



18390 - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Hostless Core-Collapse Supernovae

Cycle: 34, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Prof. Daichi Hiramatsu (PI) (Contact)	University of Florida
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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	(1) SN2022AEY	WFC3/UVIS	2	19-Aug-2026 11:04:32.0	yes
02	(2) SN2023IWY	WFC3/UVIS	2	19-Aug-2026 11:04:32.0	yes
03	(3) SN2020DGD	WFC3/UVIS	2	19-Aug-2026 11:04:32.0	yes
04	(4) SN2020SJE	WFC3/UVIS	2	19-Aug-2026 11:04:33.0	yes
05	(5) SN2021STU	WFC3/UVIS	2	19-Aug-2026 11:04:33.0	yes
06	(6) SN2023VKZ	WFC3/UVIS	2	19-Aug-2026 11:04:33.0	yes
07	(7) SN2021KKX	WFC3/UVIS	2	19-Aug-2026 11:04:34.0	yes
08	(8) SN2018IDH	WFC3/UVIS	2	19-Aug-2026 11:04:34.0	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>
09	(9) SN2022WLM	WFC3/UVIS	2	19-Aug-2026 11:04:34.0	yes

18 Total Orbits Used

ABSTRACT

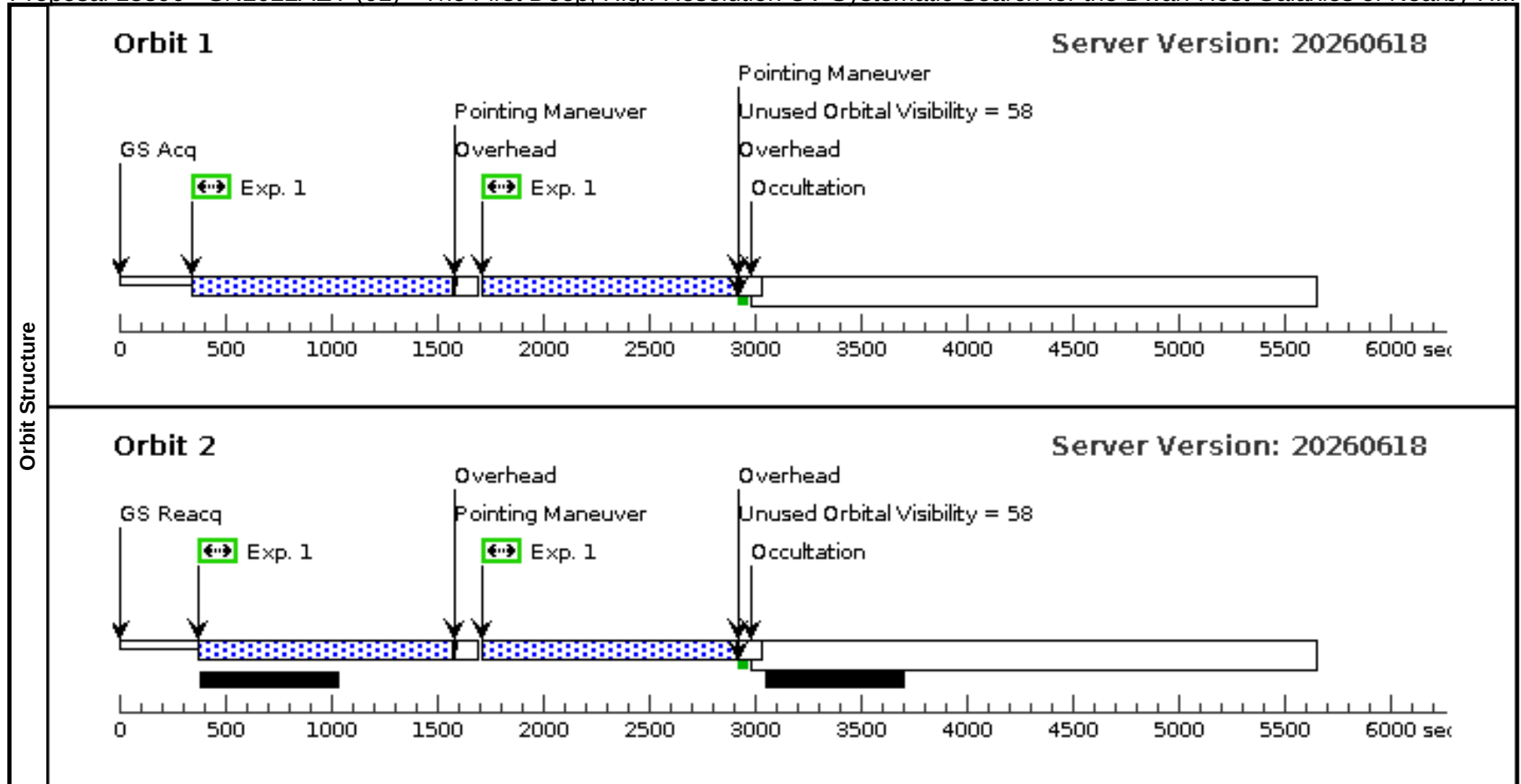
Massive stars (above 8 solar masses) end their lives in core-collapse supernovae (CCSNe), but key aspects of this process remain poorly understood with the observed spectral and light-curve diversities, reflecting a range of progenitor properties. Type II SNe progenitors - red supergiants - have been directly observed, and the progenitors of stripped-envelope SNe (Types Ib/c) are thought to be even more massive stars (e.g., Wolf-Rayet stars) and/or equally massive stars in a binary system with sufficient mass loss. Because massive stars have short lifetimes, they are expected to explode near their star-forming birthplaces. However, some CCSNe appear "hostless" with no obvious host galaxy detected, offering unique insight into