



18084 - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Cycle: 33, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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Dr. Sebastian Gomez (CoI)	University of Texas at Austin
Dr. Justin Pierel (CoI)	Space Telescope Science Institute
Dr. Melissa Shahbandeh (CoI)	Space Telescope Science Institute

<i>Name</i>	<i>Institution</i>
Dr. Armin Rest (CoI)	Space Telescope Science Institute

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-2024ABFO	WFC3/UVIS	1	01-May-2026 18:00:14.0	yes
02	(3) SN-2024ISS	WFC3/UVIS	1	01-May-2026 18:00:14.0	yes
03	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
07	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
04	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
08	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
09	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
05	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:15.0	yes
10	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:16.0	yes
06	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:16.0	yes
11	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:16.0	yes
12	(1) SN-2022JLI	WFC3/UVIS	1	01-May-2026 18:00:16.0	yes

12 Total Orbits Used

ABSTRACT

Binary physics is important as >60% massive stars form in some kind of interacting binary system. The identification of progenitor systems of stripped-envelope supernovae (SESNe) offers one means to directly constrain binary evolution pathways, with implications ranging from the evolution of massive stars to the integrated stellar light from distant galaxies. Although the method by which SESN progenitors lose their envelopes remains uncertain, growing evidence have been shifting the paradigm from single star models to binary models. In recent years, five direct detections of surviving companions to SESN have been detected. However, the sample size is still too small to be statistically meaningful. Since suitable candidates for this type of search are rare, each additional new data point carries significant statistical weight. Here, we propose deep WFC3/UVIS optical and UV imaging of the only suitable SESNe target for a deep companions search in Cycle 33: SN 2022jli, which already has strong evidence of having a surviving companion. As with other companion searches, we plan to detect or place meaningful limits on any surviving companion. We

also propose one orbit each to obtain F555W astrometry on the recent SN2024abfo and SN2024iss for potential future follow-up companion searches. This study will utilize HST's unique UV capabilities and build a statistically significant sample that will advance our current understanding of binary evolution. Given the rarity of relevant events and the limited HST lifetime, acquiring these observations is critical.

OBSERVING DESCRIPTION

In this proposal, we will obtain deep WFC3/UVIS optical and UV imaging of the explosion site of SN 2022jli in order to either detect or place meaningful limits on any surviving companion to the supernova progenitor. Specifically, we will observe in the F336W, F438W, and F555W filters with total exposures time of 12880, 8295 and 3807 seconds, respectively. The source is expected to be faint, so we have placed it at the UVIS2-512C-CTE aperture. However, we read out the entire array to increase the number of stars that can be used for image alignment.

The impacts of a reduced gyro operations on this program are primarily reduced schedulability due to the smaller field of regard. To help mitigate, we have split the 10 orbits allocated to observations of SN2022jli into four visits with 2 or 3 orbits each. However, as the target is expected to be variably on the timescale of ~year, and we wish to use the observations in three filters to place constraints on the SED of the surviving companion, we require that all orbits are obtained within ~1 month (30 days) of each other. We have implemented manual dithering via the POS TARG values for the observations in different filters that will be split between different visits.

Finally, we also obtain one orbit of imaging each for the fields of SN2024abfo and SN2024iss. Our goal is image the supernova themselves to obtain precise astrometry for the explosions.

Proposal 18084 - SN2024ABFO Astrometry (01) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

