



18354 - Unveiling the Elusive Population of Local Nitrogen Emitters

Cycle: 34, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) J233846.84+181719.3	COS/NUV	3	19-Aug-2026 15:00:32.0	yes
02	(2) 39628309423723142	COS/NUV	3	19-Aug-2026 15:00:32.0	yes
03	(2) 39628309423723142	COS/NUV	2	19-Aug-2026 15:00:32.0	yes
04	(3) 39627959371301130	COS/NUV	3	19-Aug-2026 15:00:33.0	yes
05	(4) 39633389581502446	COS/NUV	3	19-Aug-2026 15:00:33.0	yes
07	(4) 39633389581502446	COS/FUV COS/NUV	3	19-Aug-2026 15:00:34.0	yes

17 Total Orbits Used

ABSTRACT

JWST spectroscopy of high- z galaxies has uncovered a population of starbursts with unusually dense, Nitrogen (N) rich gas via rest-UV nebular emission. These objects are likely key to understanding star-formation driving cosmic dawn galaxies, however their immense distances hinder acquisition of high SNR data and prohibit spatially resolved studies. A path forward is to leverage analogs in the local universe, but identifying analogs is challenging; optical spectra are typically insufficient to reveal dense, N-rich gas to inform requisite UV follow-up. As such, the sample of known-analogs remains at 1. We present a new indicator to select objects via anomalously strong [N II]5755 and high [N II]5755/6584, implying high densities $n_e > 10^5 \text{ cm}^{-3}$ and supersolar N/O, as well as optical Wolf-Rayet wind features, implying modest metallicities and young stellar populations. Using four promising candidates (of ~ 10) selected by this approach from SDSS+DESI DR1, we propose a pilot study with COS to acquire FUV+NUV spectroscopic coverage of the UV nebular features necessary to both confirm the presence of high density, N-rich gas, and characterize the ISM. This proposal will 1) Probe the conditions of N-enrichment via C/O and N/O abundances of 4 promising local N-emitters, identifying whether the source of N is also C-rich (e.g., WR, AGB), and more broadly 2) will validate a new approach for identifying local N-emitters. The upcoming DESI release will $\sim 4\times$ this sample, enabling high SNR demographic studies of these objects in regimes which are simply impractical in their high- z counterparts (e.g., $R > 1000$ Optical/UV, resolved IFU, X-ray, MIR, Radio).

OBSERVING DESCRIPTION

Observations Overview:

We divide the approved 17-orbit program into six independent, configuration-specific COS visits. Four targets will each be observed for three orbits with COS/NUV G230L at CENWAVE=2950. Target 39628309423723142 will additionally be observed for two orbits with G230L at CENWAVE=3360, and target 39633389581502446 will additionally be observed for three orbits with COS/FUV G140L at CENWAVE=1105. One grating and central-wavelength configuration is used per visit to maximize long-dwell science integrations and minimize configuration-change overheads.

Target Acquisition: Each visit begins with a COS/NUV ACQ/IMAGE exposure through the PSA. MIRRORA is used for J233846.84+181719.3 and 39628309423723142, while MIRRORB is used for the two brighter targets 39627959371301130 and 39633389581502446 to reduce their NUV imaging count rates. The acquisition exposure times are determined with the COS ETC to provide S/N of at least 25, with S/N=50 adopted where practical. The ETC source models are normalized conservatively to the compact source's available UV and optical photometry. The final coordinates are registered to the compact UV/blue star-forming component responsible for the optical emission-line spectrum. No ACQ/SEARCH is requested because the final coordinate uncertainties are less than 0.4 arcsec. All acquisition and science exposures will be verified with the APT Bright Object Tool.