progenitor environments. Possible explanations include undetected faint dwarf hosts or runaway massive stars ejected from their galaxies. We propose deep, high-resolution UV (F300X) imaging with WFC3/UVIS to search for faint dwarf galaxies with recent star formation at the explosion sites of nine nearby ($z < 0.05$), spectroscopically confirmed hostless CCSNe (6 Type II, 3 Type Ic-BL). These targets lack clear host associations with high probabilities of chance alignment with unrelated field galaxies. Only HST provides the required UV sensitivity and spatial resolution. We request 2 orbits per target to reach 26.1 AB mag with sufficient signal-to-noise for robust host detection or stringent non-detection limits. These observations will probe the faint end of the galaxy UV luminosity function and inform models of massive star evolution, galaxy formation, and stellar kinematics.

OBSERVING DESCRIPTION

To maximize the signal while focusing on UV light to track recent star formation, we place the supernova location at the center of UVIS chip 2 and choose the most transmissive filter whose red edge is less than 300nm - F300X. We calculate the on-source exposure times required by WFC3/UVIS F300X to obtain signal-to-noise ratios greater than 10. With four dithers (for optimal cosmic-ray rejection and point-spread function sampling) for a 2" source with a 1" extraction radius, we find 80 minutes of on-source time (or 2 orbits including the overhead) to reach $m_{F300X} = 26.1$ (AB) for all the hostless core-collapse supernova sample.

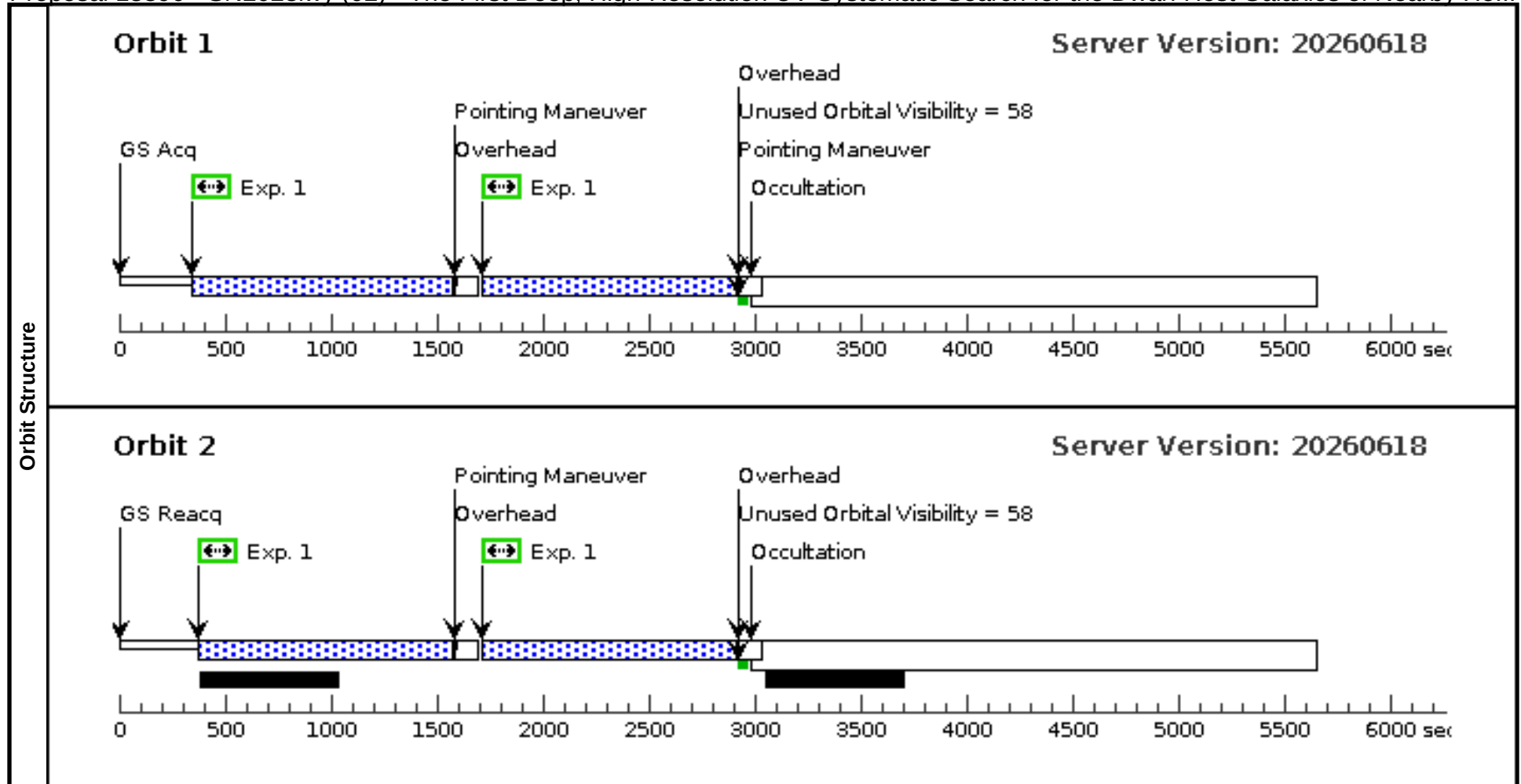
Proposal 18390 - SN2022AEY (01) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby H...