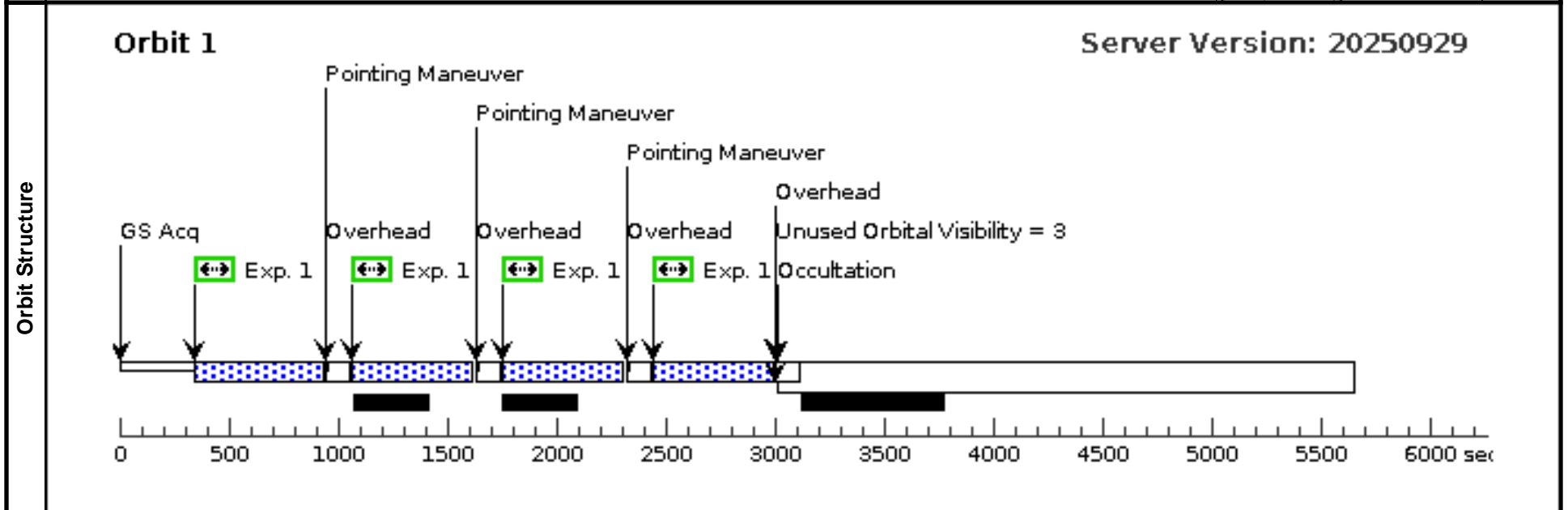
Visit	Proposal 18084, SN2024ABFO Astrometry (01), scheduled Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)		
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Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false	(1)

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	SN-2024ABFO	RA: 03 57 25.6220 (59.3567583d) Dec: -46 11 7.67 (-46.18546d) Equinox: J2000		V=25	Reference Frame: ICRS

Comments:
Category=EXT-STAR
Description=[SUPERNOVA]

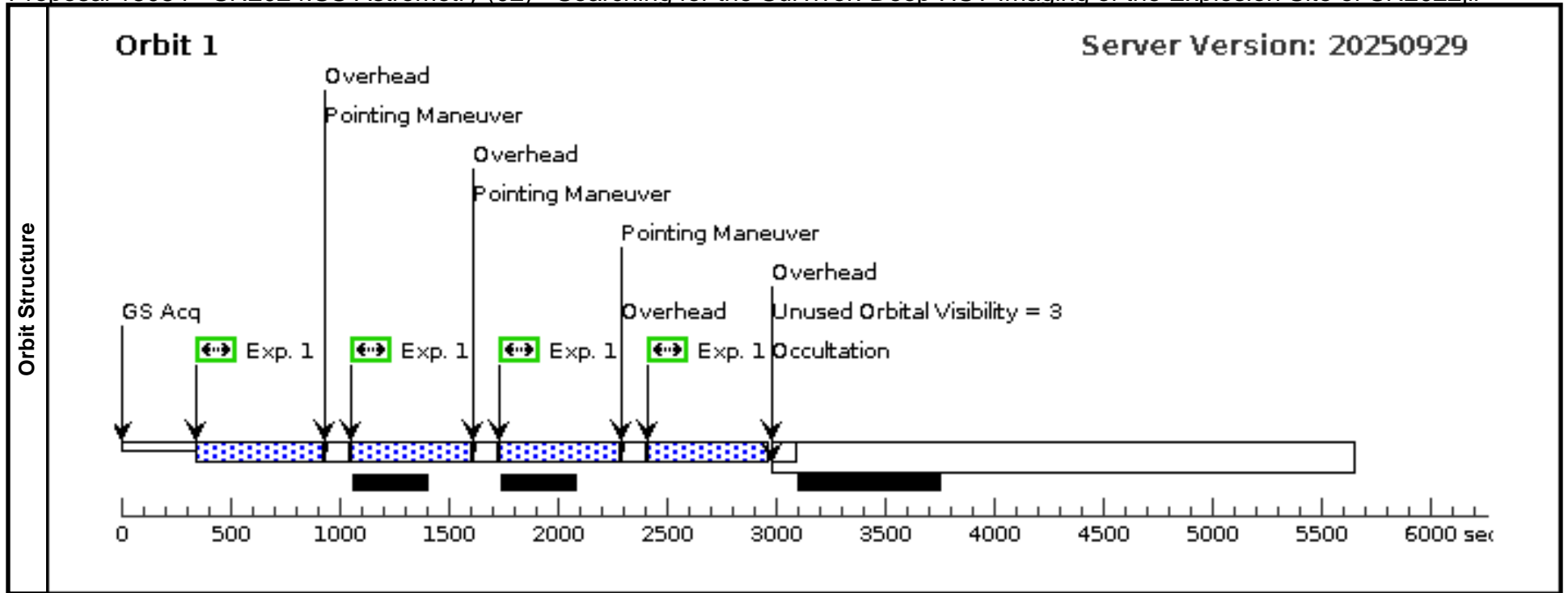
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	SN2024ABFO (WFC3UVIS.im.2025329)	(2) SN-2024ABFO	WFC3/UVIS, ACCUM, UVIS2	F555W	FLASH=3			Pattern 1, Exps 1-1 in SN2024ABFO Astrometry (01) (1)	556 Secs (2224 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]