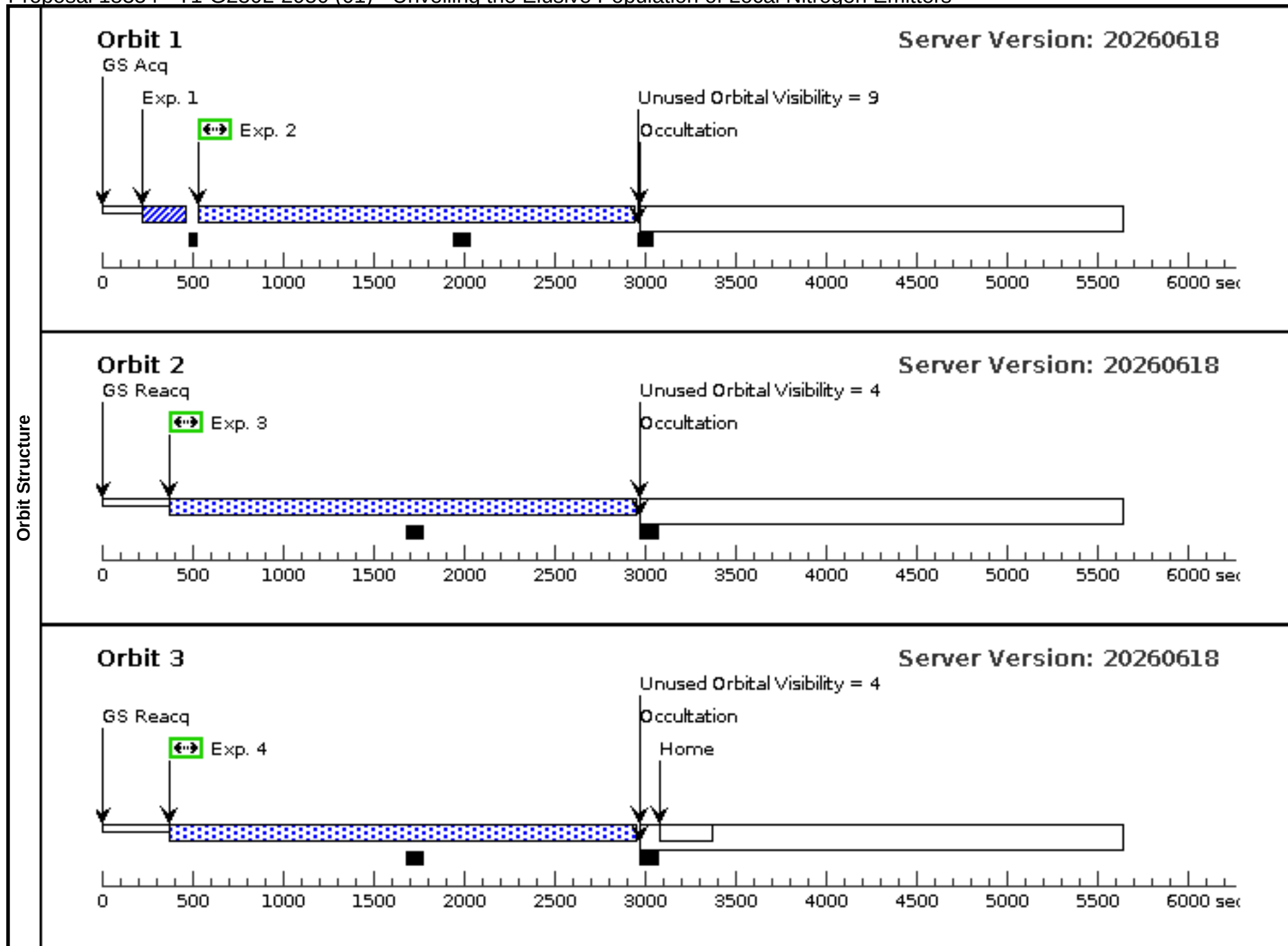
G230L Science Exposures:

The G230L observations use the PSA in TIME-TAG mode with automatic wavelength-calibration flashes. We employ a long-dwell strategy with one science exposure per orbit. FP-POS values are changed between orbits where permitted by wavelength coverage. For J233846.84+181719.3 we use FP-POS 2, 3, and 4; for 39628309423723142 at CENWAVE=2950 we use FP-POS 1, 3, and 4; at CENWAVE=3360 we use FP-POS 1 and 4; for 39627959371301130 we use FP-POS 1, 3, and 4; and for 39633389581502446 we use FP-POS 3, 4, and 4. These selections dither the spectra across the detector while retaining the blue O III] lines for the two lowest-redshift targets. The G230L/3360 first-order Stripe A spectrum provides Si III] and C III] for the highest-redshift target.

G140L Science Exposures: The G140L observations use the PSA in TIME-TAG mode at CENWAVE=1105, with SEGMENT=A and LIFETIME-POS=LP11. The four FP-POS settings are specified individually and executed in monotonically increasing order across the three-orbit visit. FP-POS 2 and 3 are divided between adjacent orbits so that the cumulative exposure time is approximately equal at all four FP-POS positions while avoiding inefficient backward grating movements. Automatic wavelength-calibration flashes are enabled. BUFFER-TIME values are calculated from the ETC after the final exposure durations and orbit packing have been established. The ETC yields and SNR per resel < 23 assuming continuum for a GALEX FUV mag 17.1 at 1486 Angstroms (expected location of low EW line) and SNR per resel < 10 at 1909 angstroms assuming C III] line EW of 1 Angstrom.