Visit	Proposal 18390, SN2022AEY (01)										Wed Aug 19 15:04:35 GMT 2026		
	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			
	(1)	SN2022AEY		RA: 16 04 8.1900 (241.0341250d) Dec: +29 27 43.78 (29.46216d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.015		V=(?) g=24.7		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVI S.im.2366880)	(1) SN2022AEY	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2022AEY (01) (1)	1200 Secs (4800 Secs)			
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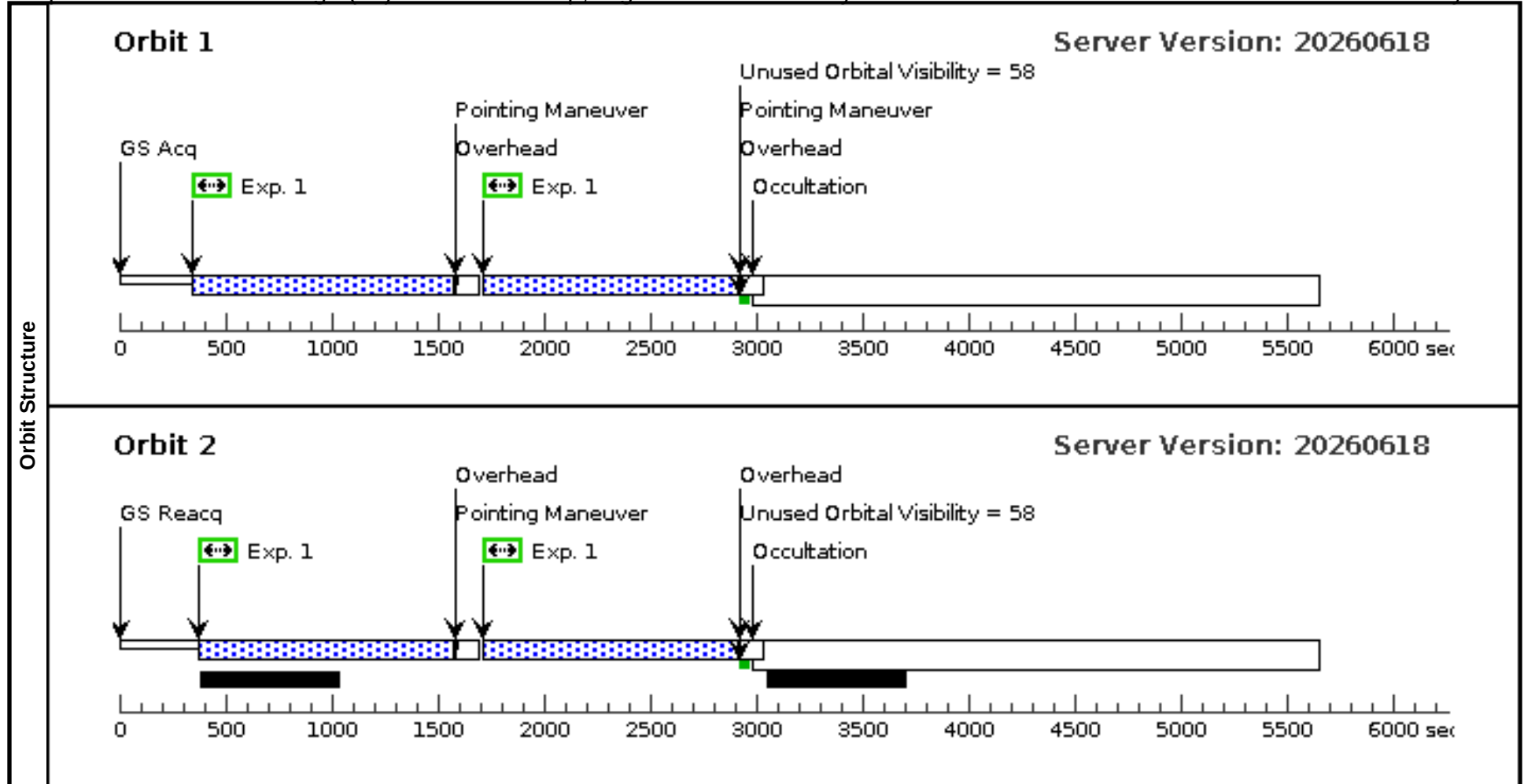
Proposal 18390 - SN2023iwy (02) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2023iwy (02)										Wed Aug 19 15:04:35 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFC3/UVIS											
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Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
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	(2)	SN2023IWY	RA: 18 00 18.6218 (270.0775908d) Dec: +26 24 32.04 (26.40890d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.03		V=(?) g=24.7		Reference Frame: ICRS			
