18109 - Lightning Strikes Twice: A Panchromatic View of Shock Power in the Closest Type II Supernovae of the Decade

Cycle: 33, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN-2023IXF (3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD STIS/FUV-MAMA	2	30-Jan-2026 12:00:28.0	yes
02	(1) SN-2023IXF (3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD STIS/NUV-MAMA	2	30-Jan-2026 12:00:29.0	yes
03	(2) SN-2024GGI	STIS/CCD STIS/FUV-MAMA	2	30-Jan-2026 12:00:29.0	yes
04	(2) SN-2024GGI	STIS/CCD STIS/NUV-MAMA	2	30-Jan-2026 12:00:30.0	yes

8 Total Orbits Used

ABSTRACT

Late-time observations of type II supernovae (SNe II) are a window into the uncertain mass-loss history of their red supergiant (RSG) star progenitors as well as a direct probe of the physics of shock interaction as SN ejecta collide with distant circumstellar material (CSM). We propose a long term monitoring program to obtain HST UV spectroscopy of SNe II 2023ixf and 2024ggi, the closest SNe of the decade, that currently show excess X-ray-to-radio emission at late-times from on-going CSM interaction. This unprecedented multi-wavelength campaign will enable the first spectral energy distributions of their kind, capable of directly constraining the unknown thermalization efficiency of radiation produced by the SN shock and the characterization of UV emission line spectra from the post-shock gas. These observations will also directly constrain the highly debated mass-loss histories of RSGs in the final centuries-to-millenia before core-collapse.

OBSERVING DESCRIPTION

This program is to observe SN 2023ixf and SN 2024ggi in the FUV and NUV. Each object will be observed once during Cycle 33 with 4 orbits (2 FUV, 2 NUV) per object. The faintest SN 2023ixf will be during the cycle is V=20mag and the faintest SN 2024ggi will be is V=21 mag.

Visit

Proposal 18109, 2023ixf - Epoch 1 - FUV (01), implementation Fri Jan 30 17:00:30 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

