



17287 - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
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Dr. Hsiang-Chih Hwang (CoI)	Institute For Advanced Study

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) SDSSJ0732+3533	WFC3/IR	1	07-Jun-2024 15:02:01.0	yes
02	(1) SDSSJ0732+3533	STIS/CCD	1	07-Jun-2024 15:02:02.0	yes
03	(13) SDSSJ1608+2716	WFC3/IR	1	07-Jun-2024 15:02:03.0	yes
04	(2) SDSSJ0812+2007	STIS/CCD	1	07-Jun-2024 15:02:04.0	yes
05	(3) SDSSJ0841+4825	WFC3/IR	1	07-Jun-2024 15:02:05.0	yes
06	(4) SDSSJ0927+3512	WFC3/IR	1	07-Jun-2024 15:02:07.0	yes
07	(12) SDSSJ1625+4309	STIS/CCD	1	07-Jun-2024 15:02:08.0	yes
08	(5) SDSSJ0911+2405	STIS/CCD	1	07-Jun-2024 15:02:09.0	yes
58	(5) SDSSJ0911+2405	STIS/CCD	1	07-Jun-2024 15:02:09.0	yes
09	(6) SDSSJ0950+4329	WFC3/IR	1	07-Jun-2024 15:02:11.0	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>
10	(11) SDSSJ1015+1230	STIS/CCD	1	07-Jun-2024 15:02:11.0	yes
11	(7) SDSSJ1059+0622	STIS/CCD	1	07-Jun-2024 15:02:12.0	yes
12	(8) SDSSJ1118+0749	STIS/CCD	1	07-Jun-2024 15:02:12.0	yes
52	(8) SDSSJ1118+0749	STIS/CCD	1	07-Jun-2024 15:02:13.0	yes
13	(9) SDSSJ1225+4831	WFC3/IR	1	07-Jun-2024 15:02:14.0	yes
14	(10) SDSSJ1327+1036	WFC3/IR	1	07-Jun-2024 15:02:16.0	yes
15	(10) SDSSJ1327+1036	STIS/CCD	1	07-Jun-2024 15:02:16.0	yes
59	(10) SDSSJ1327+1036	STIS/CCD	1	07-Jun-2024 15:02:17.0	yes

18 Total Orbits Used

ABSTRACT

STIS G430L slit spectroscopy and WFC3 F160W imaging are proposed to unambiguously confirm close (<5 kpc) dual and strong gravitationally lensed quasars at $1 < z < 3$. The sample probes a new regime at higher redshifts, higher luminosities, and smaller separations than previous work. This poorly explored regime is crucial for understanding the impact of mergers in triggering SMBH accretion at Cosmic Noon, i.e., the peak quasar epoch. The targets are selected from Gaia using two new techniques. Targets have been carefully chosen to minimize interlopers from star-quasar superpositions. Ground-based follow-up AO-assisted NIR imaging has uncovered $\sim 0.3''$ - $0.7''$ double cores in each target, suggesting dual or lensed quasars, but the existing data are insufficient for determining their physical origins. The proposed new observations will unambiguously establish the targets as $1 < z < 3$ sub-arcsecond dual or lensed quasars. STIS will detect spatially resolved spectra from each nucleus and measure SMBH and accretion properties (mass, mass ratio, and Eddington ratio) to put them into their cosmological context. WFC3 imaging will detect the much fainter extended host galaxy mergers against the bright quasars and possibly low surface brightness tidal features indicative of ongoing mergers in dual quasars, or foreground lenses in lensed quasars. The results will elucidate the unknown $1 < z < 3$ sub-arcsec dual/lensed quasar population statistics. It will provide empirical constraints on the merger rate of $1 < z < 3$ SMBHs and inform the prospects of binary SMBHs as targets for multi-messenger astronomy. Alternatively, discovery of small-scale lensed quasars would be equally interesting in its own right.

OBSERVING DESCRIPTION

Proposal 17287 (STScI Edit Number: 4, Created: Friday, June 7, 2024 at 2:02:17 PM Eastern Standard Time) - Overview

This program will conduct WFC3/IR F160W imaging (for 7 targets) and STIS/G430L slit spectroscopy (for 8 targets) for a total sample of 11 candidate kpc-scale dual/lensed quasars at $z \sim 1-3$. The targets have close double cores with separations of $\sim 0.3''-0.7''$. The targets are a subset of a complete sample of high-fidelity double quasars at $z > 1$ selected using two new techniques that have been developed recently (i.e., "varstrometry" and Gaia Multi Peak). Deep HST IR F160W imaging will detect the extended host galaxy mergers and low-surface-brightness tidal features (indicative of ongoing mergers) or foreground lenses to unambiguously distinguish between dual and lensed quasars. STIS slit spectroscopy will detect spatially resolved spectra simultaneously covering both nuclei.

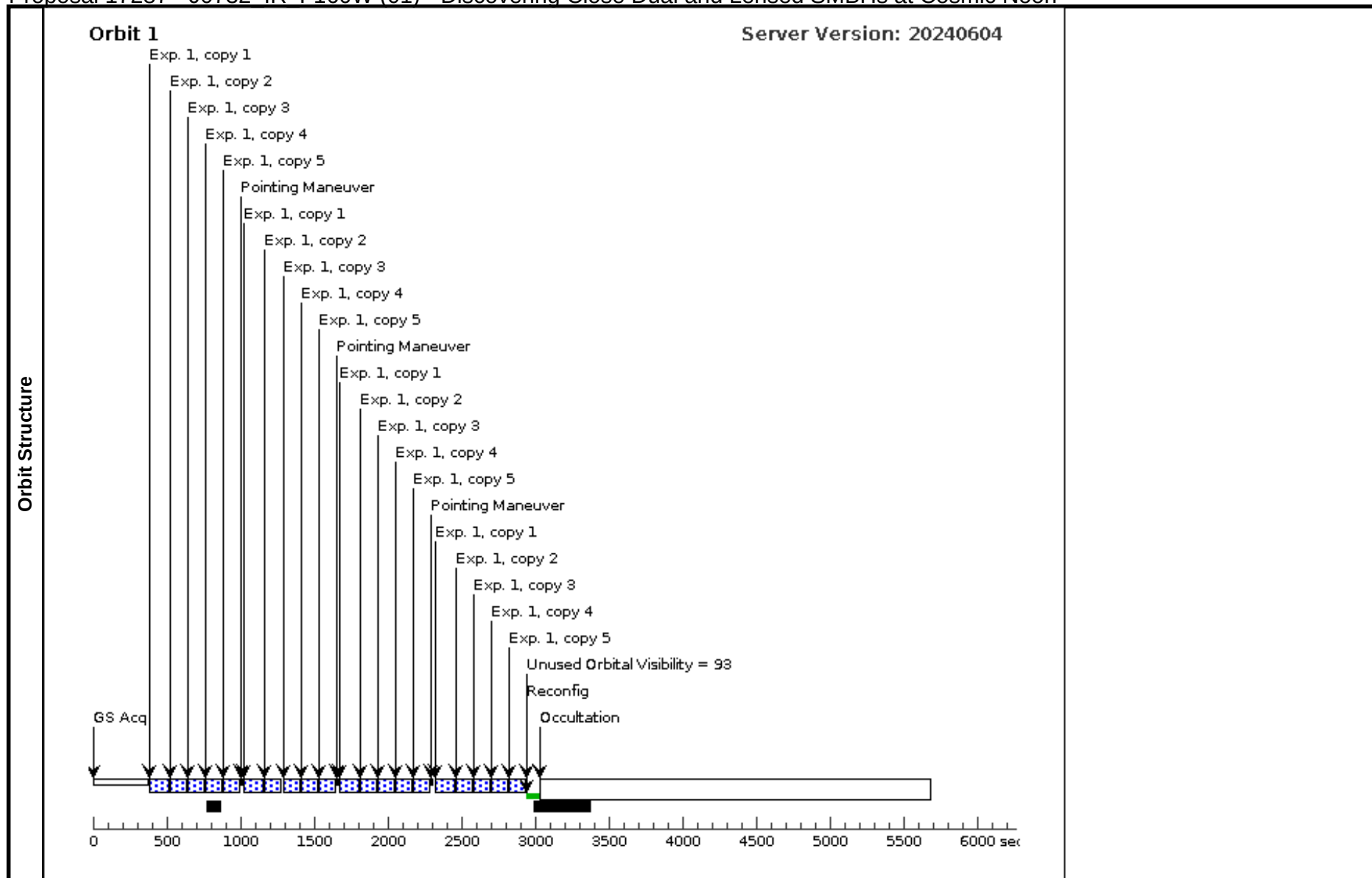
In dual quasars, the unresolved quasars will be carefully modeled (by PSFs) and subtracted in order to robustly reveal the (much fainter) extended host galaxies underlying each quasar. Furthermore, after carefully subtracting both the quasars (PSFs) and the host galaxies (using Sersic models), we may discover low surface brightness tidal features as direct evidence for mergers. Alternatively, in lensed quasars, the unresolved lensed quasar images will be carefully modeled (using PSFs) and subtracted in order to either detect or put stringent upper limits on the foreground lens galaxy. Using the structure decomposition constraints (on both the lensed images and the lens), we will perform strong lensing mass modeling tests in order to quantitatively assess the strong gravitational lensing scenario. The results will reveal bona-fide high-redshift kpc-scale dual quasars that are still largely elusive (but are predicted to be abundant by theory).

For the WFC3 IR F160W imaging, we adopt the 256x256 subarray (30"x30" FOV, corresponding to $\sim 250\text{kpc} \times 250\text{kpc}$ at $z=2$, more than enough to cover the double quasars and host galaxies). We adopt SPARS10 (NSAMP=15) to increase the dynamic range and account for potential saturation of bright cores, and the 4-step BOX dither (similar to the default WFC3-IR-DITHER-BOX-MIN but with increased spacing to meet the >10 pixel requirement to avoid persistence effects) for cosmic-ray and bad-pixel rejection, to better sample the PSF for optimal effective resolution. Since our primary goal is to detect the lens galaxy (or the lack thereof) rather than to accurately measure host galaxy morphology, this dither pattern is sufficient - nor do we require a dedicated PSF observation; we will use field stars and/or recent archival data to build an empirical PSF template. The IR depth assuming 412s on-source exposure is $H \sim 24$ AB mag arcsec $^{-2}$ (3σ), sufficient to detect double cores and rule out lensing.

For the STIS slit spectroscopy, we use the 52x0.2" slit and the G430L aperture. The slit will be placed across both cores to obtain the spectrum for both components. The separation between the two cores is $\sim 0.3''-0.7''$, and we will use the point-source mode for acquisition. The conversion between the PA of the two cores and the ORIENT parameter is: $\text{ORIENT} = \text{PA} + 45.35$ or $\text{ORIENT} = \text{PA} + 225.35$ according to Table 11.2 of the STIS Instrument Handbook.