Proposal 18084 - SN2024ISS Astrometry (02) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2024ISS Astrometry (02), scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
(1)		Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112				Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false			(1)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(3)	SN-2024ISS	RA: 12 59 6.1300 (194.7755417d) Dec: +28 48 42.62 (28.81184d) Equinox: J2000				V=25	Reference Frame: ICRS			
Comments: Category=EXT-STAR Description=[SUPERNOVA]											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	SN2024ISS (WFC3UV1 S.im.2025328)	(3) SN-2024ISS	WFC3/UVIS, ACCUM, UVIS2	F555W	FLASH=3		Pattern 1, Exps 1-1 in SN2024ISS Astrometry (02) (1)	549 Secs (2196 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]



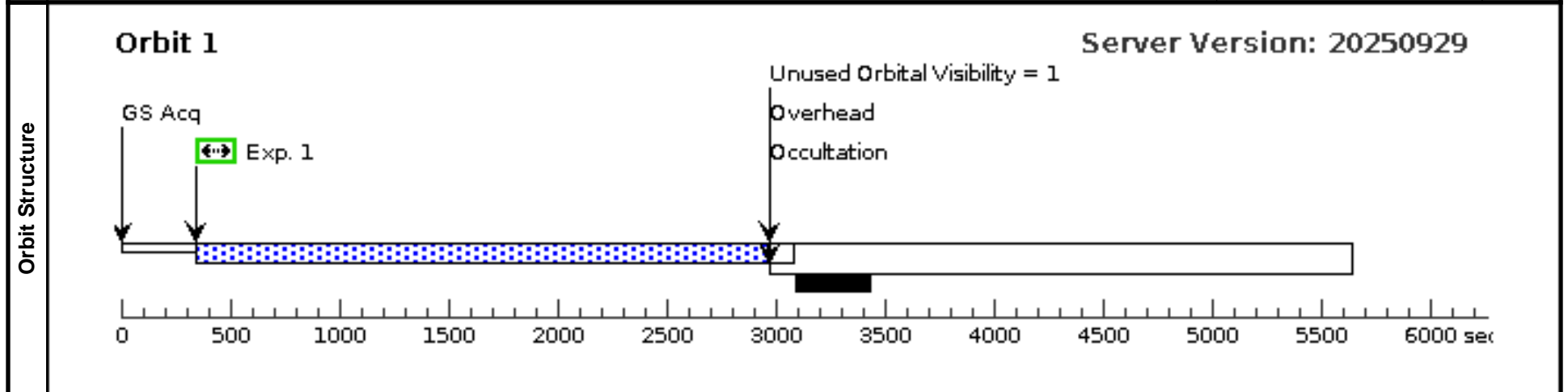
Proposal 18084 - SN2022JLI-UV1 (03) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022JLI-UV1 (03), scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i>					
	Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F336W (WFC3UVI S.im.202533 3)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F336W	FLASH=9	POS TARG 0,0		2588 Secs (2588 Secs)	
									[==>]	[1]