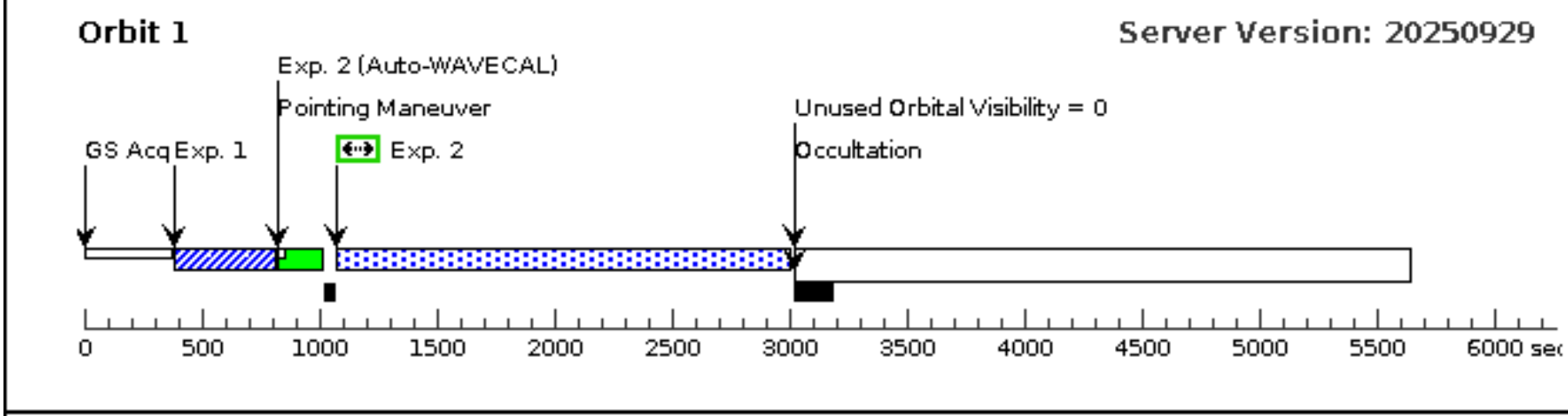
Fixed Targets

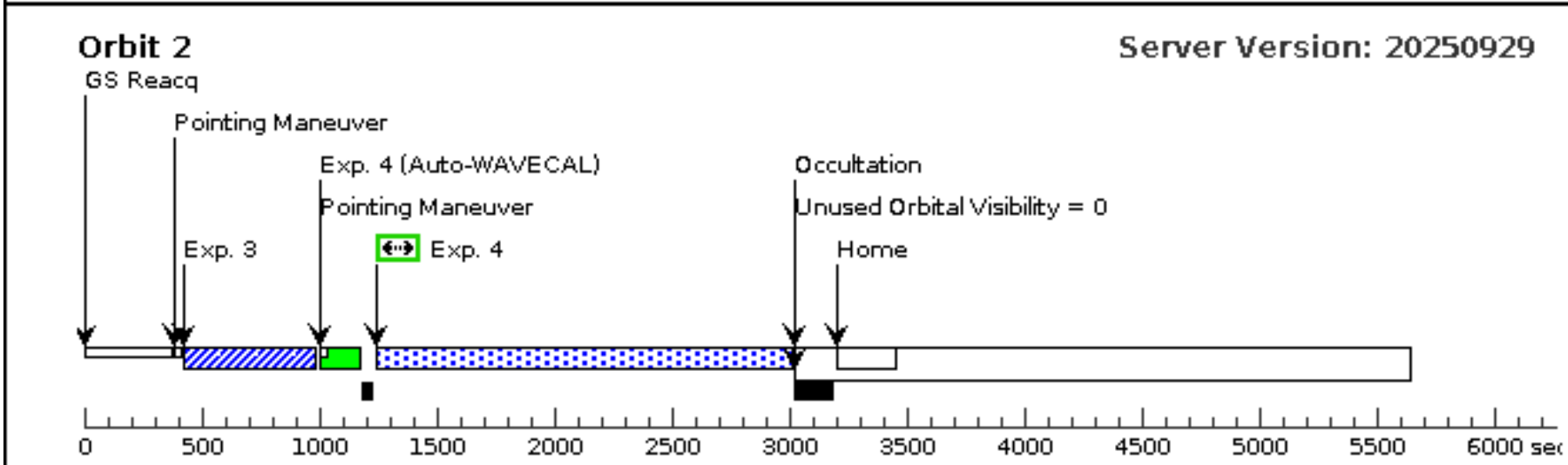
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-2023IXF	RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000	Epoch of Position: 2000	V=19.5	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=EXT-STAR* *Description=[SUPERNOVA TYPE II]*					
(3)	SN23IXF-OFFSET-LEGACY5313	RA: 14 03 39.8499 (210.9160413d) Dec: +54 18 6.99 (54.30194d) Equinox: J2000		V=20.5	Reference Frame: ICRS
Comments: g=20.48, r=20.43, z=20.39 *Category=EXT-STAR* *Description=[K V-IV]*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA orbit 1 - offset (STIS.ta.2025541)	(3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD, ACQ, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>]*	*[1]*
2	FUV orbit 1 (STIS.sp.2025540)	(1) SN-2023IXF	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=8000			1919 Secs (1919 Secs) *[==>]*	*[1]*
3	TA orbit 2 - offset (STIS.ta.2025541)	(3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD, ACQ, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>]*	*[2]*
4	FUV orbit 2 (STIS.sp.2025540)	(1) SN-2023IXF	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=8000			1755 Secs (1755 Secs) *[==>]*	*[2]*

Orbit Structure





Visit

Proposal 18109, 2023ixf - Epoch 1 - NUV (02), implementation Fri Jan 30 17:00:31 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: (none)