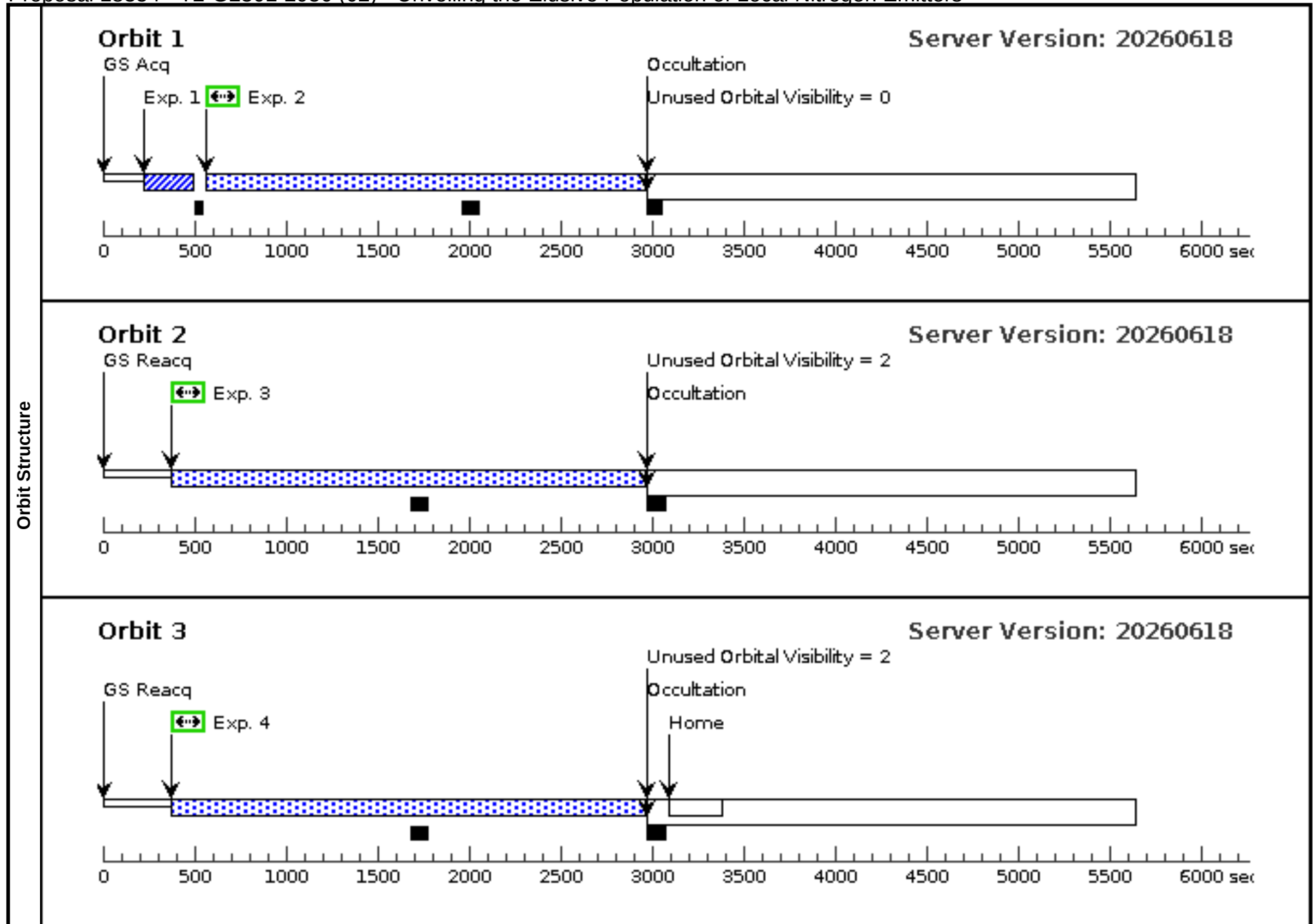
Proposal 18354 - T1-G230L-2950 (01) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T1-G230L-2950 (01)										Wed Aug 19 19:00:34 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/NUV											
	Special Requirements: (none)											
Comments: Three-orbit COS/NUV G230L/2950 visit. One long science exposure per orbit; FP-POS values 2, 3, and 4 preserve blue O III coverage while dithering the spectrum.												
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous						
	(1)	J233846.84+181719.3	RA: 23 38 46.8402 (354.6951675d) Dec: +18 17 19.32 (18.28870d) Equinox: J2000	Redshift: 0.0165	V=19.0 umag=18.17, z=0.0165	Reference Frame: ICRS						
	Comments: Category=GALAXY Description=[DWARF COMPACT, STAR FORMING REGION] Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	ACQ (COS.ta.236 6582)	(1) J233846.84+181 719.3	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				15 Secs (15 Secs)			
									[==>]		[1]	
	Comments: ETC set for TA SN 50.											
	2	SCI-FP2 (COS.sp.236 6607)	(1) J233846.84+181 719.3	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=2; FLASH=YES; BUFFER-TIME=13 00			2300 Secs (2300 Secs)			
									[==>]		[1]	
	Comments: Buffer time set as 2/3 of buffer fill time estimated by ETC as 2100s											
	3	SCI-FP3 (COS.sp.236 6607)	(1) J233846.84+181 719.3	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=3; FLASH=YES; BUFFER-TIME=13 00			2565 Secs (2565 Secs)			
									[==>]		[2]	
	Comments: Buffer time set as 2/3 of buffer fill time estimated by ETC as 2100s											
4	SCI-FP4 (COS.sp.236 6607)	(1) J233846.84+181 719.3	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2565 Secs (2565 Secs)				
								[==>]		[3]		
Comments: Buffer time set as 2/3 of buffer fill time estimated by ETC as 2100s												