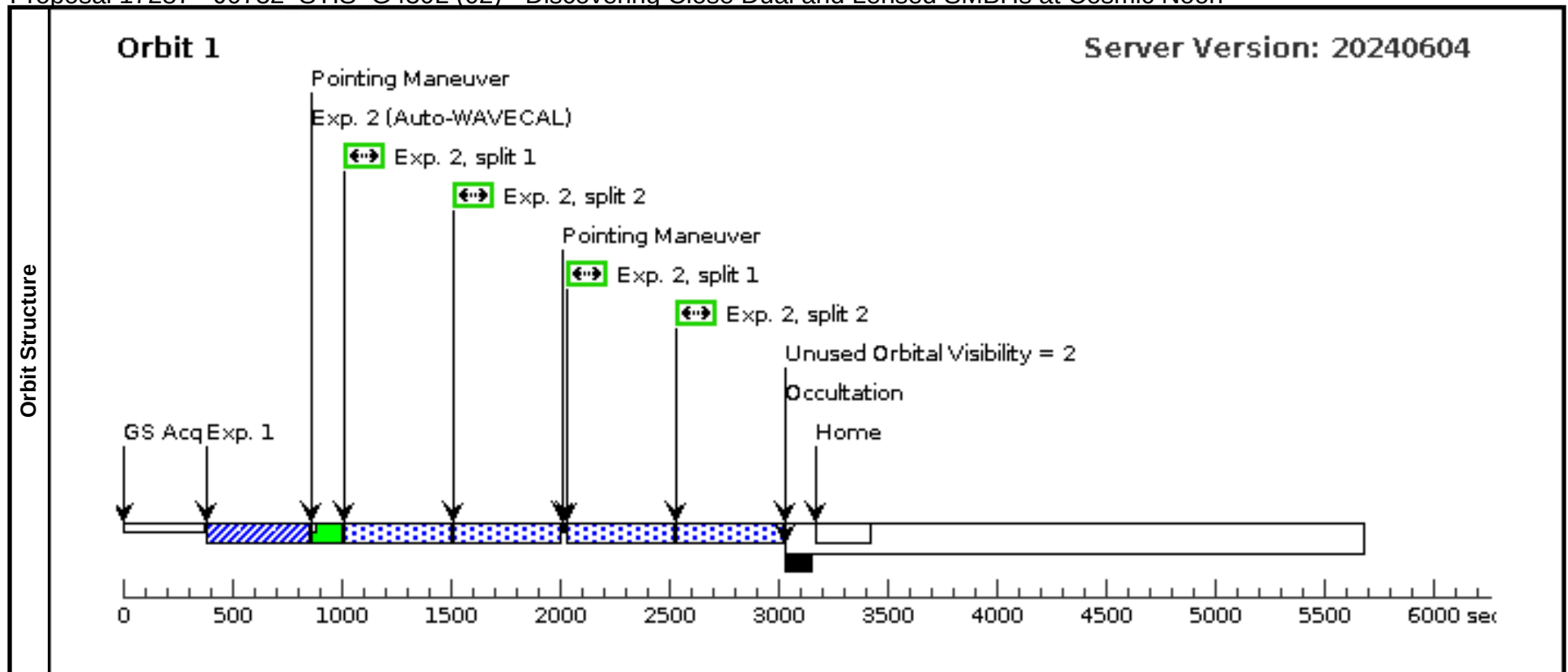
Proposal 17287 - J0732 IR F160W (01) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0732_IR_F160W (01), completed										Fri Jun 07 19:02:17 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/IR												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975					Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	SDSSJ0732+3533		RA: 07 32 51.5700 (113.2148750d) Dec: +35 33 15.34 (35.55426d) Equinox: J2000		Redshift: 3.0652		V=(?) G=20.31, r=20.20, z=19.3		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3IR.im.1836338)	(1) SDSSJ0732+3533 3	WFC3/IR, MULTIACCUM, IRSUB256		F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J0732_IR_F160W (01) (1)	103.128633 Secs X 5 (2062.573 Secs)			
	[==>(Pattern 1, Copy 1)]											[1]	
	[==>(Pattern 1, Copy 2)]												
	[==>(Pattern 1, Copy 3)]												
	[==>(Pattern 1, Copy 4)]												
	[==>(Pattern 1, Copy 5)]												
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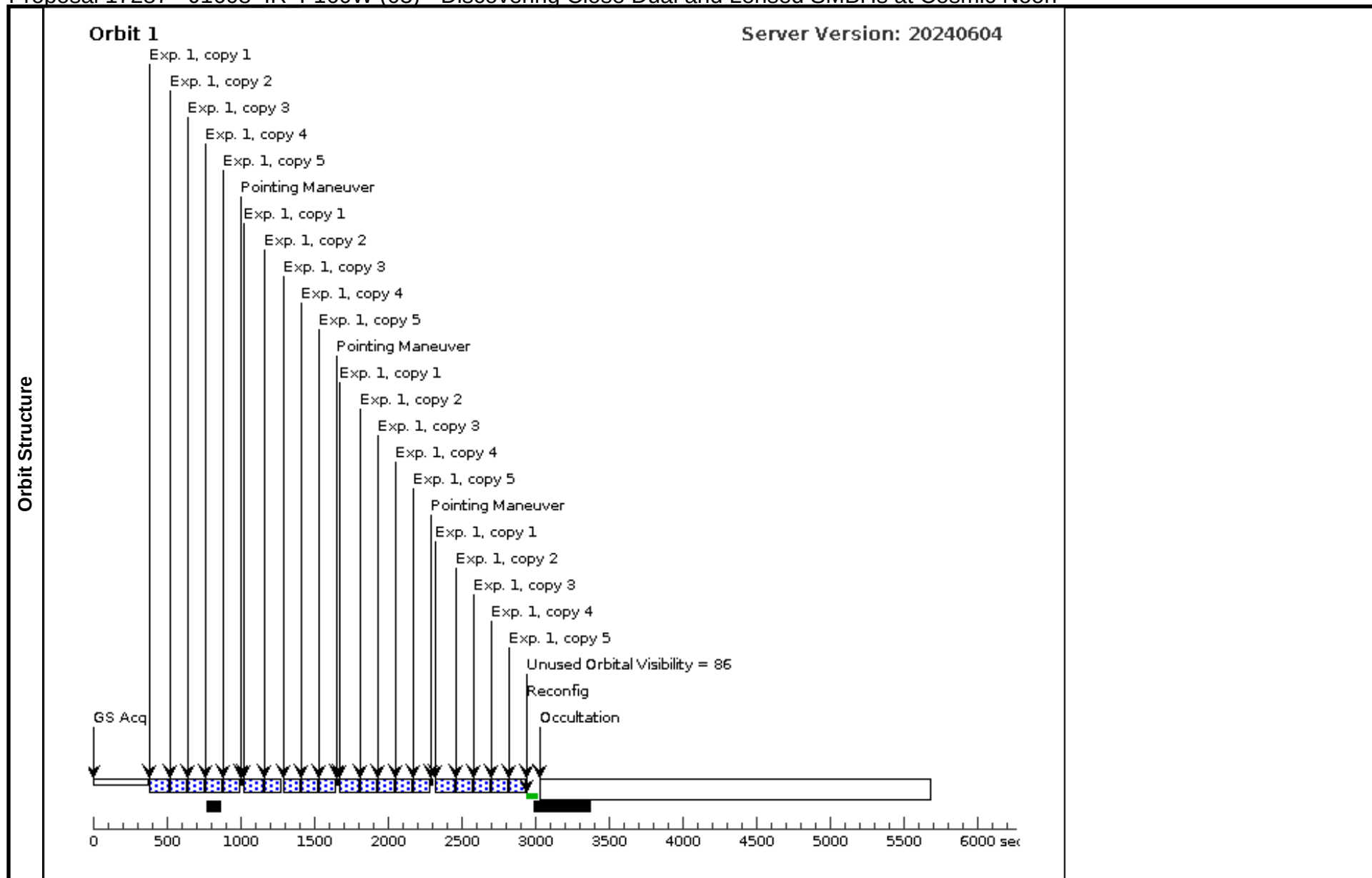
Proposal 17287 - J0732 STIS G430L (02) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0732_STIS_G430L (02), implementation										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: STIS/CCD												
	Special Requirements: ORIENT 245.35D TO 245.35 D; ORIENT 65.35D TO 65.35 D												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Purpose=DITHER Number Of Points=2 Point Spacing=1.0 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides= Center Pattern=false										(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	SDSSJ0732+3533		RA: 07 32 51.5700 (113.2148750d) Dec: +35 33 15.34 (35.55426d) Equinox: J2000		Redshift: 3.0652		V=(?) G=20.31, r=20.20, z=19.3		Reference Frame: ICRS			
Comments: Category=GALAXY Description=[QUASAR]													
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq (STIS.ta.183 6341)	(1) SDSSJ0732+353 3	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			60 Secs (60 Secs)			
										[==>]		[1]	
	2	(STIS.sp.18 36343)	(1) SDSSJ0732+353 3	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 i n J0732_STIS_G430 L (02) (2)	1200 Secs (1812 Secs)			
										[==>453.0 Secs (Pattern 1, Split 1)] [==>453.0 Secs (Pattern 1, Split 2)] [==>453.0 Secs (Pattern 2, Split 1)] [==>453.0 Secs (Pattern 2, Split 2)]		[1]	
Comments: The E1 position is used to mitigate CTE effects.													



