



18349 - Echoes of Dying Breaths: Measuring Mass Loss with Late-time Observations of SN 2023ixf and SN 2024ggi

Cycle: 34, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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Dr. Manisha Shrestha (CoI)	Monash University

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(2) SN-2023IXF	WFC3/UVIS	1	18-Aug-2026 11:03:19.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
02	(2) SN-2023IXF	WFC3/UVIS	1	18-Aug-2026 11:03:20.0	yes
03	(1) SN-2024GGI	WFC3/UVIS	1	18-Aug-2026 11:03:20.0	yes
04	(1) SN-2024GGI	WFC3/UVIS	1	18-Aug-2026 11:03:20.0	yes

4 Total Orbits Used

ABSTRACT

A growing number of Type IIP supernovae (SNe IIP) display early and sustained circumstellar medium (CSM) interaction, requiring CSM masses that challenge the observed mass-loss rates of their red supergiant progenitors. This suggests red supergiants may experience a period of enhanced mass loss at the end of their lives. SN 2023ixf and SN 2024ggi, the nearest and best-observed SNe IIP in the past decade, provide the ideal laboratory to understand this phenomenon. We propose multi-cycle HST imaging in the UV and optical to map the distribution and composition of the CSM surrounding SN 2023ixf and SN 2024ggi. These observations target two complementary probes: UV emission from ongoing ejecta-CSM interaction and optical light echoes from more distant material. Together, this data will constrain the geometry, radial extent, and density of the CSM, ultimately providing critical insight into the mechanisms that drive late-stage mass loss. Long-term HST imaging will add to existing and planned multi-wavelength observations and establish SN 2023ixf and SN 2024ggi as benchmark SNe IIP for decades to come.

OBSERVING DESCRIPTION

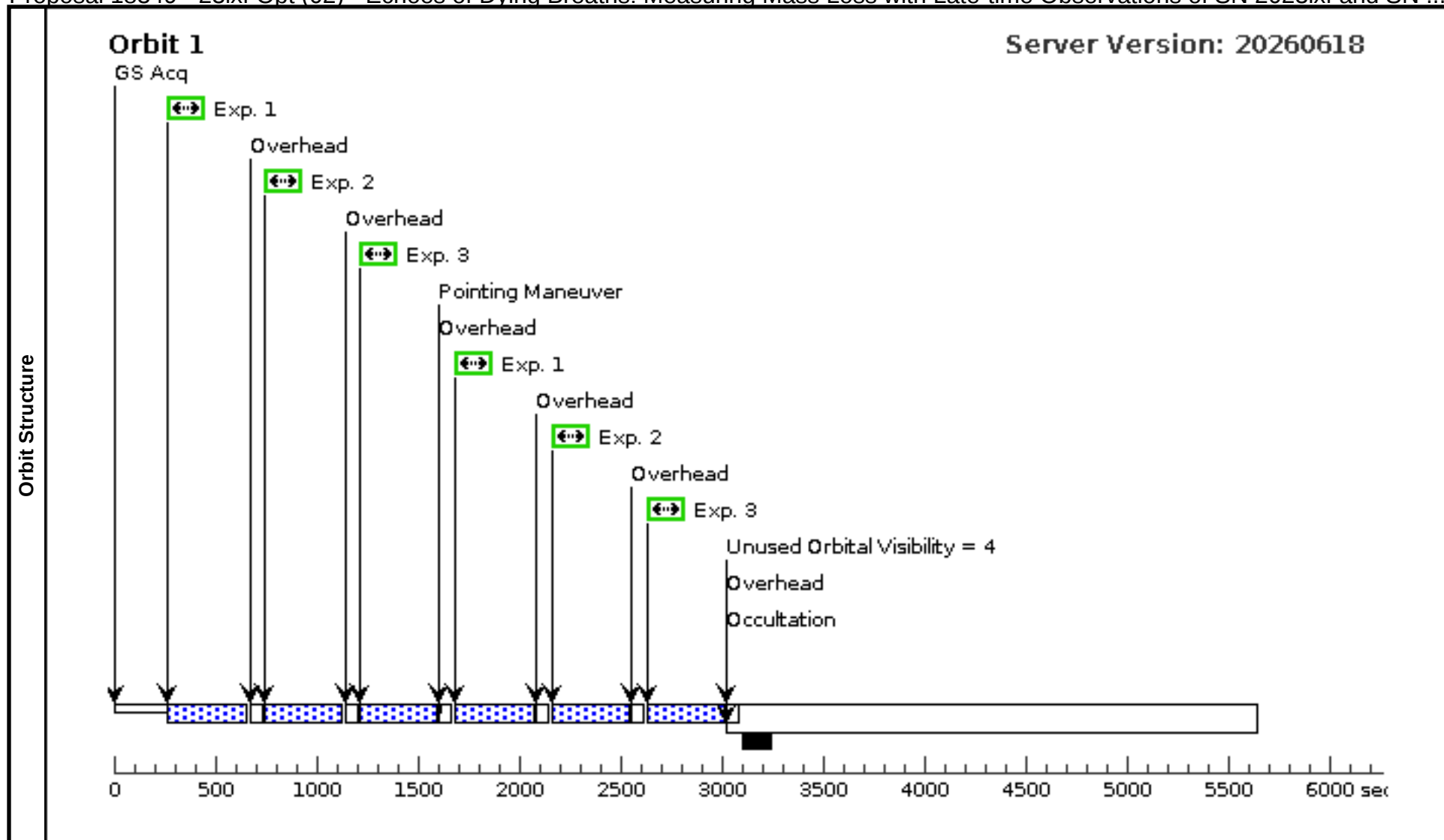
In order to monitor the evolution of SN 2023ixf and SN 2024ggi we request 4 orbits total of WFC3/UVIS imaging. One for each supernovae to get F275W and F390W imaging (therefore 2 total) that will assess the evolution of any Mg II resulting from interaction between the circumstellar material and supernova ejecta. An additional orbit for each supernovae (2 total) will be for F438W, F555W, and F814W imaging to map the optical evolution and the creation of any light echoes. Both SN 2023ixf and SN 2024ggi are located in star forming regions in their respective host galaxies, we therefore opt to use the sub array to allow for shorter exposures of the regions.