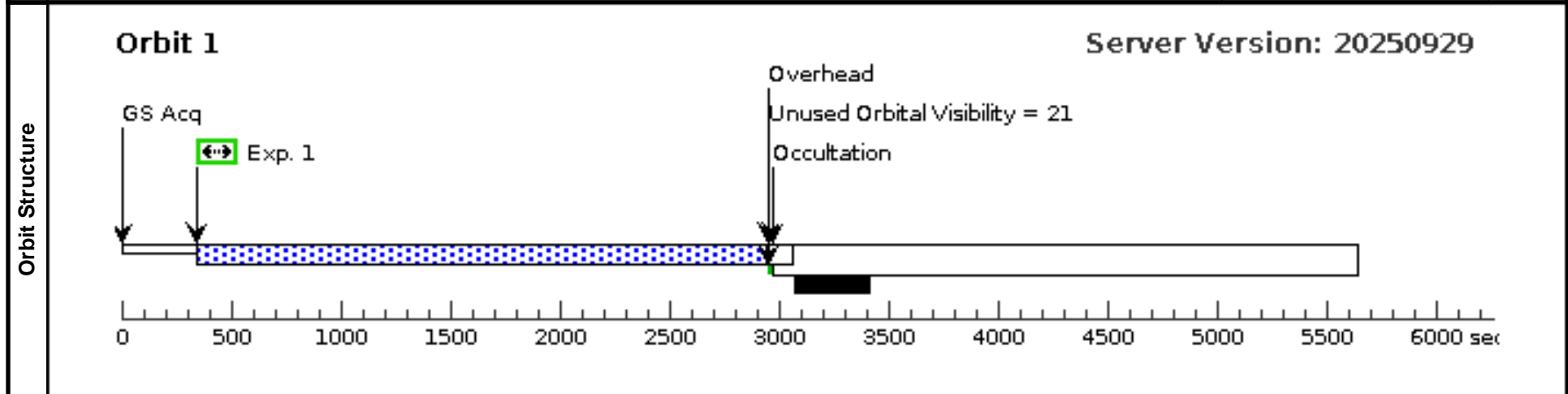
Proposal 18084 - SN2022JLI-UV1 (07) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022JLI-UV1 (07)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i>					
	<i>Category=EXT-STAR</i>					
	<i>Description=[SUPERNOVA]</i>					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F336W (WFC3UVI S.im.202533 3)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F336W	FLASH=9	POS TARG 0.1719,0 .1837		2568 Secs (2568 Secs)	
									[==>]	[1]



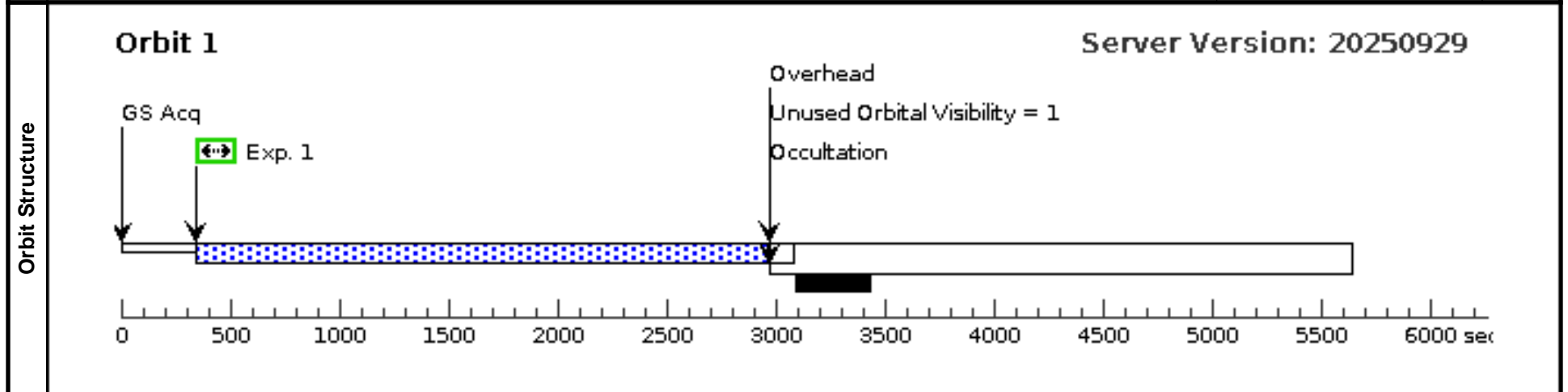
Proposal 18084 - SN2022JLI-UV2 (04) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022JLI-UV2 (04), scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i>					
	Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F336W (WFC3UVI S.im.202533 3)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F336W	FLASH=9	POS TARG 0.3437,0.3674		2588 Secs (2588 Secs)	
									[=>]	[1]