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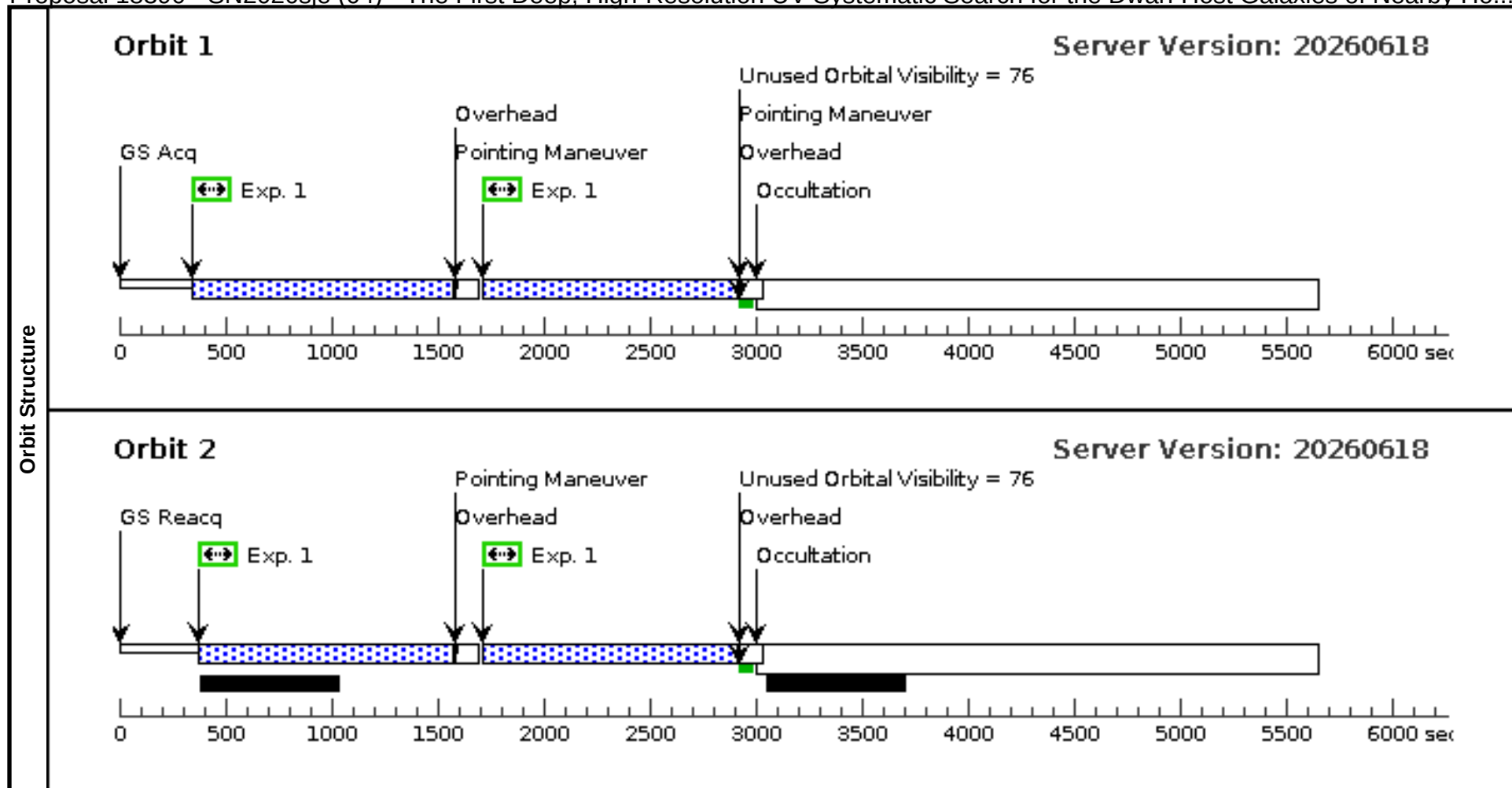
Proposal 18390 - SN2020dgd (03) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2020dgd (03)										Wed Aug 19 15:04:35 GMT 2026		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/UVIS												
	Special Requirements: (none)												
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Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(3)	SN2020DGD		RA: 15 45 35.5328 (236.3980533d) Dec: +29 18 38.51 (29.31070d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.03		V=(?) g=24.7		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVI S.im.236687 8)	(3) SN2020DGD	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2020dgd (03) (1)	1200 Secs (4800 Secs)			
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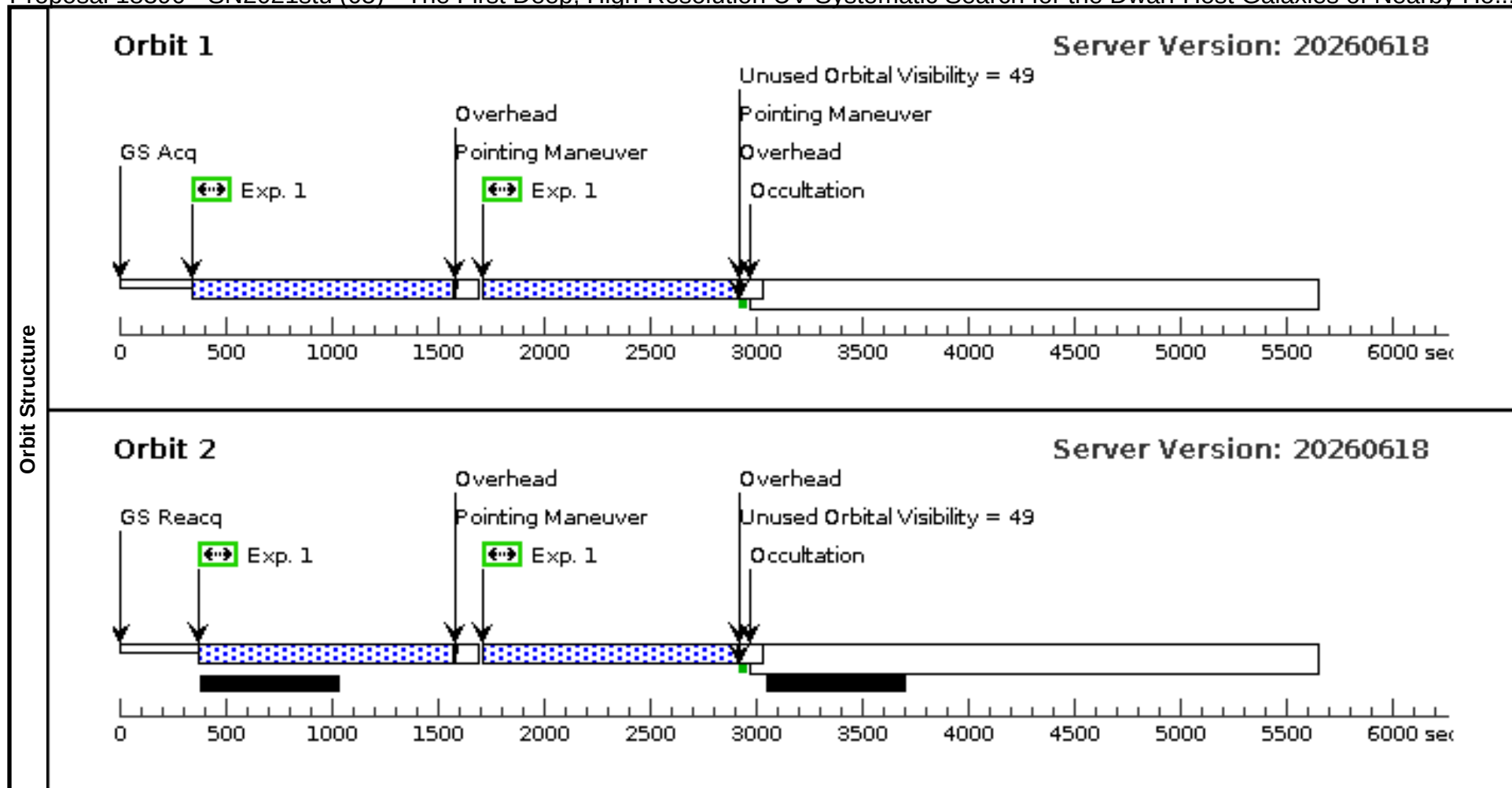
Proposal 18390 - SN2020sje (04) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2020sje (04)										Wed Aug 19 15:04:35 GMT 2026		
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	Scientific Instruments: WFC3/UVIS												