Proposal 18349 - 23ixf UV (01) - Echoes of Dying Breaths: Measuring Mass Loss with Late-time Observations of SN 2023ixf and SN 2...

Visit	Proposal 18349, 23ixf UV (01)					Tue Aug 18 15:03:21 GMT 2026				
	Diagnostic Status: Warning									
	Scientific Instruments: WFC3/UVIS									
	Special Requirements: GROUP 01,02 WITHIN 2 Orbits									
Diagnostics	(F390W (01.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Patterns	#	Primary Pattern			Secondary Pattern		Exposures			
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1-2)			
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	SN-2023IXF	RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000	Epoch of Position: 2000	V=21.5	Reference Frame: ICRS				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=STAR Description=[SUPERNOVA, SUPERNOVA TYPE II]									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F275W	(2) SN-2023IXF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F275W	FLASH=20		Pattern 2, Exps 1-2 in 23ixf UV (01) (2)	604 Secs (1208 Secs)	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	
2	F390W	(2) SN-2023IXF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F390W				Pattern 2, Exps 1-2 in 23ixf UV (01) (2)	580 Secs (1160 Secs)	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	
Orbit Structure	Orbit 1 Server Version: 20260618 GS Acq Exp. 1 Overhead Exp. 2 Overhead Exp. 1 Overhead Exp. 2 Overhead Occultation Unused Orbital Visibility = 0 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 sec									

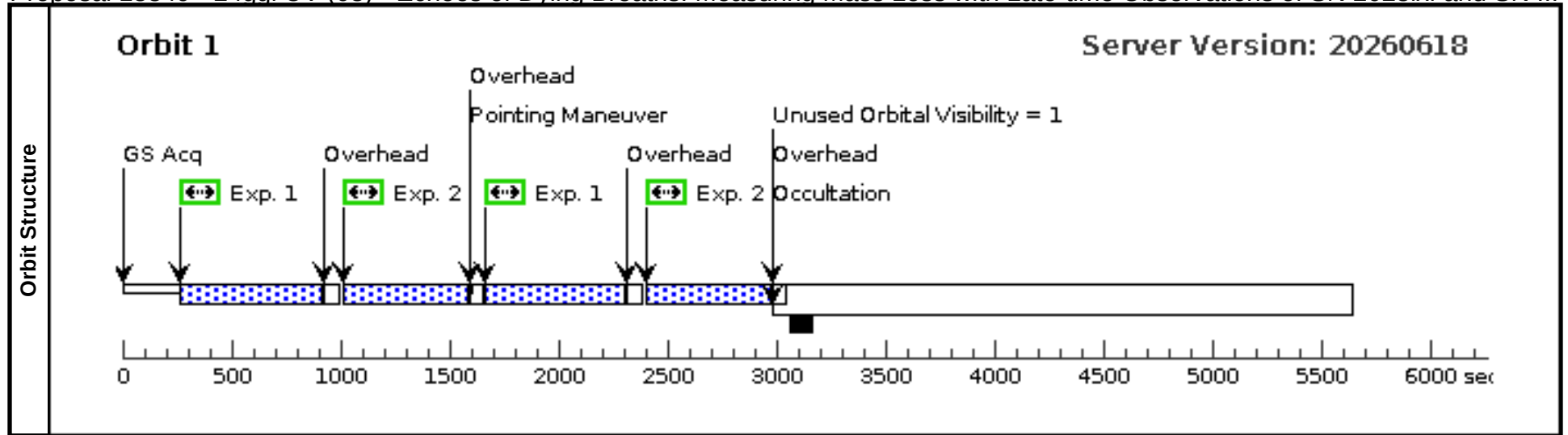
Proposal 18349 - 23ixf Opt (02) - Echoes of Dying Breaths: Measuring Mass Loss with Late-time Observations of SN 2023ixf and SN ...