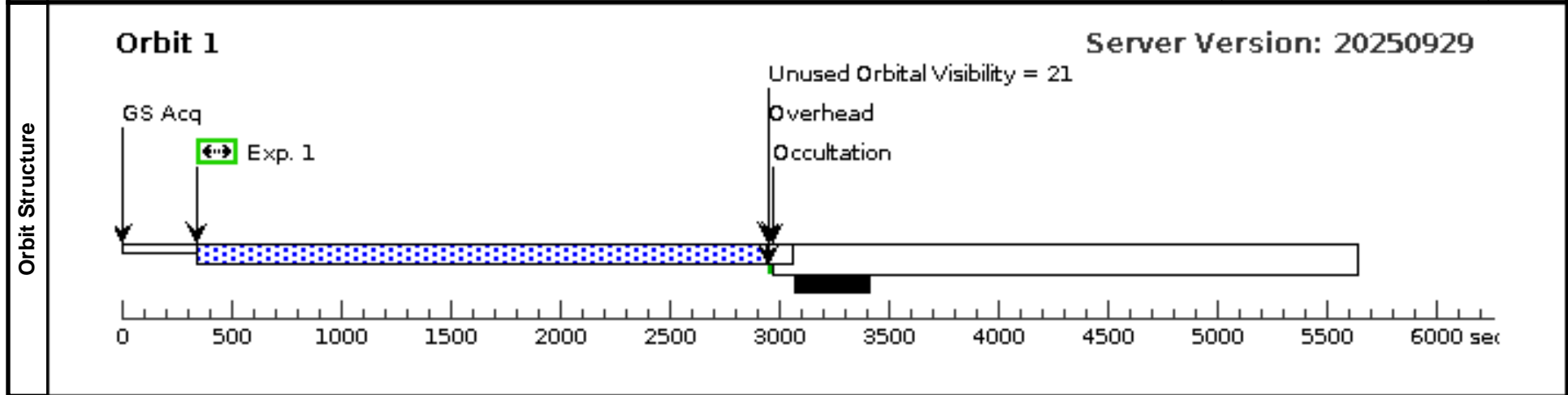
Proposal 18084 - SN2022JLI-UV2 (08) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022JLI-UV2 (08)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F336W (WFC3UVI S.im.202533 3)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F336W	FLASH=9	POS TARG 0.4760,0 .5286		2568 Secs (2568 Secs)	
									[==>]	[1]