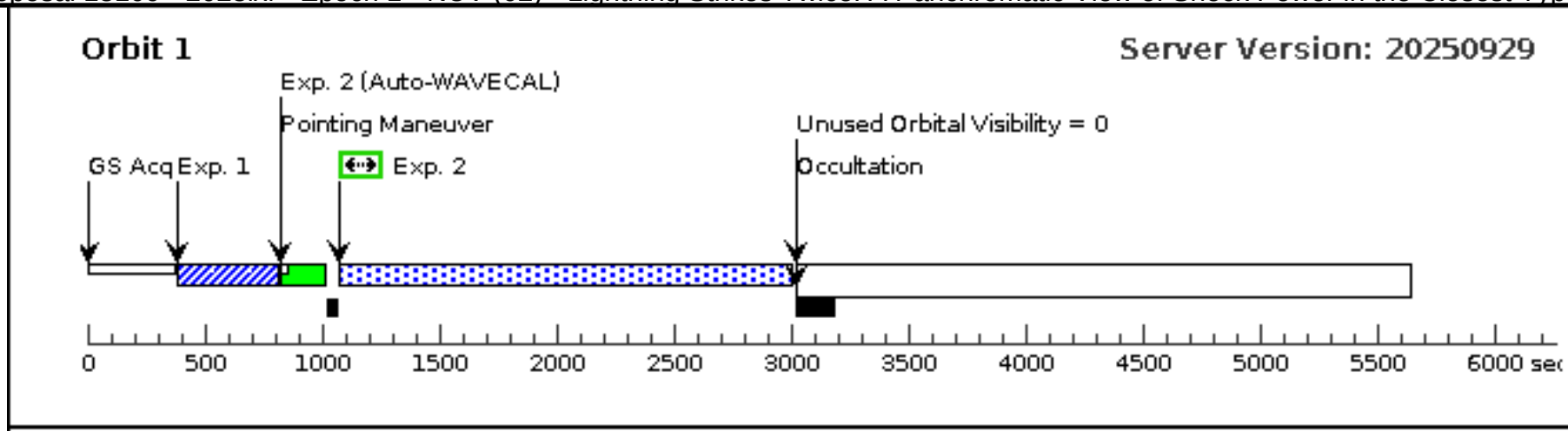
Fixed Targets

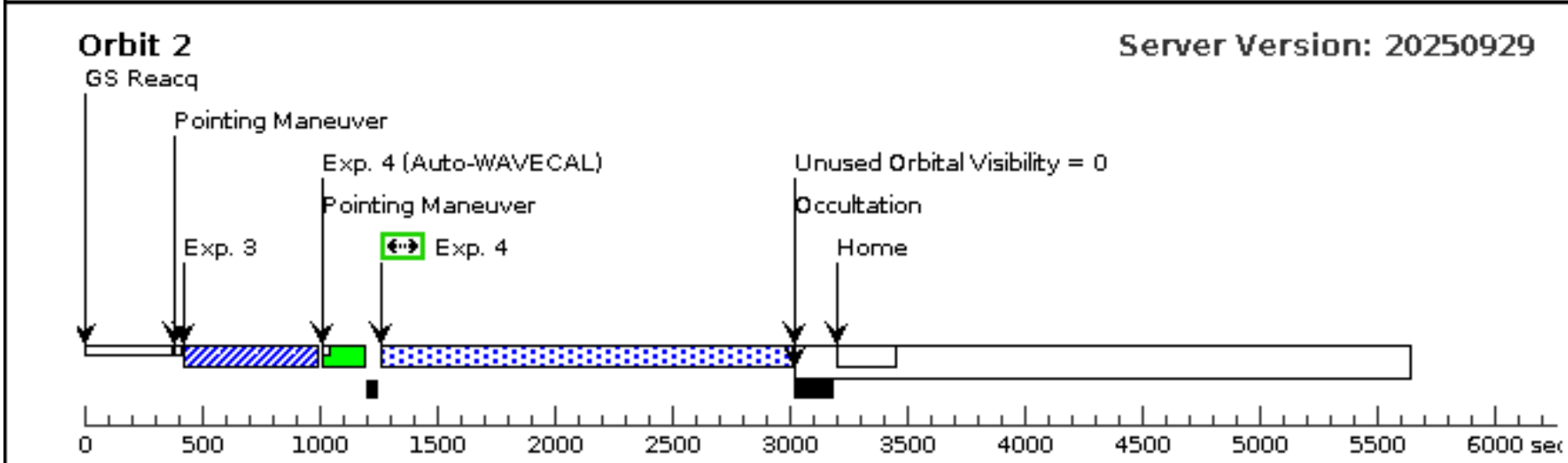
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-2023IXF	RA: 14 03 38.5620 (210.9106750d) Dec: +54 18 41.94 (54.31165d) Equinox: J2000	Epoch of Position: 2000	V=19.5	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=EXT-STAR* *Description=[SUPERNOVA TYPE II]*					
(3)	SN23IXF-OFFSET-LEGACY5313	RA: 14 03 39.8499 (210.9160413d) Dec: +54 18 6.99 (54.30194d) Equinox: J2000		V=20.5	Reference Frame: ICRS
Comments: g=20.48, r=20.43, z=20.39 *Category=EXT-STAR* *Description=[K V-IV]*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA orbit 1 - offset (STIS.ta.2025541)	(3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD, ACQ, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>]*	***[1]***
2	NUV orbit 1 (STIS.sp.2025542)	(1) SN-2023IXF	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=1200			1919 Secs (1919 Secs) *[==>]*	***[1]***
3	TA orbit 2 - offset (STIS.ta.2025541)	(3) SN23IXF-OFFSET-LEGACY5313	STIS/CCD, ACQ, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>]*	***[2]***
4	NUV orbit 2 (STIS.sp.2025542)	(1) SN-2023IXF	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=1200			1735 Secs (1735 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 18109, 2024ggi - Epoch 1 - FUV (03), implementation Fri Jan 30 17:00:31 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Diagnostics

(2024ggi - Epoch 1 - FUV (03)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Fixed Targets