Visit	Proposal 18349, 23ixf Opt (02)										Tue Aug 18 15:03:21 GMT 2026		
	Diagnostic Status: Warning												
	Scientific Instruments: WFC3/UVIS												
	Special Requirements: GROUP 02,01 WITHIN 2 Orbits												
Diagnostics	(F438W (02.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser												
	(F555W (02.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser												
	(F814W (02.003)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=					Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1-3)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(2)	SN-2023IXF		RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000		Epoch of Position: 2000		V=21.5		Reference Frame: ICRS			
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.												
	Category=STAR Description=[SUPERNOVA, SUPERNOVA TYPE II]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	F438W	(2) SN-2023IXF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F438W			Pattern 2, Exps 1-3 i n 23ixf Opt (02) (2)	362 Secs (724 Secs)			
										[==>(Pattern 1)]		[1]	
										[==>(Pattern 2)]			
	2	F555W	(2) SN-2023IXF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F555W			Pattern 2, Exps 1-3 i n 23ixf Opt (02) (2)	362 Secs (724 Secs)			
										[==>(Pattern 1)]		[1]	
										[==>(Pattern 2)]			
	3	F814W	(2) SN-2023IXF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F814W	FLASH=5		Pattern 2, Exps 1-3 i n 23ixf Opt (02) (2)	362 Secs (724 Secs)			
										[==>(Pattern 1)]		[1]	
										[==>(Pattern 2)]			



Proposal 18349 - 24ggi UV (03) - Echoes of Dying Breaths: Measuring Mass Loss with Late-time Observations of SN 2023ixf and SN ...

Visit	Proposal 18349, 24ggi UV (03)										Tue Aug 18 15:03:21 GMT 2026			
	Diagnostic Status: Warning													
	Scientific Instruments: WFC3/UVIS													
	Special Requirements: GROUP 03,04 WITHIN 2 Orbits													
Diagnostics	(F390W (03.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser													
Patterns	#	Primary Pattern					Secondary Pattern					Exposures		
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Coordinate Frame=POS-TARG Pattern Orientation=46.84 Purpose=DITHER Angle Between Sides= Number Of Points=2 Center Pattern=false Point Spacing=0.145 Line Spacing=										(1-2)		
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous				
	(1)	SN-2024GGI		RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000		Epoch of Position: 2000		V=21.5		Reference Frame: ICRS				
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.													
	Category=STAR Description=[SUPERNOVA, SUPERNOVA TYPE II]													
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit		
	1	F275W	(1) SN-2024GGI	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F275W	FLASH=20		Pattern 2, Exps 1-2 in 24ggi UV (03) (2)	600 Secs (1234 Secs)				
										[==>617.0 Secs (Pattern 1)] [==>617.0 Secs (Pattern 2)]		[1]		
	2	F390W	(1) SN-2024GGI	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F390W			Pattern 2, Exps 1-2 in 24ggi UV (03) (2)	530 Secs (1094 Secs)				
										[==>547.0 Secs (Pattern 1)] [==>547.0 Secs (Pattern 2)]		[1]		



Proposal 18349 - 24ggi Opt (04) - Echoes of Dying Breaths: Measuring Mass Loss with Late-time Observations of SN 2023ixf and SN ...

Visit	Proposal 18349, 24ggi Opt (04)										Tue Aug 18 15:03:21 GMT 2026	
	Diagnostic Status: Warning											
	Scientific Instruments: WFC3/UVIS											
	Special Requirements: GROUP 04.03 WITHIN 2 Orbits											
Diagnostics	(F438W (04.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser											
	(F555W (04.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser											
	(F814W (04.003)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(2)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false				(1-3)		
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	SN-2024GGI		RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000		Epoch of Position: 2000		V=21.5		Reference Frame: ICRS		
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=STAR Description=[SUPERNOVA, SUPERNOVA TYPE II]											
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	F438W	(1) SN-2024GGI	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F438W			Pattern 2, Exps 1-3 i n 24ggi Opt (04) (2)	356 Secs (712 Secs)		
									[==>(Pattern 1)]		[1]	
									[==>(Pattern 2)]			
	2	F555W	(1) SN-2024GGI	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F555W			Pattern 2, Exps 1-3 i n 24ggi Opt (04) (2)	356 Secs (712 Secs)		
									[==>(Pattern 1)]		[1]	
									[==>(Pattern 2)]			
	3	F814W	(1) SN-2024GGI	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F814W	FLASH=5		Pattern 2, Exps 1-3 i n 24ggi Opt (04) (2)	356 Secs (712 Secs)		
									[==>(Pattern 1)]		[1]	
								[==>(Pattern 2)]				