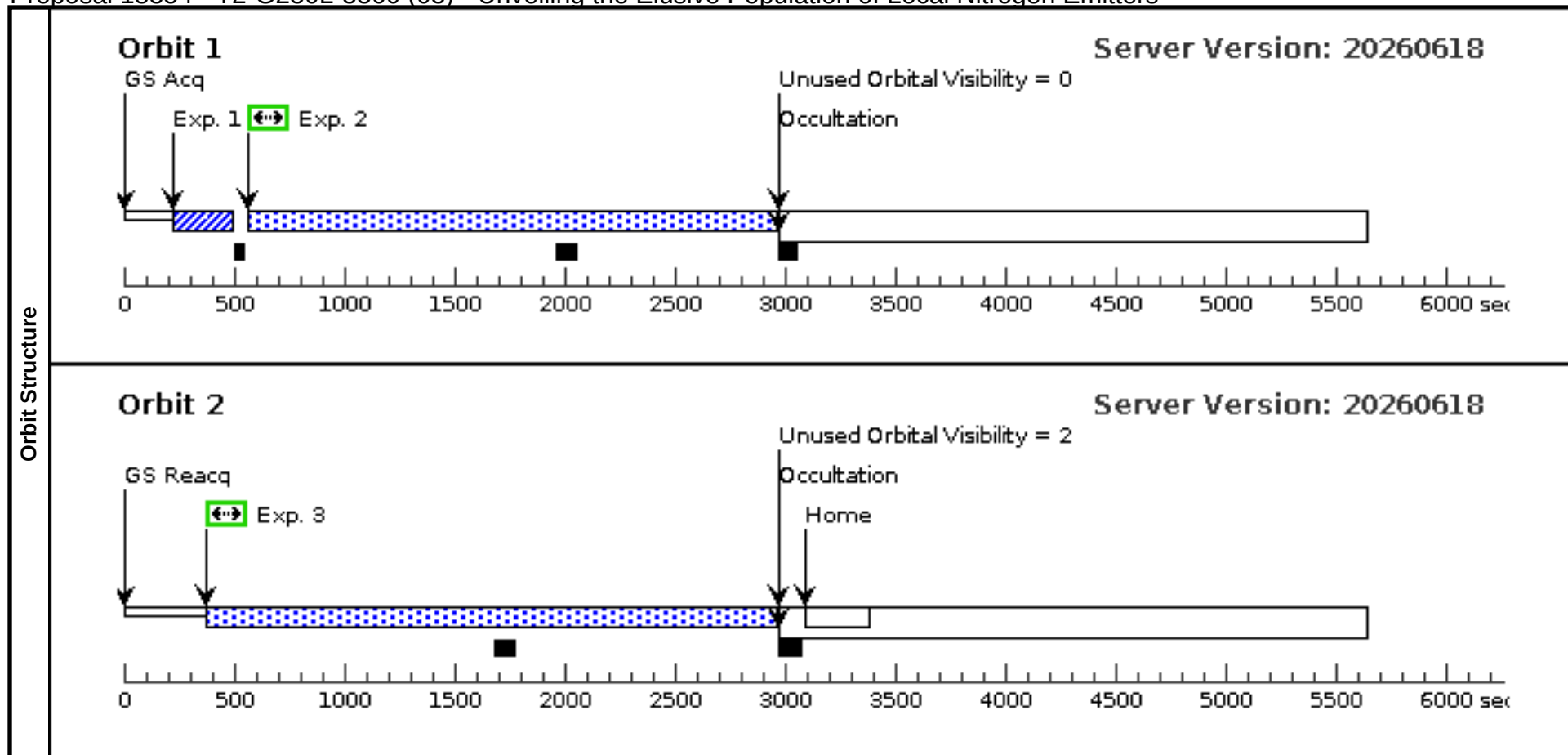
Proposal 18354 - T2-G230L-2950 (02) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T2-G230L-2950 (02)										Wed Aug 19 19:00:34 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/NUV											
	Special Requirements: (none)											
	Comments: Three-orbit COS/NUV G230L/2950 visit. One long science exposure per orbit; FP-POS values 1, 3, and 4 provide broad detector-position sampling.											
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	39628309423723142		RA: 22 59 41.3520 (344.9223000d) Dec: +22 07 1.48 (22.11708d) Equinox: J2000		Redshift: 0.1344		V=20.1 z=0.1344		Reference Frame: ICRS		
	Comments: Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	ACQ (COS.ta.236 6619)	(2) 39628309423723 142	COS/NUV, ACQ/IMAGE, PSA		MIRRORA				26 Secs (26 Secs)		
										[==>]		[1]
	Comments: Exposure set for SN = 25 given GALEX FUV 20.6 mag											
	2	SCI-FP1 (COS.sp.236 6608)	(2) 39628309423723 142	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=1; FLASH=YES; BUFFER-TIME=13 00			2290 Secs (2290 Secs)		
										[==>]		[1]
	Comments: Buffer time set at 2/3 fill time from ETC (2000s)											
	3	SCI-FP3 (COS.sp.236 6608)	(2) 39628309423723 142	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=3; FLASH=YES; BUFFER-TIME=13 00			2570 Secs (2570 Secs)		
										[==>]		[2]
	Comments: Buffer time set at 2/3 fill time from ETC (2000s)											
	4	SCI-FP4 (COS.sp.236 6608)	(2) 39628309423723 142	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2570 Secs (2570 Secs)		
										[==>]		[3]
Comments: Buffer time set at 2/3 fill time from ETC (2000s)												