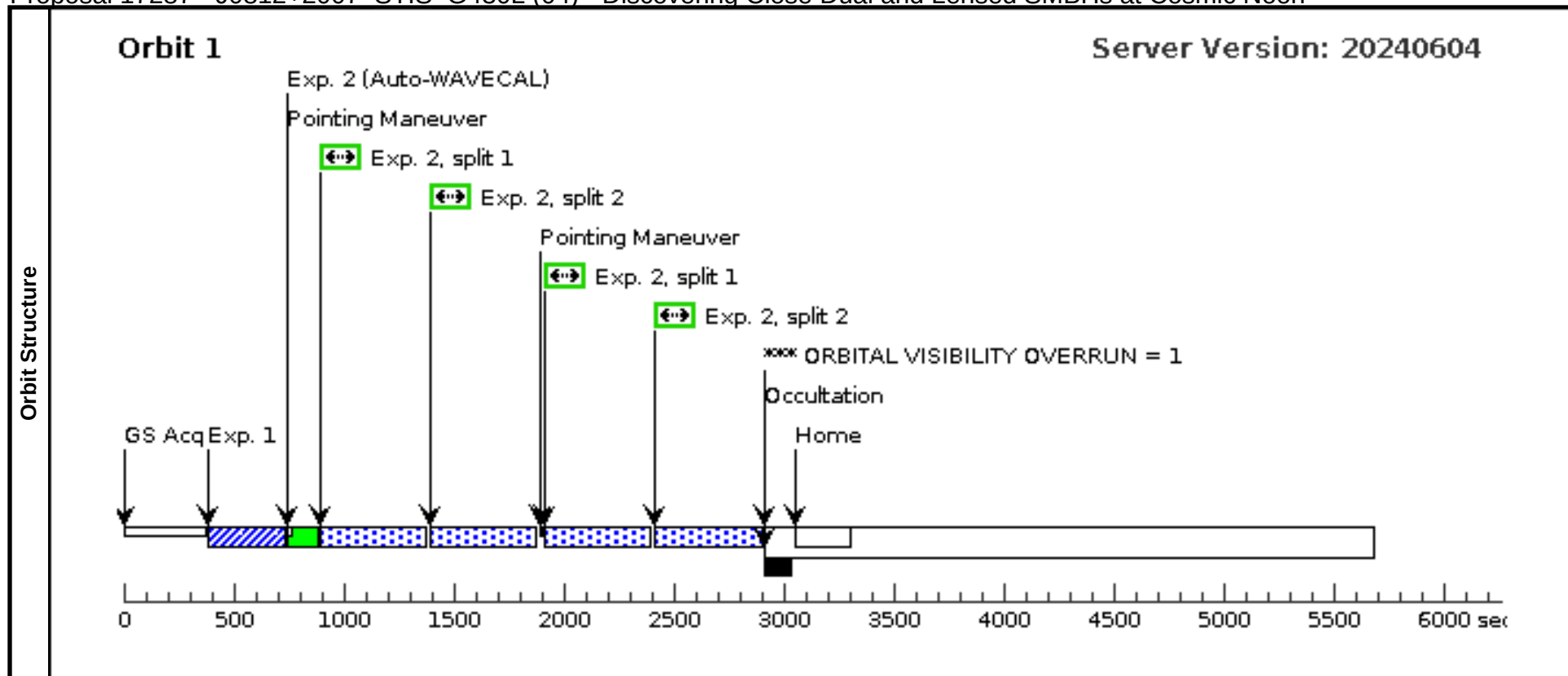
Proposal 17287 - J1608 IR F160W (03) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1608_IR_F160W (03), completed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/IR												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975					Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false					(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(13)	SDSSJ1608+2716		RA: 16 08 29.2300 (242.1217917d) Dec: +27 16 26.74 (27.27409d) Equinox: J2000		Redshift: 2.591		V=(?) r = 19.50, z = 18.93		Reference Frame: ICRS			
	Comments: Replacement target for Visit 03												
	Category=GALAXY												
Exposures	Description=[QUASAR]												
	Extended=NO												
	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(13) SDSSJ1608+2716	WFC3/IR, MULTIACCUM, IRSUB256		F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J1608_IR_F160W (03) (1)	103.128633 Secs X 5 (2062.573 Secs)			
										[==>(Pattern 1, Copy 1)]		[1]	
										[==>(Pattern 1, Copy 2)]			
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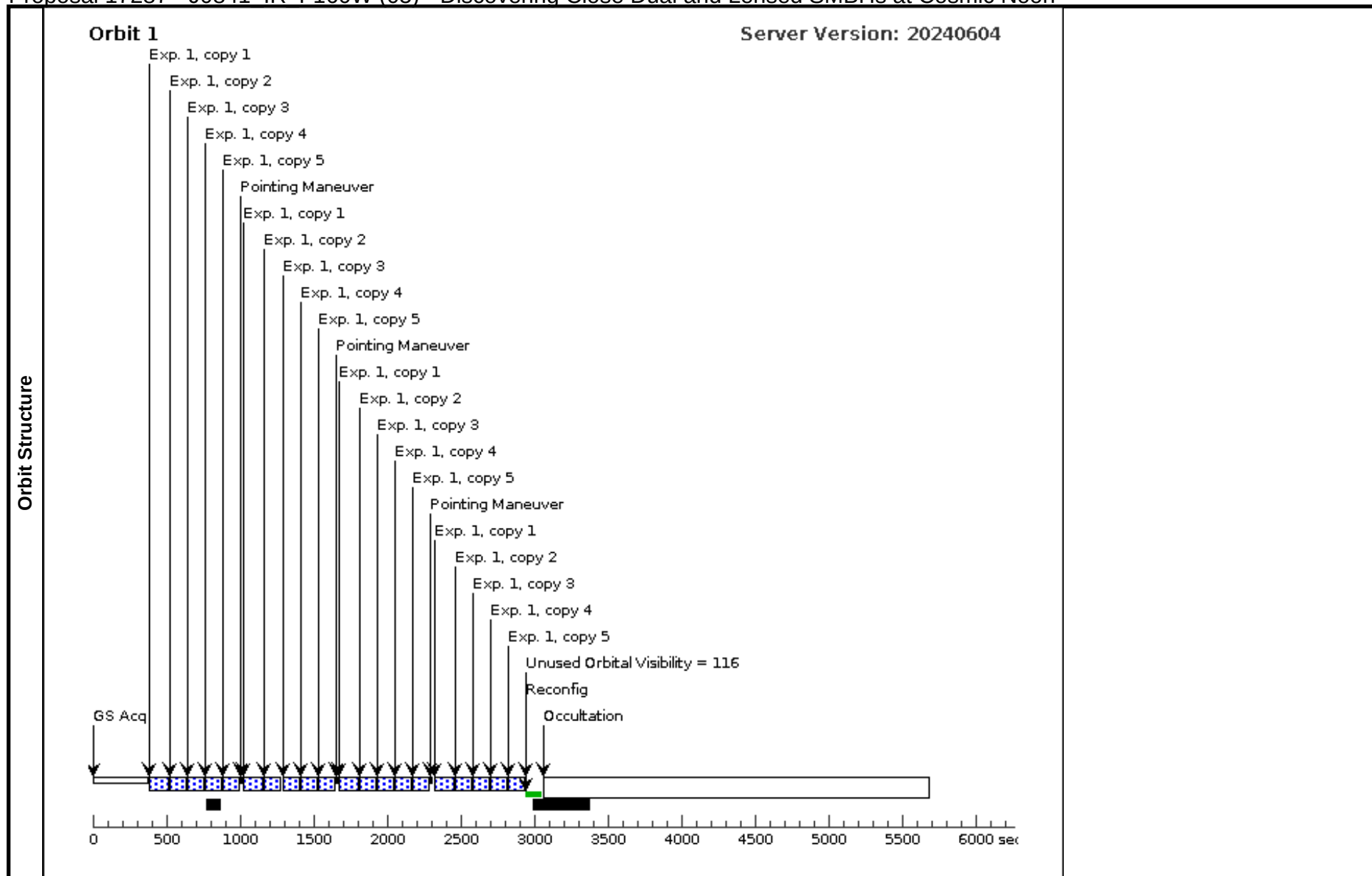
Proposal 17287 - J0812+2007 STIS G430L (04) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0812+2007_STIS_G430L (04), completed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: Warning												
	Scientific Instruments: STIS/CCD												
	Special Requirements: SCHED 100%; ORIENT 223.85D TO 223.85 D; ORIENT 43.85D TO 43.85 D												
Diagnostics	(J0812+2007_STIS_G430L (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=										(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(2)	SDSSJ0812+2007		RA: 08 12 46.4100 (123.1933750d) Dec: +20 07 30.18 (20.12505d) Equinox: J2000		Redshift: 1.480		V=(?) G=19.11, r = 19.43, z = 19.37		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq (STIS.ta.183 6344)	(2) SDSSJ0812+2007	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]		[1]	
	2	(STIS.sp.18 36346)	(2) SDSSJ0812+2007	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J0812+2007_STIS_G430L (04) (2)	1200 Secs (1808 Secs)			
										[==>452.0 Secs (Pattern 1, Split 1)] [==>452.0 Secs (Pattern 1, Split 2)] [==>452.0 Secs (Pattern 2, Split 1)] [==>452.0 Secs (Pattern 2, Split 2)]		[1]	