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Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
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Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(4)	SN2020SJE		RA: 01 17 21.9600 (19.3415000d) Dec: +44 11 41.53 (44.19487d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.03		V=(?) g=23.3		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVI S.im.236687 7)	(4) SN2020SJE	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 i n SN2020sje (04) (1)	1200 Secs (4800 Secs)			
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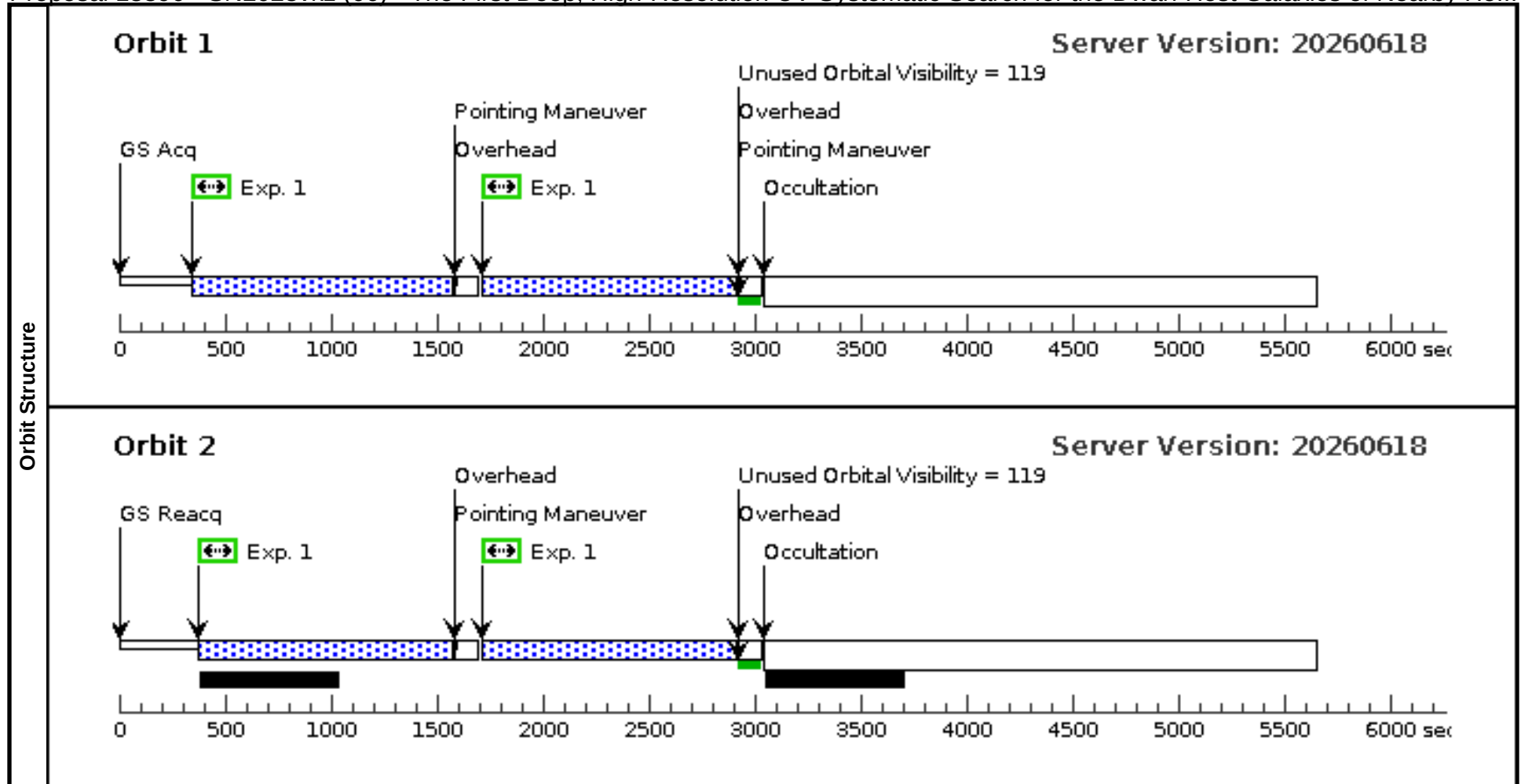
Proposal 18390 - SN2021stu (05) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2021stu (05)										Wed Aug 19 15:04:35 GMT 2026		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/UVIS												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
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Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(5)	SN2021STU		RA: 00 08 58.2189 (2.2425788d) Dec: -14 32 55.14 (-14.54865d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.034		V=(?) g=24.7		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVI S.im.236687 6)	(5) SN2021STU	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2021stu (05) (1)	1200 Secs (4800 Secs)			
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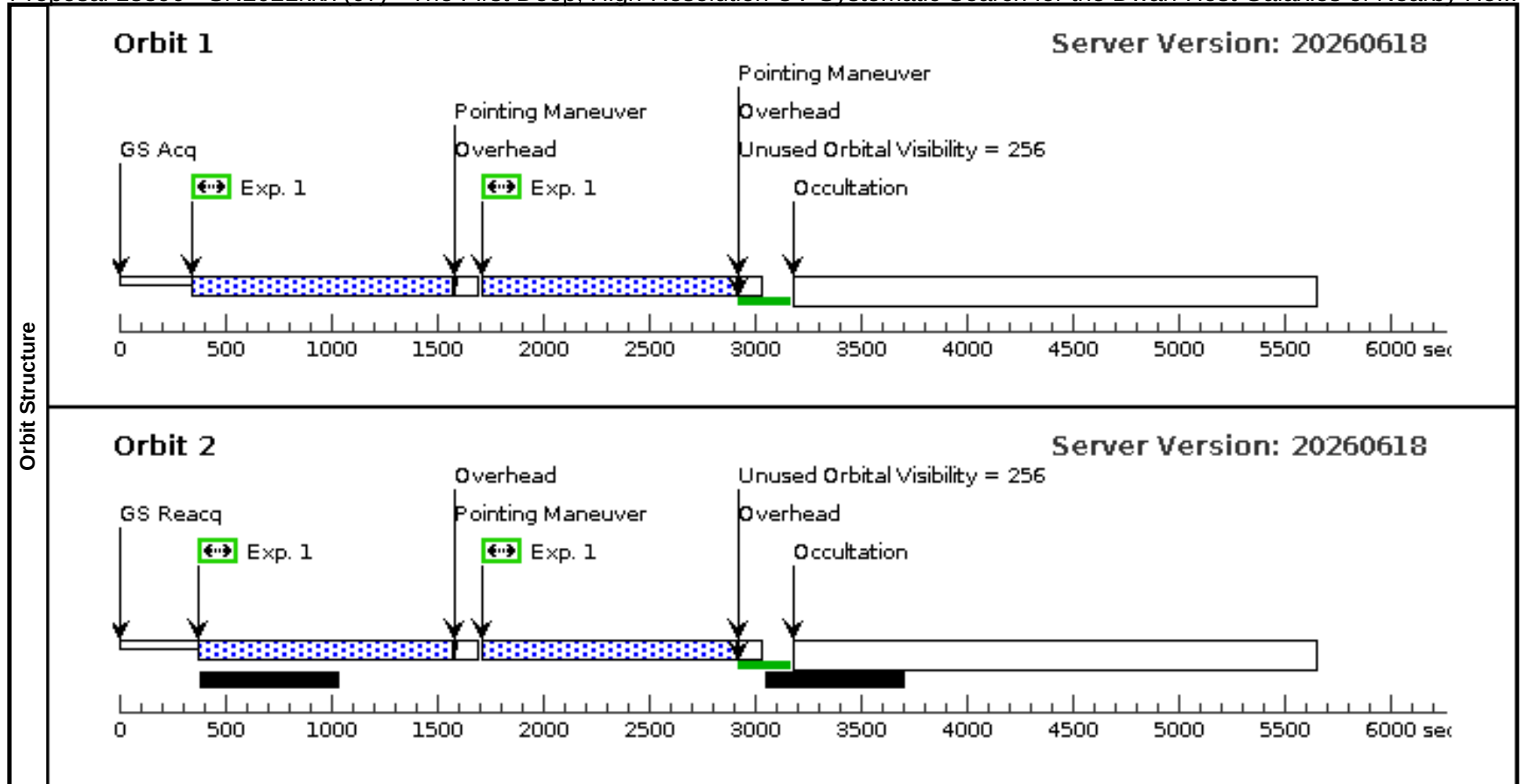
Proposal 18390 - SN2023vkz (06) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2023vkz (06)										Wed Aug 19 15:04:35 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFC3/UVIS											
	Special Requirements: (none)											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
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Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(6)	SN2023VKZ	RA: 08 28 36.1736 (127.1507233d) Dec: +57 12 31.86 (57.20885d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.035		V=(?) g=24.7		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVI S.im.236687 5)	(6) SN2023VKZ	WFC3/UVIS, ACCUM, UVIS2	F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2023vkz (06) (1)	1200 Secs (4800 Secs)			