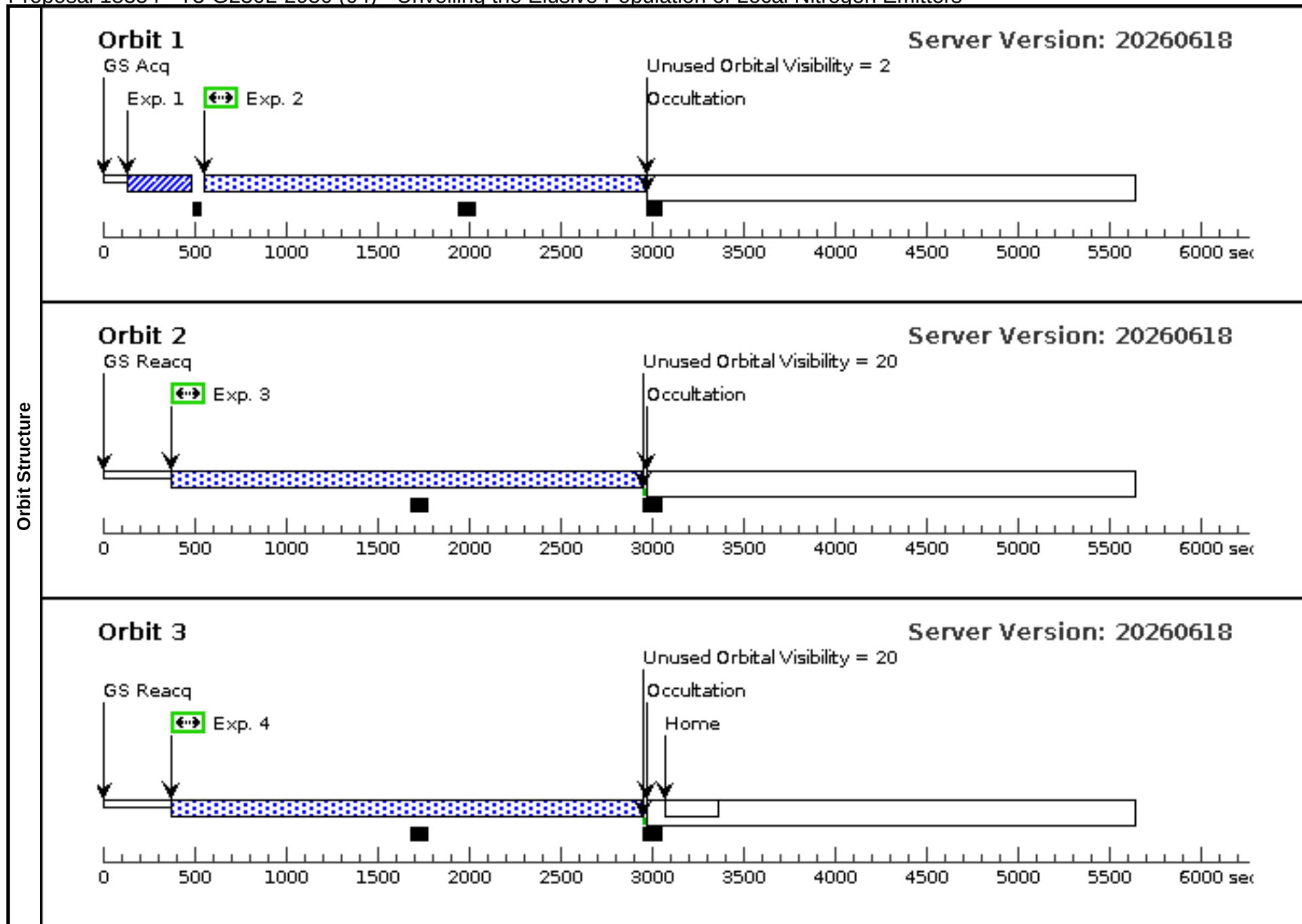
Proposal 18354 - T2-G230L-3360 (03) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T2-G230L-3360 (03)										Wed Aug 19 19:00:34 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/NUV											
	Special Requirements: (none)											
Comments: Two-orbit COS/NUV G230L/3360 visit. FP-POS values 1 and 4 maximize detector separation while retaining first-order Stripe A coverage of Si III] and C III].												
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous						
	(2)	39628309423723142	RA: 22 59 41.3520 (344.9223000d) Dec: +22 07 1.48 (22.11708d) Equinox: J2000	Redshift: 0.1344	V=20.1 z=0.1344	Reference Frame: ICRS						
	Comments: Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	ACQ (COS.ta.236 6619)	(2) 39628309423723 142	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				26 Secs (26 Secs)			
									[==>]		[1]	
	Comments: Exposure set for SN = 25 given GALEX FUV 20.6 mag											
	2	SCI-FP1 (COS.sp.236 6609)	(2) 39628309423723 142	COS/NUV, TIME-TAG, PSA	G230L 3360 A	FP-POS=1; FLASH=YES; BUFFER-TIME=13 00			2290 Secs (2290 Secs)			
									[==>]		[1]	
	Comments: Buffer time set at 2/3 fill time from ETC (2000s)											
3	SCI-FP4 (COS.sp.236 6609)	(2) 39628309423723 142	COS/NUV, TIME-TAG, PSA	G230L 3360 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2570 Secs (2570 Secs)				
								[==>]		[2]		
Comments: Buffer time set at 2/3 fill time from ETC (2000s)												