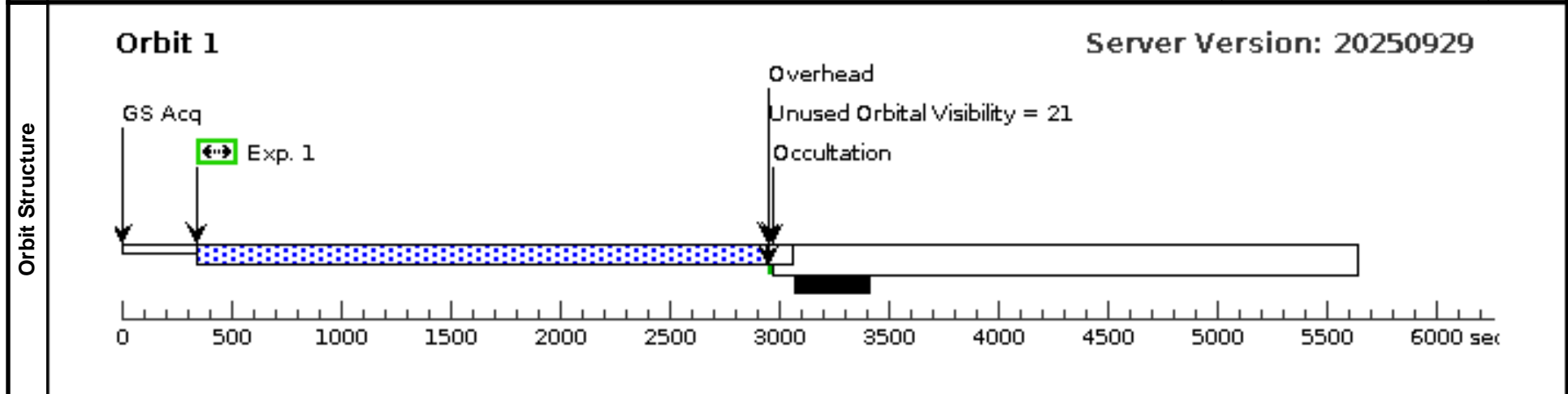
Proposal 18084 - SN2022JLI-UV2 (09) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022JLI-UV2 (09)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F336W (WFC3UVI S.im.202533 3)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F336W	FLASH=9	POS TARG 0.6544,0 .6796		2568 Secs (2568 Secs)	
									[==>]	[1]



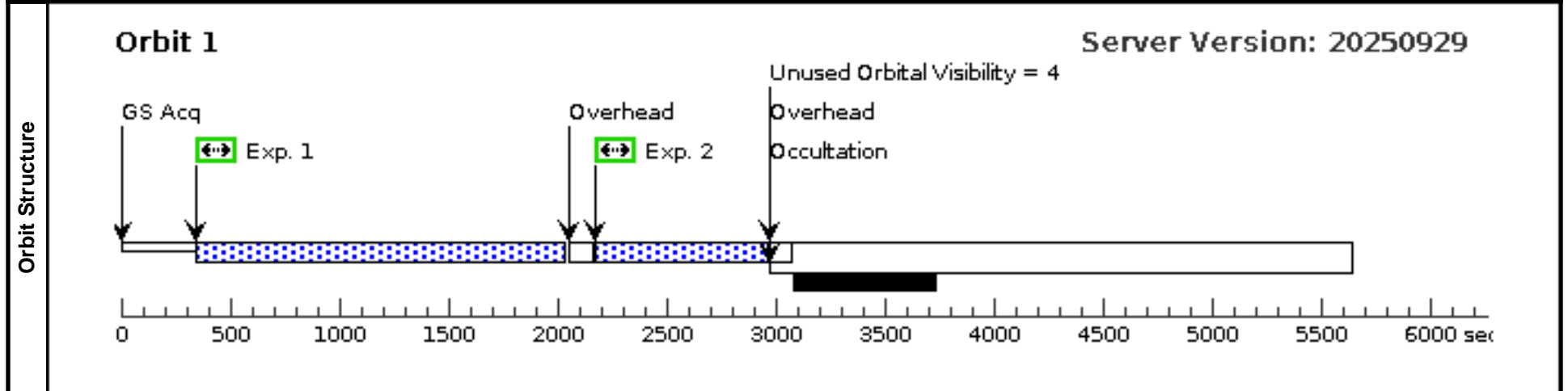
Proposal 18084 - SN2022jli-VIS1 (05) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022jli-VIS1 (05), scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i>					
	Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F438W (WFC3UVI S.im.202533 6)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F438W	FLASH=3	POS TARG 0,0		1665 Secs (1665 Secs) [==>]	[1]
	2	F555W (WFC3UVI S.im.202533 7)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F555W		SAME POS AS 1		765 Secs (765 Secs) [==>]	[1]