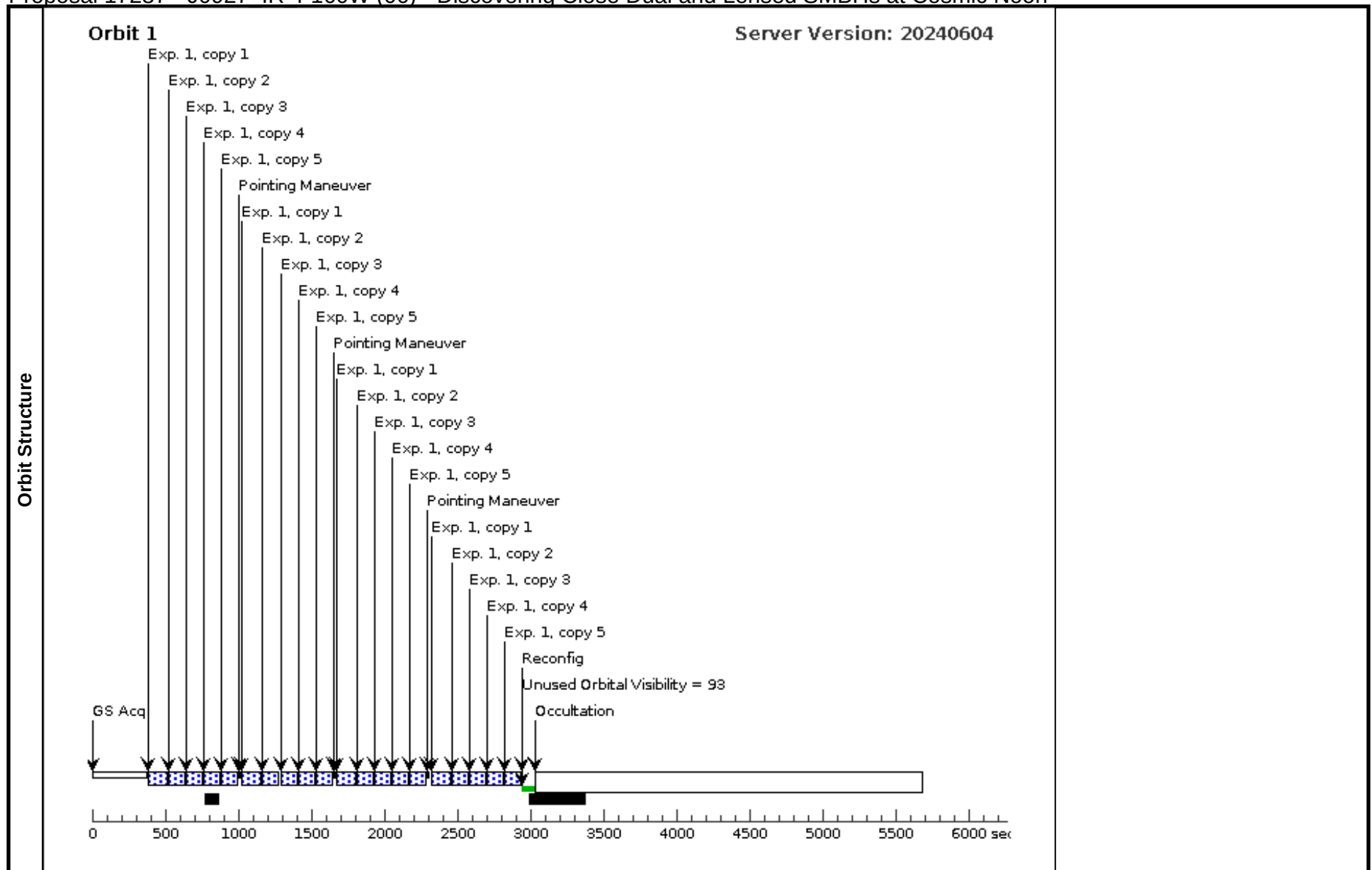
Proposal 17287 - J0841 IR F160W (05) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0841_IR_F160W (05), completed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/IR												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975			Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false							(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(3)	SDSSJ0841+4825		RA: 08 41 29.7700 (130.3740417d) Dec: +48 25 48.50 (48.43014d) Equinox: J2000		Redshift: 2.949		V=(?) G=19.29		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(3) SDSSJ0841+4825	WFC3/IR, MULTIACCUM, IRSUB256		F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J0841_IR_F160W (05) (1)	103.128633 Secs X 5 (2062.573 Secs)		[1]	
										[==>(Pattern 1, Copy 1)]			
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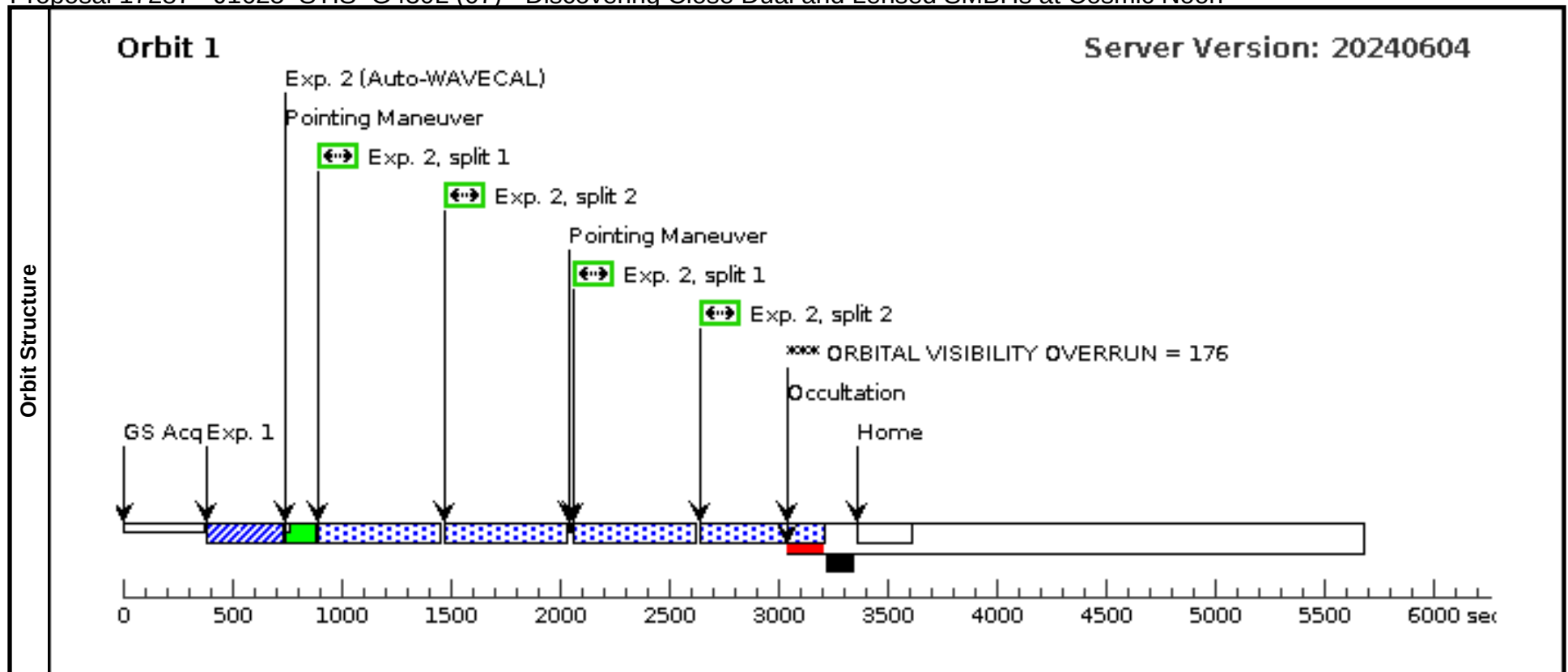
Proposal 17287 - J0927 IR F160W (06) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0927_IR_F160W (06), completed										Fri Jun 07 19:02:18 GMT 2024	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFC3/IR											
	Special Requirements: (none)											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975		Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false						(1)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(4)	SDSSJ0927+3512	RA: 09 27 48.4200 (141.9517500d) Dec: +35 12 41.31 (35.21148d) Equinox: J2000		Redshift: 1.1495		V=(?) G=15.85, r = 15.73, z = 15.40		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(4) SDSSJ0927+3512 2	WFC3/IR, MULTIACCUM, IRSUB256	F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J0927_IR_F160W (06) (1)	103.128633 Secs X 5 (2062.573 Sec s)		[1]	
										[==>(Pattern 1, Copy 1)]		
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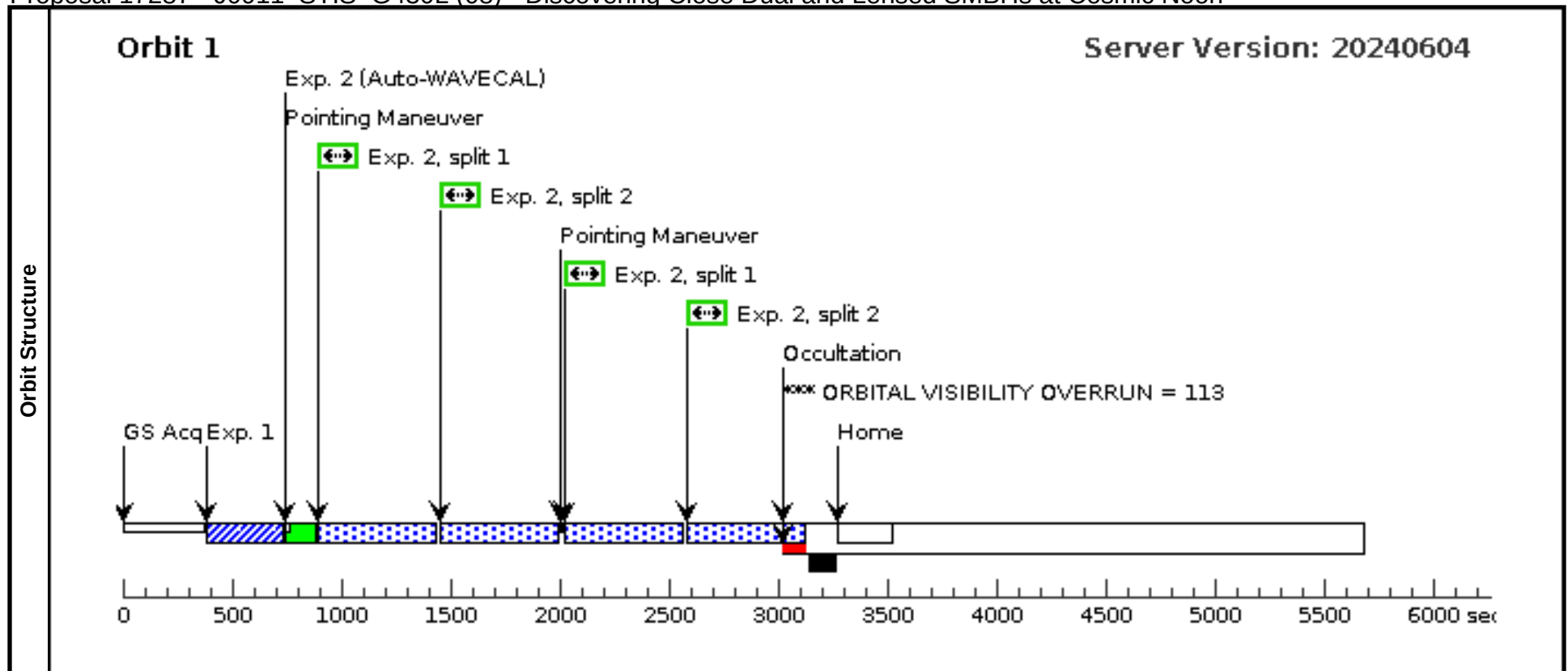
Proposal 17287 - J1625 STIS G430L (07) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1625_STIS_G430L (07), completed Fri Jun 07 19:02:18 GMT 2024									
	Diagnostic Status: Warning Scientific Instruments: STIS/CCD Special Requirements: ORIENT 16.45D TO 16.45 D; ORIENT 196.45D TO 196.45 D									
Diagnostics	(J1625_STIS_G430L (07)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=							(2)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
	(12)	SDSSJ1625+4309	RA: 16 25 1.9800 (246.2582500d) Dec: +43 09 31.60 (43.15878d) Equinox: J2000		Redshift: 1.654		V=(?) r = 18.68		Reference Frame: ICRS	
Exposures	Comments: Replacement target for Visit 07 Category=GALAXY Description=[QUASAR] Extended=NO									
	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	acq	(12) SDSSJ1625+4309	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)	
									[==>]	[1]
	2		(12) SDSSJ1625+4309	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1625_STIS_G430L (07) (2)	1000 Secs (2120 Secs)	
									[==>530.0 Secs (Pattern 1, Split 1)] [==>530.0 Secs (Pattern 1, Split 2)] [==>530.0 Secs (Pattern 2, Split 1)] [==>530.0 Secs (Pattern 2, Split 2)]	[1]



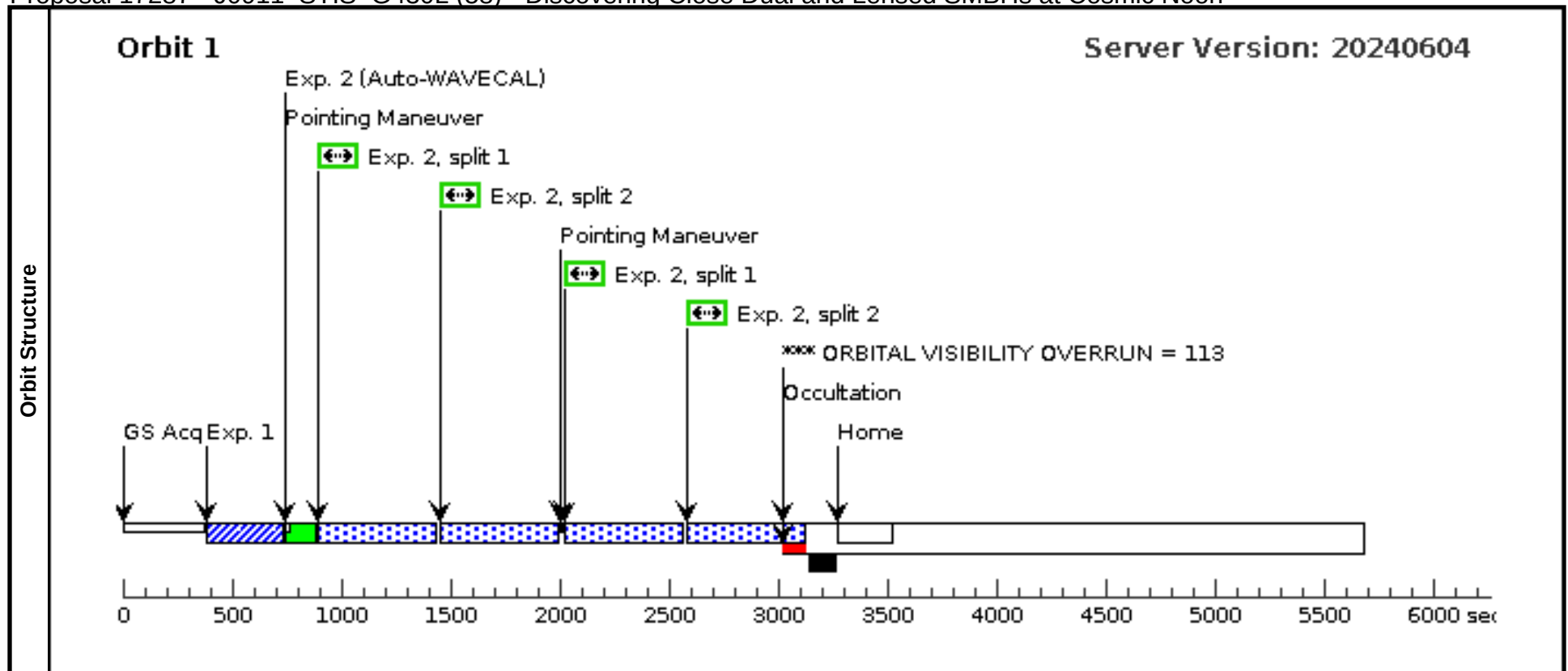
Proposal 17287 - J0911 STIS G430L (08) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0911_STIS_G430L (08), failed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: Warning												
	Scientific Instruments: STIS/CCD												
	Special Requirements: ORIENT 308.55D TO 308.55 D; ORIENT 128.55D TO 128.55 D												
Diagnostics	(J0911_STIS_G430L (08)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=										(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(5)	SDSSJ0911+2405		RA: 09 11 50.6600 (137.9610833d) Dec: +24 05 45.78 (24.09605d) Equinox: J2000		Redshift: 2.464		V=(?) r = 18.98, z = 18.71		Reference Frame: ICRS			
	Comments: Replacement target for Visit 08 (both the original target J0938 and the first replacement J0032 have no guide stars available for STIS).												
	Category=GALAXY												
Description=[QUASAR]													
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq	(5) SDSSJ0911+2405	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]		[1]	
	2		(5) SDSSJ0911+2405	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J0911_STIS_G430L (08) (2)	1200 Secs (2036 Secs)			
										[==>509.0 Secs (Pattern 1, Split 1)] [==>509.0 Secs (Pattern 1, Split 2)] [==>509.0 Secs (Pattern 2, Split 1)] [==>509.0 Secs (Pattern 2, Split 2)]		[1]	