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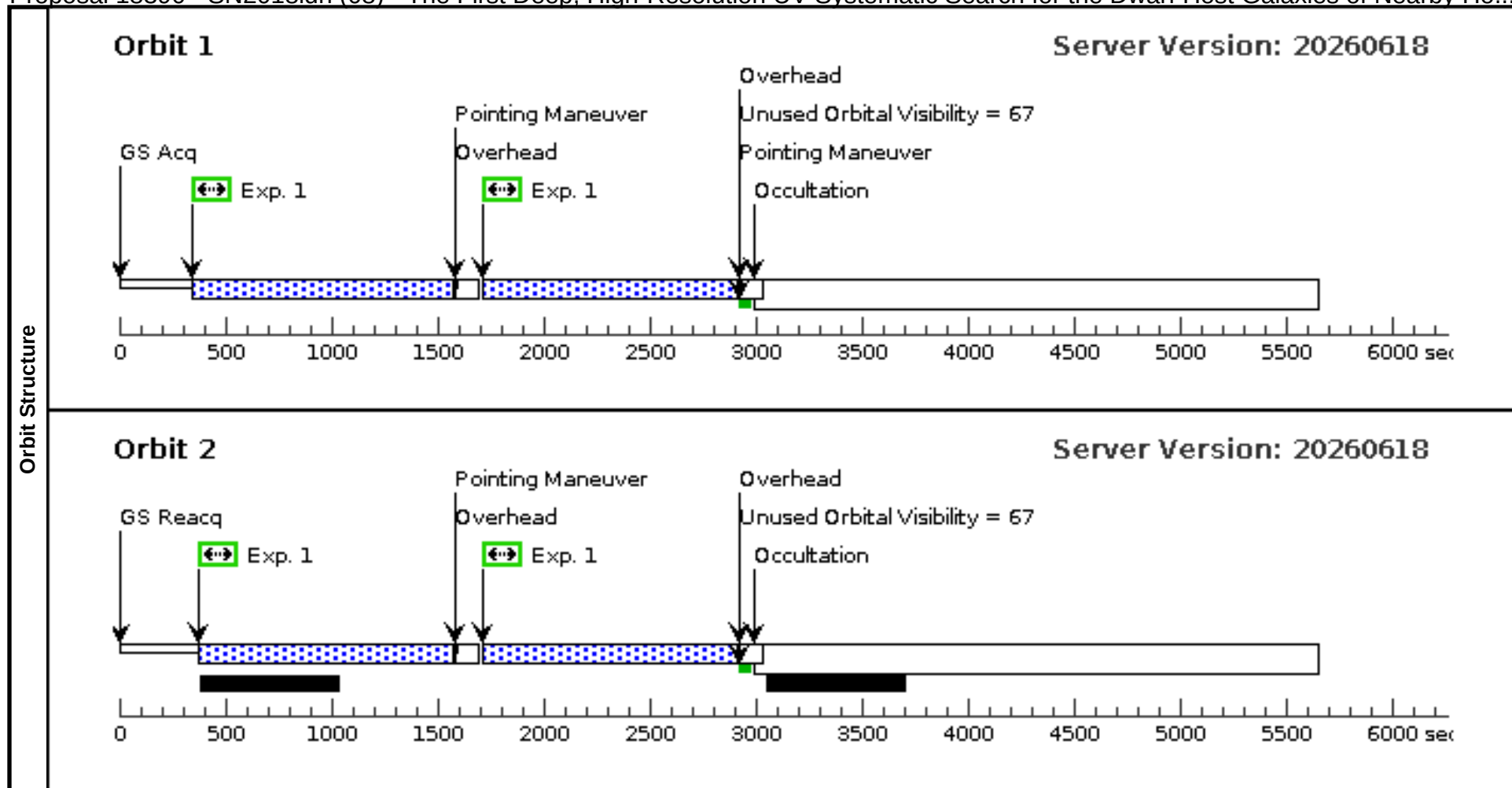
Proposal 18390 - SN2021kkx (07) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2021kkx (07) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)										Wed Aug 19 15:04:35 GMT 2026	
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Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(7)	SN2021KKX	RA: 15 48 3.8132 (237.0158883d) Dec: +82 34 34.02 (82.57612d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.0383		V=(?) g=24.7		Reference Frame: ICRS			
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(WFC3UVI S.im.2366874)	(7) SN2021KKX	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2021kkx (07) (1)	1200 Secs (4800 Secs)		
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Proposal 18390 - SN2018ldh (08) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby Ho...

Visit	Proposal 18390, SN2018ldh (08)										Wed Aug 19 15:04:35 GMT 2026	
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Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(8)	SN2018IDH		RA: 07 07 48.3110 (106.9512958d) Dec: +36 28 25.95 (36.47387d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.04		V=(?) g=24.7		Reference Frame: ICRS		
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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(WFC3UVI S.im.236687 3)	(8) SN2018IDH	WFC3/UVIS, ACCUM, UVIS2		F300X	FLASH=15		Pattern 1, Exps 1-1 in SN2018ldh (08) (1)	1200 Secs (4800 Secs)		
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Proposal 18390 - SN2022wlm (09) - The First Deep, High-Resolution UV Systematic Search for the Dwarf Host Galaxies of Nearby H...

Visit	Proposal 18390, SN2022wlm (09)										Wed Aug 19 15:04:35 GMT 2026		
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	Scientific Instruments: WFC3/UVIS												
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Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(9)	SN2022WLM		RA: 05 56 46.6335 (89.1943063d) Dec: +48 06 20.84 (48.10579d) Equinox: J2000		Epoch of Position: 2000 Redshift: 0.05		V=(?) g=23.3		Reference Frame: ICRS			
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