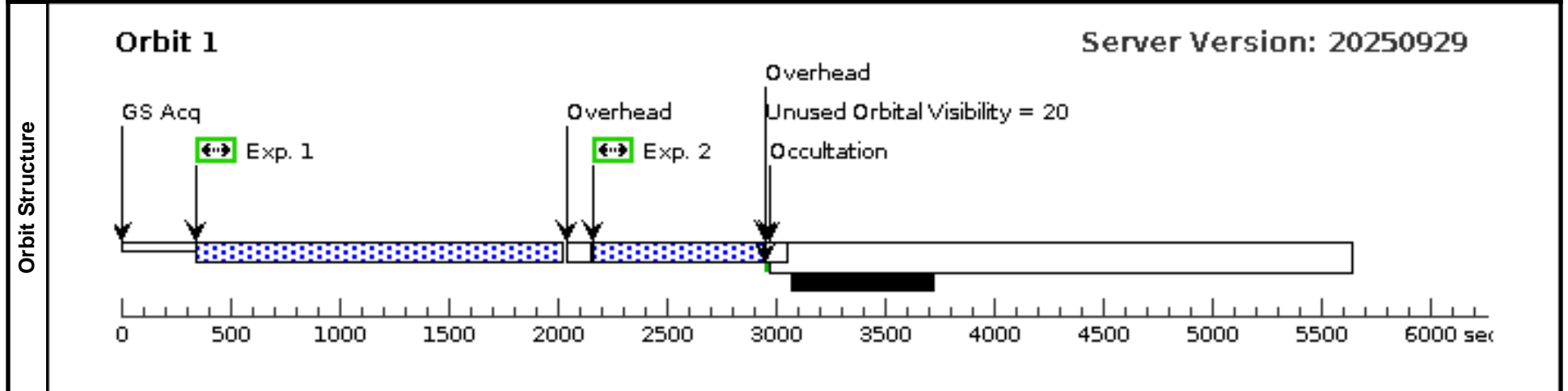
Proposal 18084 - SN2022jli-VIS1 (10) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022jli-VIS1 (10)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F438W (WFC3UVI S.im.202533 6)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F438W	FLASH=3	POS TARG 0.1719,0 .1837		1655 Secs (1655 Secs) [==>]	[1]
	2	F555W (WFC3UVI S.im.202533 7)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F555W		SAME POS AS 1		759 Secs (759 Secs) [==>]	[1]



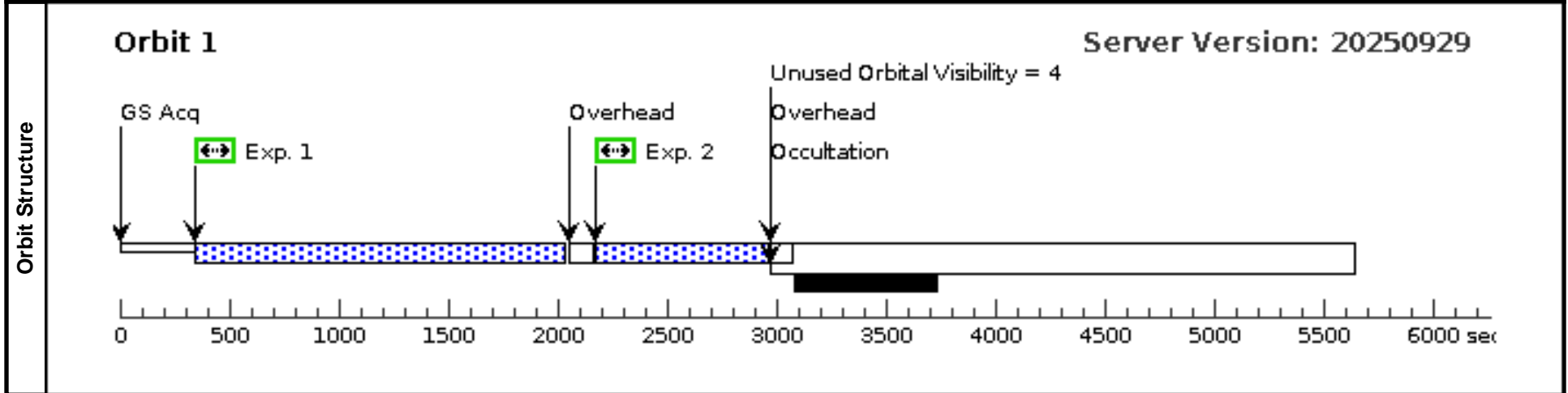
Proposal 18084 - SN2022jli-VIS2 (06) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022jli-VIS2 (06), scheduling				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F438W (WFC3UVI S.im.202533 6)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F438W	FLASH=3	POS TARG 0.3437,0.3674		1665 Secs (1665 Secs) [==>]	[1]
	2	F555W (WFC3UVI S.im.202533 7)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F555W		SAME POS AS 1		765 Secs (765 Secs) [==>]	[1]