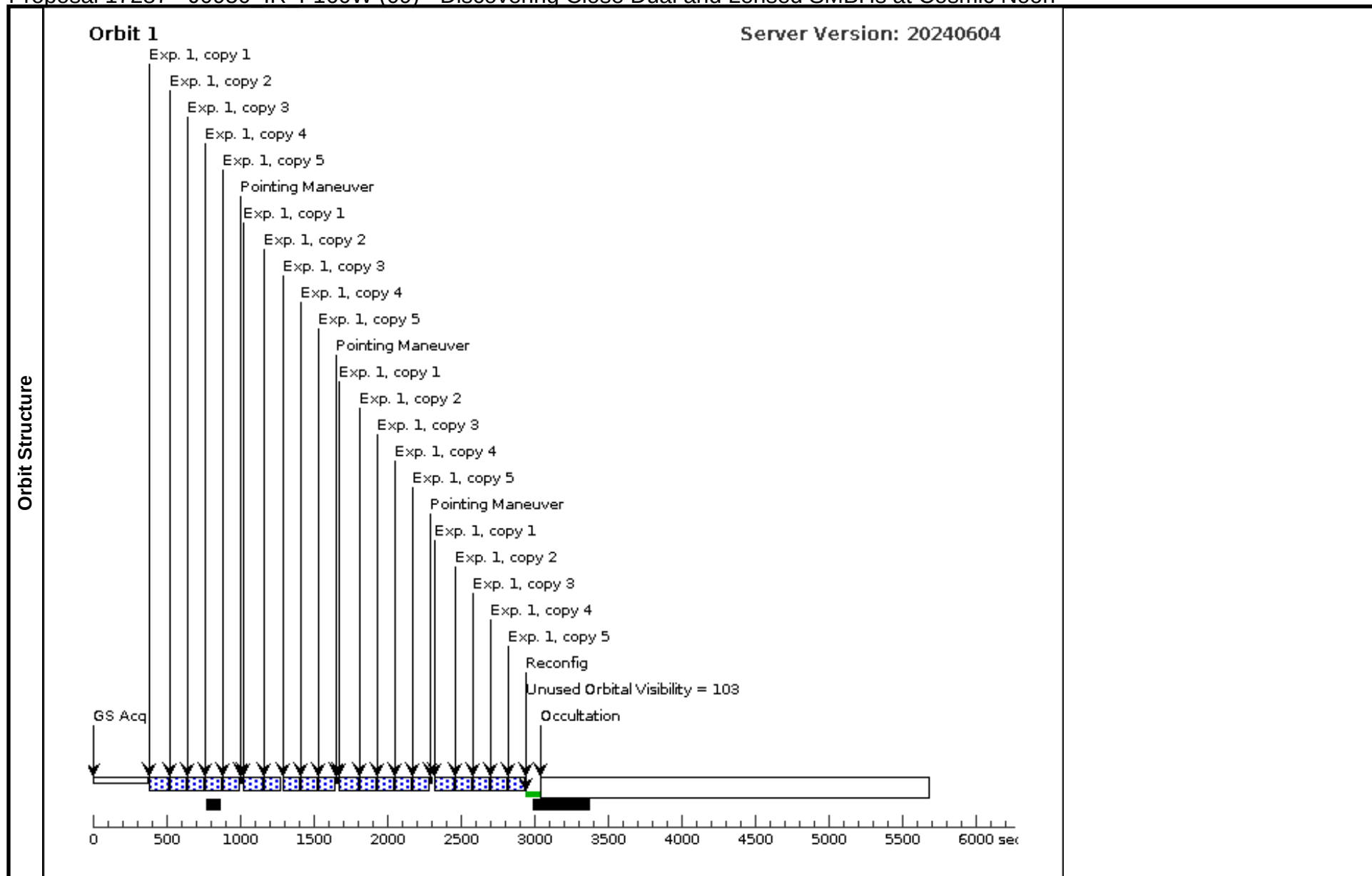
Proposal 17287 - J0911 STIS G430L (58) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0911_STIS_G430L (58), completed										Fri Jun 07 19:02:18 GMT 2024	
	Diagnostic Status: Warning											
	Scientific Instruments: STIS/CCD											
	Special Requirements: ORIENT 308.55D TO 308.55 D; ORIENT 128.55D TO 128.55 D											
Comments: HOPR copy of visit 8												
Diagnostics	(J0911_STIS_G430L (58)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN											
Patterns	#	Primary Pattern					Secondary Pattern				Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=									(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(5)	SDSSJ0911+2405		RA: 09 11 50.6600 (137.9610833d) Dec: +24 05 45.78 (24.09605d) Equinox: J2000		Redshift: 2.464		V=(?) r = 18.98, z = 18.71		Reference Frame: ICRS		
	Comments: Replacement target for Visit 08 (both the original target J0938 and the first replacement J0032 have no guide stars available for STIS).											
	Category=GALAXY Description=[QUASAR]											
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	acq	(5) SDSSJ0911+2405	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)		
			5							[==>]		[1]
	2		(5) SDSSJ0911+2405	STIS/CCD, ACCUM, 52X0.2E1		G430L	CR-SPLIT=2		Pattern 2, Exps 2-2 in J0911_STIS_G430L (58) (2)	1200 Secs (2036 Secs)		
			5			4300 A				[==>509.0 Secs (Pattern 1, Split 1)] [==>509.0 Secs (Pattern 1, Split 2)] [==>509.0 Secs (Pattern 2, Split 1)] [==>509.0 Secs (Pattern 2, Split 2)]		[1]



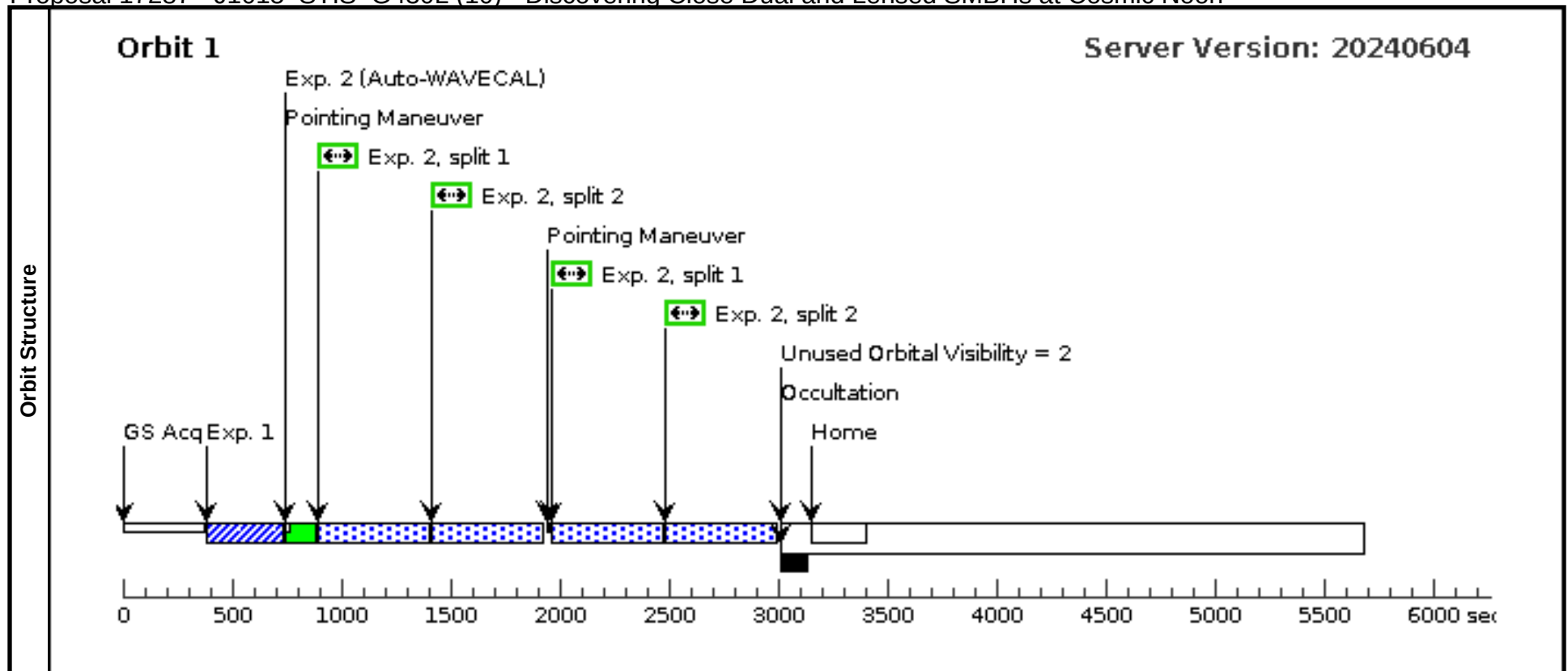
Proposal 17287 - J0950 IR F160W (09) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J0950_IR_F160W (09), completed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/IR												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975			Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false							(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(6)	SDSSJ0950+4329		RA: 09 50 31.6300 (147.6317917d) Dec: +43 29 8.40 (43.48567d) Equinox: J2000		Redshift: 1.771		V=16.9 r = 16.93, z = 16.26		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(6) SDSSJ0950+4329 9	WFC3/IR, MULTIACCUM, IRSUB256		F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J0950_IR_F160W (09) (1)	103.128633 Secs X 5 (2062.573 Secs)		[1]	
											[==>(Pattern 1, Copy 1)]		
											[==>(Pattern 1, Copy 2)]		
											[==>(Pattern 1, Copy 3)]		
											[==>(Pattern 1, Copy 4)]		
											[==>(Pattern 1, Copy 5)]		
											[==>(Pattern 2, Copy 1)]		
											[==>(Pattern 2, Copy 2)]		
											[==>(Pattern 2, Copy 3)]		
											[==>(Pattern 2, Copy 4)]		
											[==>(Pattern 2, Copy 5)]		
											[==>(Pattern 3, Copy 1)]		
											[==>(Pattern 3, Copy 2)]		
											[==>(Pattern 3, Copy 3)]		
											[==>(Pattern 3, Copy 4)]		
											[==>(Pattern 3, Copy 5)]		
											[==>(Pattern 4, Copy 1)]		
											[==>(Pattern 4, Copy 2)]		
											[==>(Pattern 4, Copy 3)]		
											[==>(Pattern 4, Copy 4)]		
											[==>(Pattern 4, Copy 5)]		



