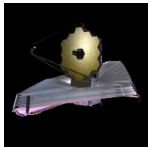

7881 - Watching Dust Formation in Real Time in Two Very Nearby Core Collapse Supernovae

Cycle: 4, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	SN-2023ixf (Obs 1)	MIRI Imaging	(2) SN-2023ixf
Observation Folder				
	2	SN-2024ggi (Obs 1)	MIRI Imaging	(3) SN-2024ggi

ABSTRACT

The very nearby core collapse supernovae (CCSN) SN 2023ixf and SN 2024ggi (both at ~7 Mpc) will likely be the most well-studied SNe this decade. The combination of pre-explosion data combined with the comprehensive follow-up post explosion has given us an unprecedented chance to

study both massive star and CCSN evolution in two completely different galaxies. In particular, these nearby SNe may hold key information in understanding the formation of dust in the Universe. Dust is abundant in the early universe, and CCSN are a likely source. However, existing observations of CCSNe in the near- and short mid-infrared yield dust masses ~2-3 orders of magnitude lower than expected. One possible solution is that this dust is hiding deep in the mid-infrared, at temperatures of ~100-200K, or that it is created over a longer time span than some models predict. JWST+MIRI is able to probe both warm (~300-500K) and cold (~100-200K) dust with unprecedented sensitivity. By observing SN 2023ixf and SN 2024ggi over the next three JWST cycles with MIRI we will create spectral energy distributions out to ~25 microns allowing us to quantify and characterize the amount of cold and warm dust both pre-existing and newly formed. This will help us understand dust formation in real time, explore links between dust formation and other SN properties, and address the issue of cosmic dust formation in the early universe.

OBSERVING DESCRIPTION

This proposal will image the recent, nearby core collapse supernovae SN 2023ixf and SN 2024ggi with MIRI over the next three JWST Cycles to watch any dust formation occur in real time. Long baseline observations are necessary as well to help differentiate newly formed dust from pre-existing dust.

Each observation will consist of imaging in all the primary MIRI filters: F560W, F770W, F1000W, F1130W, F1280W, F1500W, F1800W, F2100W, and F2550W. The full suite of MIRI imaging is necessary to characterize both cold and warm dust components (down to ~100-200K) and to have sensitivity to PAH and SiO dust-related features. Standard 4-point dithers will be applied.

Proposal 7881 - Targets - Watching Dust Formation in Real Time in Two Very Nearby Core Collapse Supernovae

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	SN-2023ixf	RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Supernovae, Type II supernovae]* *Extended=NO*				
(3)	SN-2024ggi	RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Star* *Description=[Supernovae, Type II supernovae]*				

Observation

Proposal 7881, Observation 1: SN-2023ixf (Obs 1) Wed Nov 05 19:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI Imaging

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)	SN-2023ixf	RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae, Type II supernovae]
Extended=NO

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				5	1	POINT SOURCE	POSITIVE	DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	F560W	FASTR1	10	1	1	Dither 1	4	4	111.002	
2	F770W	FASTR1	10	1	1	Dither 1	4	4	111.002	
3	F1000W	FASTR1	10	1	1	Dither 1	4	4	111.002	
4	F1130W	FASTR1	10	1	1	Dither 1	4	4	111.002	
5	F1280W	FASTR1	10	1	1	Dither 1	4	4	111.002	
6	F1500W	FASTR1	10	1	1	Dither 1	4	4	111.002	
7	F1800W	FASTR1	10	1	1	Dither 1	4	4	111.002	
8	F2100W	FASTR1	10	1	1	Dither 1	4	4	111.002	
9	F2550W	FASTR1	10	1	1	Dither 1	4	4	111.002	

Observation

Proposal 7881, Observation 2: SN-2024ggi (Obs 1)

Wed Nov 05 19:00:09 GMT 2025

Diagnostic Status: Warning

Observing Template: MIRI 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
(3)	SN-2024ggi	RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Star
Description=[Supernovae, Type II supernovae]

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				5	1	POINT SOURCE	POSITIVE	DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	F560W	FASTR1	10	1	1	Dither 1	4	4	111.002	
2	F770W	FASTR1	10	1	1	Dither 1	4	4	111.002	
3	F1000W	FASTR1	10	1	1	Dither 1	4	4	111.002	
4	F1130W	FASTR1	10	1	1	Dither 1	4	4	111.002	
5	F1280W	FASTR1	10	1	1	Dither 1	4	4	111.002	
6	F1500W	FASTR1	10	1	1	Dither 1	4	4	111.002	
7	F1800W	FASTR1	10	1	1	Dither 1	4	4	111.002	
8	F2100W	FASTR1	10	1	1	Dither 1	4	4	111.002	
9	F2550W	FASTR1	10	1	1	Dither 1	4	4	111.002	