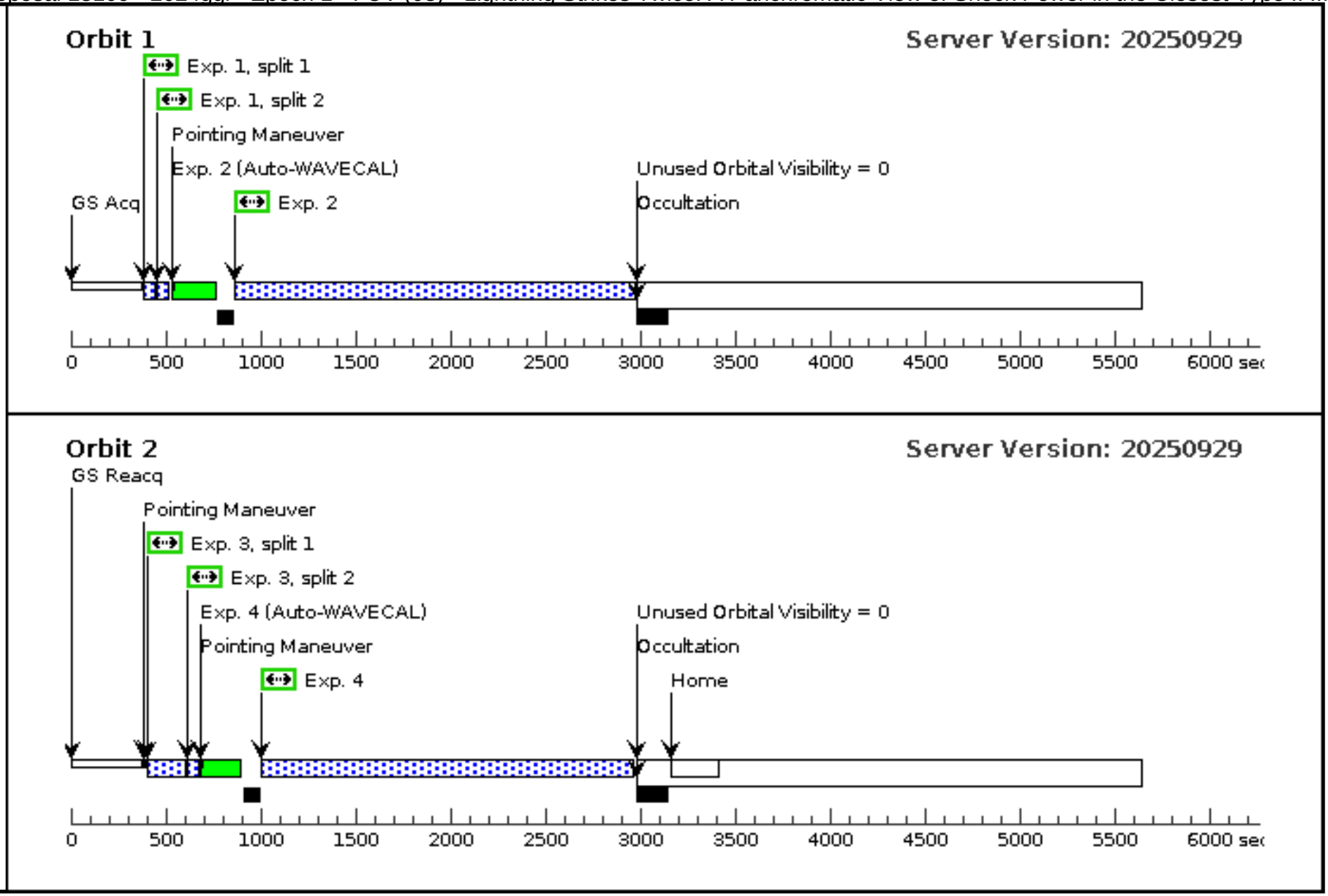
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN-2024GGI	RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000	Epoch of Position: 2000	V=18	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=EXT-STAR
Description=[SUPERNOVA TYPE II]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA orbit 1 (STIS.ta.2025558)	(2) SN-2024GGI	STIS/CCD, ACCUM, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2	FUV orbit 1 (STIS.sp.2025556)	(2) SN-2024GGI	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=8100			2092 Secs (2092 Secs) *[==>]*	***[1]***
3	TA orbit 2 (STIS.ta.2025558)	(2) SN-2024GGI	STIS/CCD, ACCUM, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
4	FUV orbit 2 (STIS.sp.2025556)	(2) SN-2024GGI	STIS/FUV-MAMA, TIME-TAG, 52X0.2	G140L 1425 A	BUFFER-TIME=8100			1951 Secs (1951 Secs) *[==>]*	***[2]***

Orbit Structure



Visit

Proposal 18109, 2024ggi - Epoch 1 - NUV (04), implementation Fri Jan 30 17:00:31 GMT 2026

Diagnostic Status: Warning

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: (none)

Diagnostics

(2024ggi - Epoch 1 - NUV (04)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN-2024GGI	RA: 11 18 22.0870 (169.5920292d) Dec: -32 50 15.27 (-32.83758d) Equinox: J2000	Epoch of Position: 2000	V=18	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=EXT-STAR
Description=[SUPERNOVA TYPE II]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	TA orbit 1 (STIS.ta.2025558)	(2) SN-2024GGI	STIS/CCD, ACCUM, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2	NUV orbit 1 (STIS.sp.2025561)	(2) SN-2024GGI	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=1600			2092 Secs (2092 Secs) *[==>]*	***[1]***
3	TA orbit 2 (STIS.ta.2025558)	(2) SN-2024GGI	STIS/CCD, ACCUM, F28X50LP	MIRROR				50 Secs (50 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
4	NUV orbit 2 (STIS.sp.2025561)	(2) SN-2024GGI	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=1600			1931 Secs (1931 Secs) *[==>]*	***[2]***

Orbit Structure