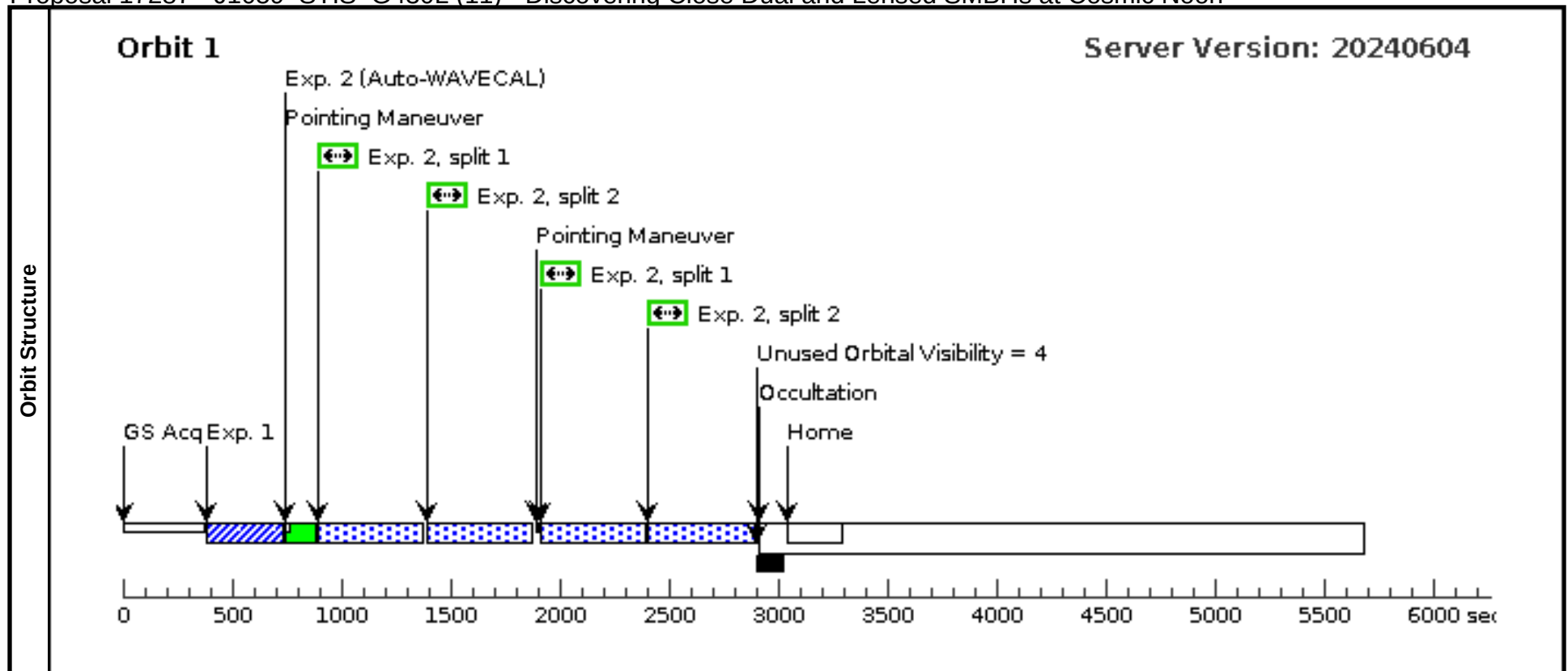
Proposal 17287 - J1015 STIS G430L (10) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1015_STIS_G430L (10), implementation										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: STIS/CCD												
	Special Requirements: ORIENT 289.95D TO 289.95 D; ORIENT 109.95D TO 109.95 D												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Purpose=DITHER Number Of Points=2 Point Spacing=1.0 Line Spacing=					Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides= Center Pattern=false					(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(11)	SDSSJ1015+1230		RA: 10 15 4.7600 (153.7698333d) Dec: +12 30 22.29 (12.50619d) Equinox: J2000		Redshift: 1.697		V=(?) r = 17.56, z = 17.40		Reference Frame: ICRS			
	Comments: Replacement target for Visit 10 (the original target J0950 has no guide star available for STIS).												
	Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq	(11) SDSSJ1015+1230	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]		[1]	
	2		(11) SDSSJ1015+1230	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1015_STIS_G430L (10) (2)	1000 Secs (1908 Secs)			
										[==>477.0 Secs (Pattern 1, Split 1)] [==>477.0 Secs (Pattern 1, Split 2)] [==>477.0 Secs (Pattern 2, Split 1)] [==>477.0 Secs (Pattern 2, Split 2)]		[1]	



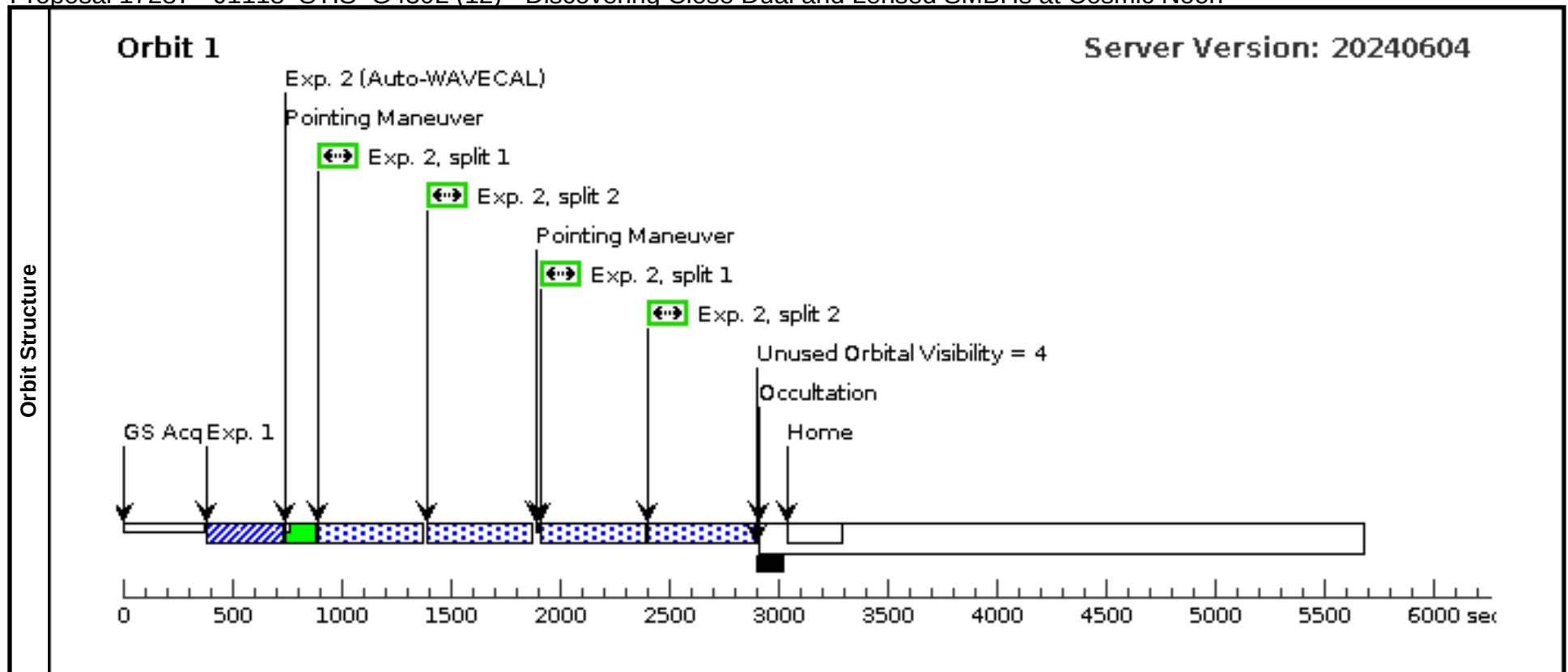
Proposal 17287 - J1059 STIS G430L (11) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1059_STIS_G430L (11), completed										Fri Jun 07 19:02:18 GMT 2024	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: STIS/CCD											
	Special Requirements: SCHED 100%; ORIENT 206.35D TO 206.35 D; ORIENT 26.35D TO 26.35 D											
Patterns	#	Primary Pattern					Secondary Pattern				Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=									(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(7)	SDSSJ1059+0622		RA: 10 59 26.4300 (164.8601250d) Dec: +06 22 27.47 (6.37430d) Equinox: J2000		Redshift: 2.193		V=(?) r = 17.36, z=16.87		Reference Frame: ICRS		
	Comments: Replacement target recently discovered after the proposal was submitted. It has WFC3 IR imaging scheduled, but lacks slit spectroscopy so STIS will be needed to achieve the science goals.											
	Category=GALAXY Description=[QUASAR]											
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	acq	(7) SDSSJ1059+0622	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)		
			2							[==>]		[1]
	2		(7) SDSSJ1059+0622	STIS/CCD, ACCUM, 52X0.2E1		G430L	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1059_STIS_G430L (11) (2)	1200 Secs (1804 Secs)		
			2			4300 A				[==>451.0 Secs (Pattern 1, Split 1)] [==>451.0 Secs (Pattern 1, Split 2)] [==>451.0 Secs (Pattern 2, Split 1)] [==>451.0 Secs (Pattern 2, Split 2)]		[1]



