 23 20:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: PA range set to nominal ERS visibility window

Diagnostics

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

(NICam (Obs 3)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SN-1987A	RA: 05 35 27.9875 (83.8666146d) Dec: -69 16 11.11 (-69.26975d) Equinox: J2000	Epoch of Position: 2015	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae]
Extended=YES

Template

Module	Subarray
B	FULLP

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		9

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
1	F150W	F356W	RAPID	10	1	9	9	966.309	223876
2	F200W	F444W	RAPID	10	1	9	9	966.309	223876
3	F210M	F300M	RAPID	10	2	18	9	2029.25	223876

Special Requirements

Offset -11.8 arcsec, -13.7 arcsec

Sequence Observations 1, 3 within 7 Days
Aperture PA Offset 3 from 1 by 15 to 30 Degrees (Same offsets in V3)

Observation

Proposal 7575, Observation 2: MIRI Imaging

Tue Sep 23 20:00:11 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Coordinated Parallel Template(s): NIRCam Imaging

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
(1)	SN-1987A	RA: 05 35 27.9875 (83.8666146d) Dec: -69 16 11.11 (-69.26975d) Equinox: J2000	Epoch of Position: 2015	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae]
Extended=YES

Template

MIRI Imaging	NIRCam Imaging
Subarray: BRIGHTSKY	Module: B Subarray: FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	4-POINT-MIRI-F770W-WITH-NIRCam								DEFAULT
2	4-POINT-MIRI-F770W-WITH-NIRCam								DEFAULT
3	4-POINT-MIRI-F1000W-WITH-NIRCam								DEFAULT
4	4-POINT-MIRI-F1280W-WITH-NIRCam								DEFAULT
5	4-POINT-MIRI-F1800W-WITH-NIRCam								DEFAULT
6	4-POINT-MIRI-F2100W-WITH-NIRCam								DEFAULT
7	4-POINT-MIRI-F2550W-WITH-NIRCam								DEFAULT
8	4-POINT-MIRI-F770W-WITH-NIRCam								DEFAULT

Proposal 7575 - Observation 2 - Shocks and destruction of dust in the ring of Supernova 1987A

Spectral Elements

MIRI Imaging	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	F560W	FASTR1	15	9	1	Dither 1	4	36	494.94	226703
2	F770W	FASTR1	15	4	1	Dither 2	4	16	218.051	226703
3	F1000W	FASTR1	15	4	1	Dither 3	4	16	218.051	226703
4	F1280W	FASTR1	6	4	1	Dither 4	4	16	93.45	226703
5	F1800W	FASTR1	6	4	1	Dither 5	4	16	93.45	226703
6	F2100W	FASTR1	6	4	1	Dither 6	4	16	93.45	226703
7	F2550W	FASTR1	6	4	1	Dither 7	4	16	93.45	226703

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
1	F140M	F335M	BRIGHT2	5	1	4	4	429.471	
2	F115W	F356W	BRIGHT2	2	1	4	4	171.788	
3	F150W	F444W	BRIGHT2	2	1	4	4	171.788	
4	F200W	F277W	BRIGHT2	1	1	4	4	85.894	
5	F090W	F444W	BRIGHT2	1	1	4	4	85.894	
6	F200W	F277W	BRIGHT2	1	1	4	4	85.894	
7	F090W	F444W	BRIGHT2	1	1	4	4	85.894	

Special Requirements

No Parallel Attachments