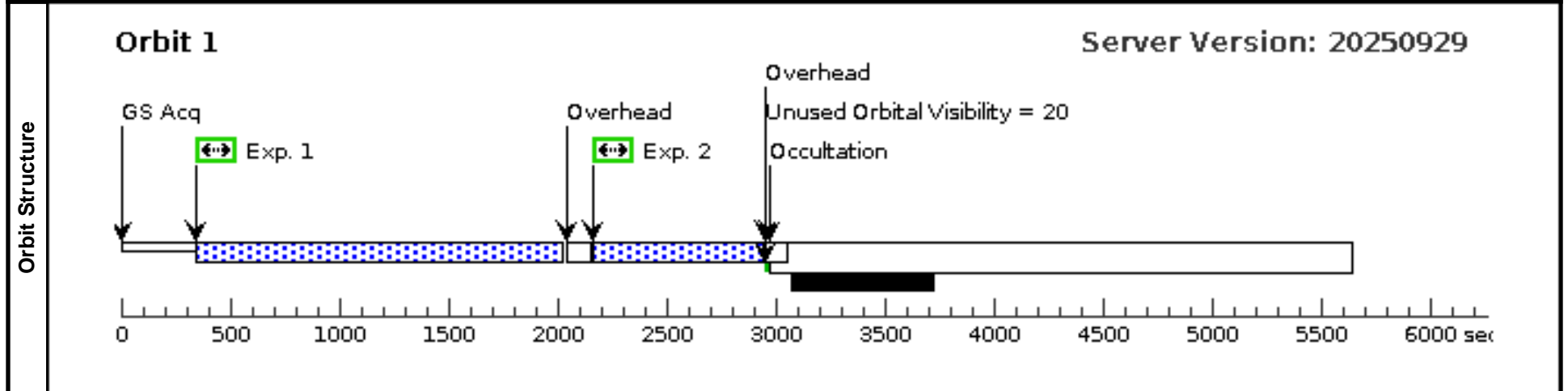
Proposal 18084 - SN2022jli-VIS2 (11) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022jli-VIS2 (11)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F438W (WFC3UVI S.im.202533 6)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F438W	FLASH=3	POS TARG 0.4760,0 .5286		1655 Secs (1655 Secs) [==>]	[1]
	2	F555W (WFC3UVI S.im.202533 7)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F555W		SAME POS AS 1		759 Secs (759 Secs) [==>]	[1]



Proposal 18084 - SN2022jli-VIS2 (12) - Searching for the Survivor: Deep HST Imaging of the Explosion Site of SN2022jli

Fri May 01 22:00:17 GMT 2026

Visit	Proposal 18084, SN2022jli-VIS2 (12)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: (none)				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN-2022JLI	RA: 00 34 45.6900 (8.6903750d) Dec: -08 23 12.16 (-8.38671d) Equinox: J2000		V=28	Reference Frame: ICRS
	<i>Comments:</i> Category=EXT-STAR Description=[SUPERNOVA]					

Exposures	#	Label (ETC Run)	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F438W (WFC3UVI S.im.202533 6)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F438W	FLASH=3	POS TARG 0.6544,0 .6796		1655 Secs (1655 Secs) [==>]	[1]
	2	F555W (WFC3UVI S.im.202533 7)	(1) SN-2022JLI	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F555W		SAME POS AS 1		759 Secs (759 Secs) [==>]	[1]