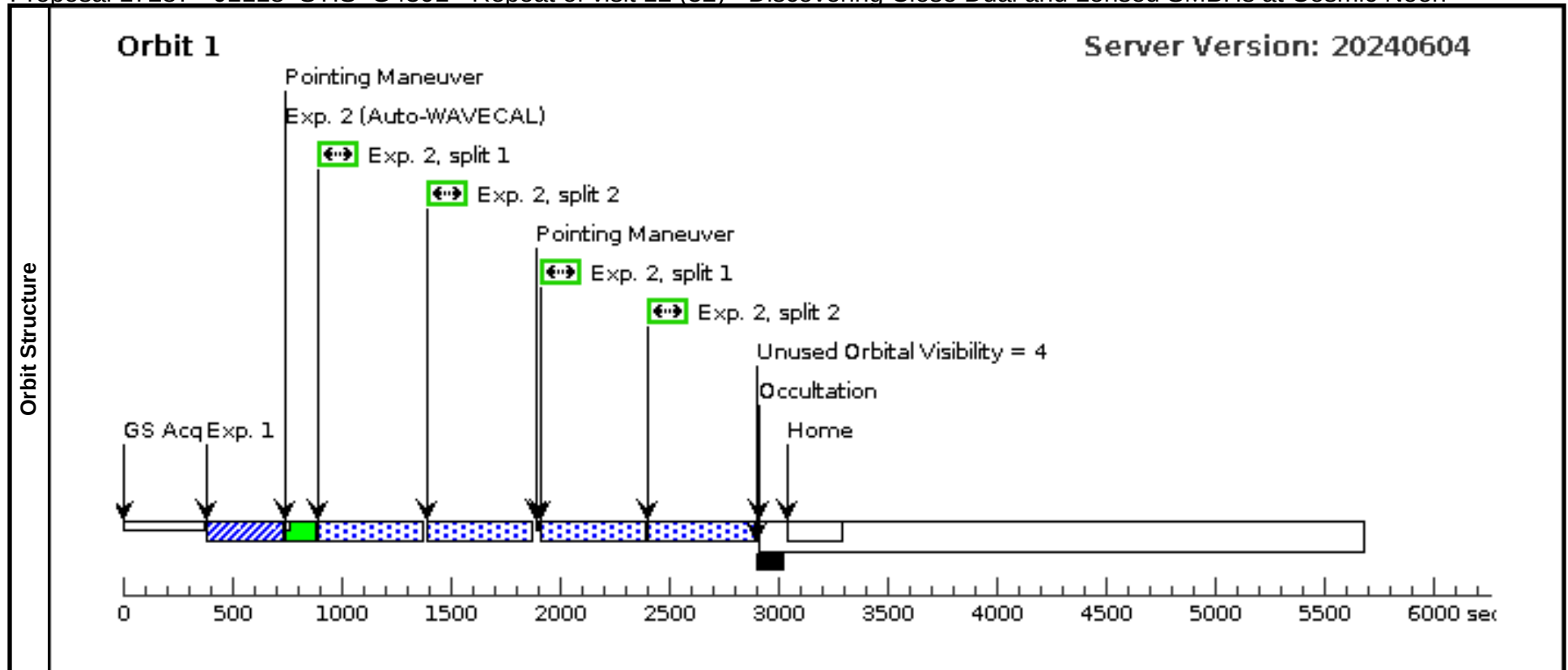
Proposal 17287 - J1118 STIS G430L (12) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1118_STIS_G430L (12), failed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: STIS/CCD												
	Special Requirements: SCHED 100%; ORIENT 213.15D TO 213.15 D; ORIENT 33.15D TO 33.15 D												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Purpose=DITHER Number Of Points=2 Point Spacing=1.0 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides= Center Pattern=false										(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(8)	SDSSJ1118+0749		RA: 11 18 53.5000 (169.7229167d) Dec: +07 49 46.00 (7.82944d) Equinox: J2000		Redshift: 2.038		V=(?) r = 18.75, z = 18.44		Reference Frame: ICRS			
	Comments: Replacement target recently discovered after the proposal was submitted. It has WFC3 IR imaging scheduled, but lacks slit spectroscopy so STIS will be needed to achieve the science goals.												
	Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq	(8) SDSSJ1118+0749	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]		[1]	
	2		(8) SDSSJ1118+0749	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1118_STIS_G430L (12) (2)	1200 Secs (1804 Secs)			
										[==>451.0 Secs (Pattern 1, Split 1)] [==>451.0 Secs (Pattern 1, Split 2)] [==>451.0 Secs (Pattern 2, Split 1)] [==>451.0 Secs (Pattern 2, Split 2)]		[1]	



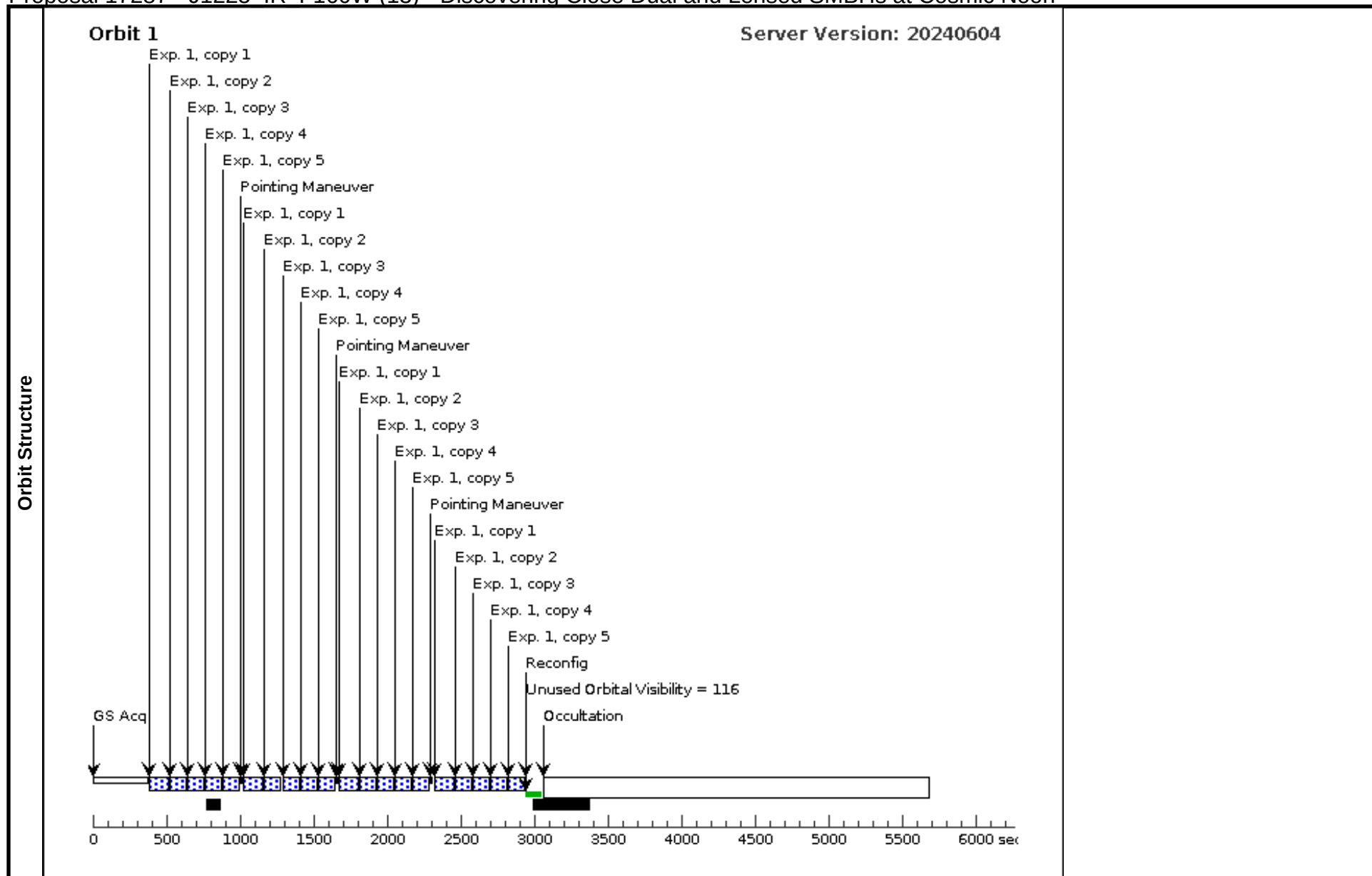
Proposal 17287 - J1118 STIS G430L - Repeat of visit 12 (52) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1118_STIS_G430L - Repeat of visit 12 (52), implementation										Fri Jun 07 19:02:18 GMT 2024
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: STIS/CCD										
	Special Requirements: SCHED 100%; ORIENT 213.15D TO 213.15 D; ORIENT 33.15D TO 33.15 D										
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=								(2)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(8)	SDSSJ1118+0749	RA: 11 18 53.5000 (169.7229167d) Dec: +07 49 46.00 (7.82944d) Equinox: J2000		Redshift: 2.038		V=(?) r = 18.75, z = 18.44		Reference Frame: ICRS		
	Comments: Replacement target recently discovered after the proposal was submitted. It has WFC3 IR imaging scheduled, but lacks slit spectroscopy so STIS will be needed to achieve the science goals.										
	Category=GALAXY Description=[QUASAR]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	acq	(8) SDSSJ1118+0749	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)		
									[==>]		[1]
	2		(8) SDSSJ1118+0749	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1118_STIS_G430L - Repeat of visit 12 (52) (2)	1200 Secs (1804 Secs)		
									[==>451.0 Secs (Pattern 1, Split 1)] [==>451.0 Secs (Pattern 1, Split 2)] [==>451.0 Secs (Pattern 2, Split 1)] [==>451.0 Secs (Pattern 2, Split 2)]		[1]



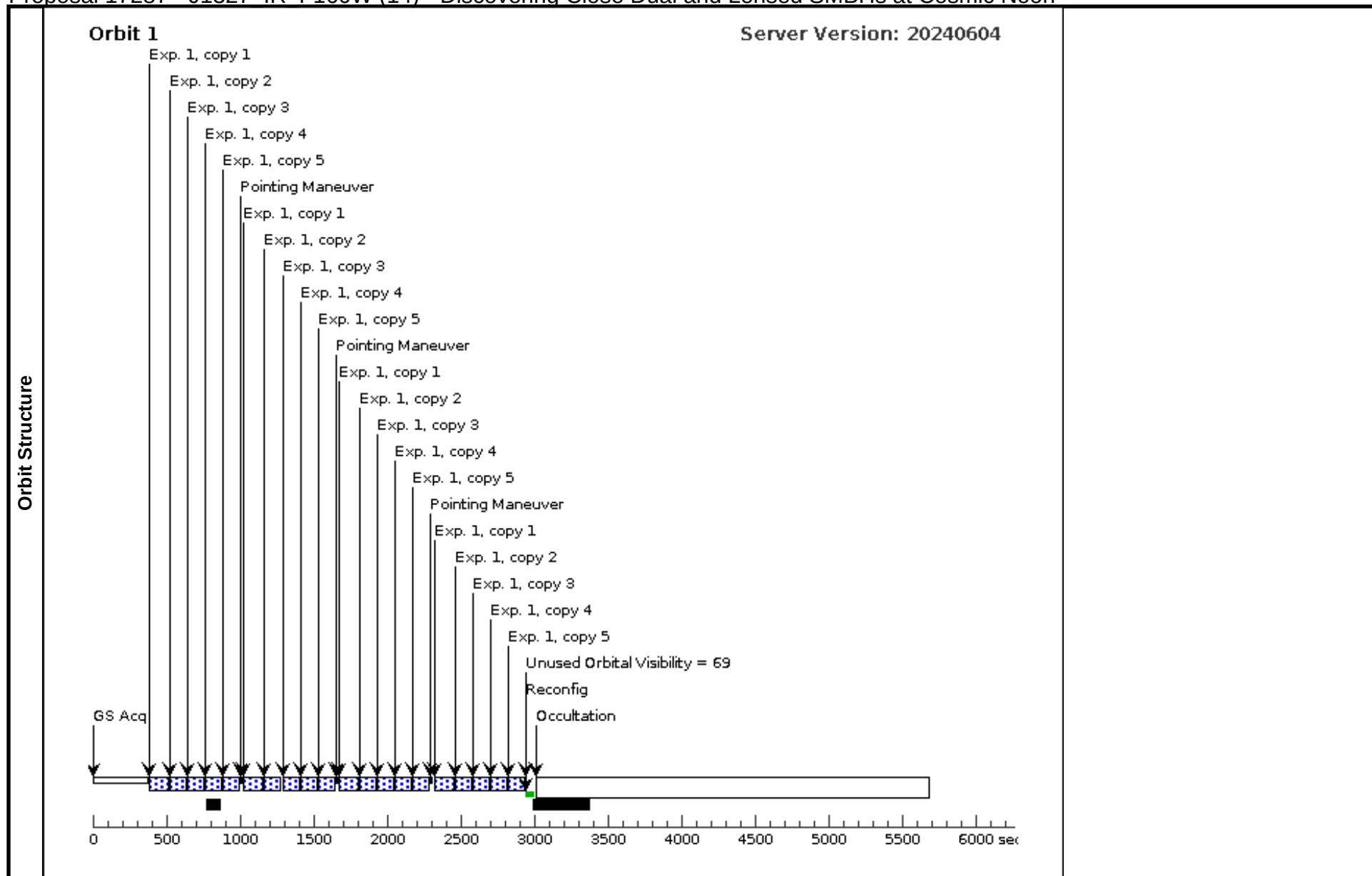
Proposal 17287 - J1225 IR F160W (13) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1225_IR_F160W (13), completed										Fri Jun 07 19:02:18 GMT 2024	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFC3/IR											
	Special Requirements: (none)											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN		Coordinate Frame=POS-TARG						(1)		
Purpose=DITHER		Pattern Orientation=18.528										
Number Of Points=4		Angle Between Sides=74.653										
Point Spacing=1.365		Center Pattern=false										
Line Spacing=0.975												
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(9)	SDSSJ1225+4831	RA: 12 25 18.6600 (186.3277500d)		Epoch of Position: 2000		V=18.3		Reference Frame: ICRS			
			Dec: +48 31 16.30 (48.52119d)		Redshift: 3.066		z = 17.52					
			Equinox: J2000									
Comments: This is a new target (discovered after the proposal was submitted) to replace the WFC3 IR imaging for SDSSJ0938+4216 (which has a new duplicate WFC3 IR imaging most recently scheduled after the proposal submission). It already has spatially resolved spectroscopy (private communications), so no new STIS spectroscopy is needed, but deep IR imaging is still needed to achieve the science goals.												
Category=GALAXY												
Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(9) SDSSJ1225+4831	WFC3/IR, MULTIACCUM, IRSUB256	F160W	SAMP-SEQ=SPARS 10;	NSAMP=15	Pattern 1, Exps 1-1 in J1225_IR_F160W (13) (1)	103.128633 Secs X 5 (2062.573 Secs)		[1]		
								[==>(Pattern 1, Copy 1)]				
								[==>(Pattern 1, Copy 2)]				
								[==>(Pattern 1, Copy 3)]				
								[==>(Pattern 1, Copy 4)]				
								[==>(Pattern 1, Copy 5)]				
								[==>(Pattern 2, Copy 1)]				
								[==>(Pattern 2, Copy 2)]				
								[==>(Pattern 2, Copy 3)]				
								[==>(Pattern 2, Copy 4)]				
								[==>(Pattern 2, Copy 5)]				
								[==>(Pattern 3, Copy 1)]				
								[==>(Pattern 3, Copy 2)]				
								[==>(Pattern 3, Copy 3)]				
								[==>(Pattern 3, Copy 4)]				
								[==>(Pattern 3, Copy 5)]				
								[==>(Pattern 4, Copy 1)]				
								[==>(Pattern 4, Copy 2)]				
								[==>(Pattern 4, Copy 3)]				
[==>(Pattern 4, Copy 4)]												
[==>(Pattern 4, Copy 5)]												



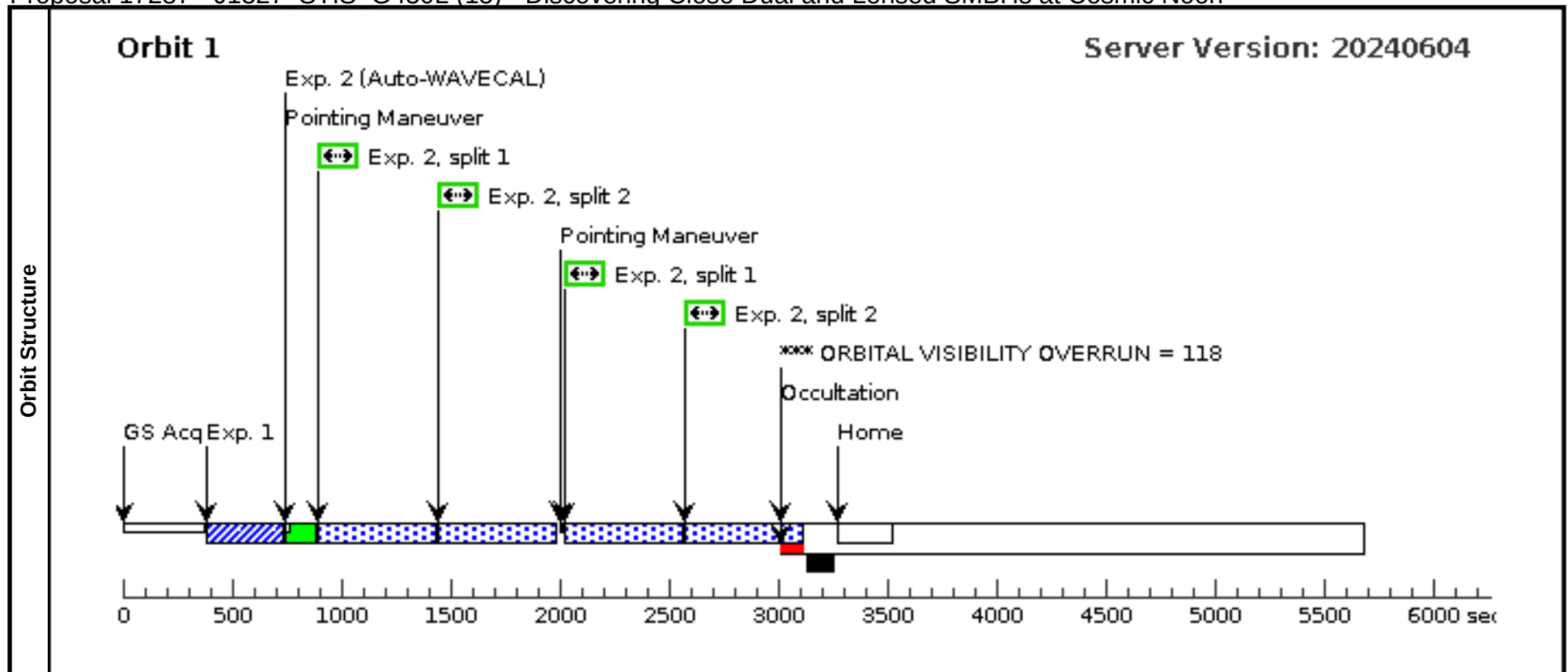
Proposal 17287 - J1327 IR F160W (14) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1327_IR_F160W (14), completed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: WFC3/IR												
	Special Requirements: (none)												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=1.365 Line Spacing=0.975			Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false							(1)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(10)	SDSSJ1327+1036		RA: 13 27 52.0400 (201.9668333d) Dec: +10 36 27.20 (10.60756d) Equinox: J2000		Redshift: 1.904		V=19.0 r = 18.98, z = 18.53		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(10) SDSSJ1327+1036	WFC3/IR, MULTIACCUM, IRSUB256		F160W	SAMP-SEQ=SPARS 10; NSAMP=15		Pattern 1, Exps 1-1 in J1327_IR_F160W (14) (1)	103.128633 Secs X 5 (2062.573 Secs)		[1]	
											[==>(Pattern 1, Copy 1)]		
											[==>(Pattern 1, Copy 2)]		
											[==>(Pattern 1, Copy 3)]		
											[==>(Pattern 1, Copy 4)]		
											[==>(Pattern 1, Copy 5)]		
											[==>(Pattern 2, Copy 1)]		
											[==>(Pattern 2, Copy 2)]		
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											[==>(Pattern 2, Copy 4)]		
											[==>(Pattern 2, Copy 5)]		
											[==>(Pattern 3, Copy 1)]		
											[==>(Pattern 3, Copy 2)]		
											[==>(Pattern 3, Copy 3)]		
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											[==>(Pattern 4, Copy 1)]		
											[==>(Pattern 4, Copy 2)]		
											[==>(Pattern 4, Copy 3)]		
											[==>(Pattern 4, Copy 4)]		
											[==>(Pattern 4, Copy 5)]		



Proposal 17287 - J1327 STIS G430L (15) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1327_STIS_G430L (15), failed										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: Warning												
	Scientific Instruments: STIS/CCD												
	Special Requirements: ORIENT 291.85D TO 291.85 D; ORIENT 111.85D TO 111.85 D												
Diagnostics	(J1327_STIS_G430L (15)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=										(2)	
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes		Miscellaneous		
	(10)	SDSSJ1327+1036	RA: 13 27 52.0400 (201.9668333d) Dec: +10 36 27.20 (10.60756d) Equinox: J2000			Redshift: 1.904			V=19.0 r = 18.98, z = 18.53		Reference Frame: ICRS		
Comments: Category=GALAXY Description=[QUASAR]													
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]			Orbit
	1	acq	(10) SDSSJ1327+1036	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]			[1]
	2		(10) SDSSJ1327+1036	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1327_STIS_G430L (15) (2)	1000 Secs (2028 Secs)			
										[==>507.0 Secs (Pattern 1, Split 1)] [==>507.0 Secs (Pattern 1, Split 2)] [==>507.0 Secs (Pattern 2, Split 1)] [==>507.0 Secs (Pattern 2, Split 2)]			[1]



Proposal 17287 - J1327 STIS G430L (59) - Discovering Close Dual and Lensed SMBHs at Cosmic Noon

Visit	Proposal 17287, J1327_STIS_G430L (59), implementation										Fri Jun 07 19:02:18 GMT 2024		
	Diagnostic Status: No Diagnostics												
	Scientific Instruments: STIS/CCD												
	Special Requirements: ORIENT 291.85D TO 291.85 D; ORIENT 111.85D TO 111.85 D												
	Comments: HOPR copy of visit 15												
Patterns	#	Primary Pattern					Secondary Pattern					Exposures	
	(2)	Pattern Type=STIS-ALONG-SLIT Coordinate Frame=POS-TARG Purpose=DITHER Pattern Orientation=90.0 Number Of Points=2 Angle Between Sides= Point Spacing=1.0 Center Pattern=false Line Spacing=										(2)	
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(10)	SDSSJ1327+1036		RA: 13 27 52.0400 (201.9668333d) Dec: +10 36 27.20 (10.60756d) Equinox: J2000		Redshift: 1.904		V=19.0 r = 18.98, z = 18.53		Reference Frame: ICRS			
	Comments: Category=GALAXY Description=[QUASAR]												
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	acq	(10) SDSSJ1327+1036	STIS/CCD, ACQ, F28X50LP		MIRROR	ACQTYPE=POINT			30 Secs (30 Secs)			
										[==>]		[1]	
	2		(10) SDSSJ1327+1036	STIS/CCD, ACCUM, 52X0.2E1		G430L 4300 A	CR-SPLIT=2		Pattern 2, Exps 2-2 in J1327_STIS_G430L (59) (2)	1000 Secs (1908 Secs)			
										[==>477.0 Secs (Pattern 1, Split 1)] [==>477.0 Secs (Pattern 1, Split 2)] [==>477.0 Secs (Pattern 2, Split 1)] [==>477.0 Secs (Pattern 2, Split 2)]		[1]	