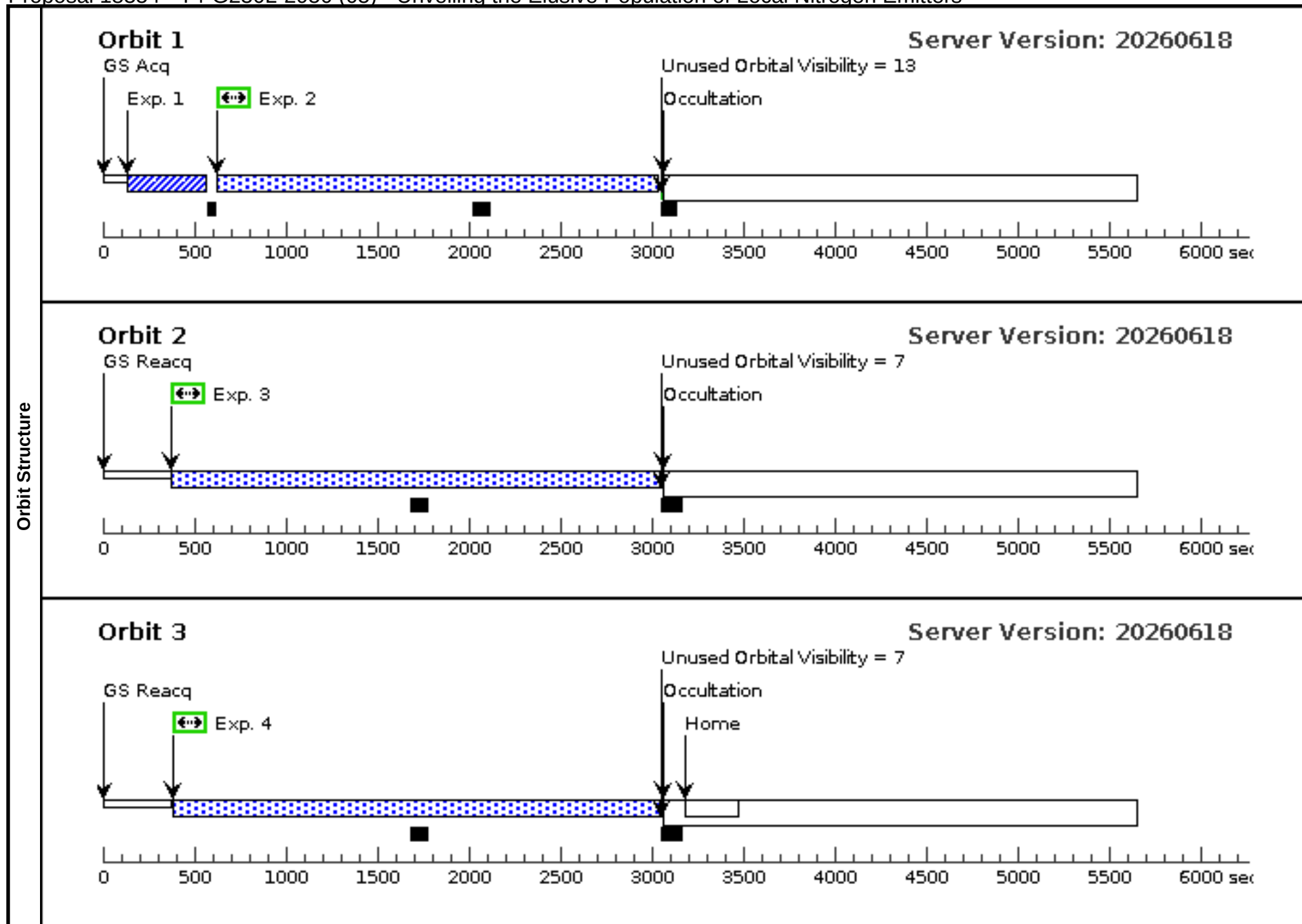
Proposal 18354 - T3-G230L-2950 (04) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T3-G230L-2950 (04)										Wed Aug 19 19:00:34 GMT 2026
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/NUV										
	Special Requirements: (none)										
Comments: Three-orbit COS/NUV G230L/2950 visit. One long science exposure per orbit; FP-POS values 1, 3, and 4 provide broad detector-position sampling.											
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
	(3)	39627959371301130	RA: 23 15 44.6178 (348.9359075d) Dec: +06 54 39.76 (6.91104d) Equinox: J2000	Redshift: 0.0299	V=16 z=0.0299	Reference Frame: ICRS					
	Comments: Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=NO										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	ACQ (COS.ta.236 6617)	(3) 39627959371301 130	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				22 Secs (22 Secs)		
									[==>]		[1]
	Comments: Target ACQ/IMAGE exposure timeset for S/N 25 using Mirror B due to GALEX FUV = 17.3 mag										
	2	SCI-FP1 (COS.sp.236 6610)	(3) 39627959371301 130	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=1; FLASH=YES; BUFFER-TIME=13 00			2300 Secs (2300 Secs)		
									[==>]		[1]
	Comments: Buffer Time set to 2/3 of Buffer Fill time which is 2000s on the ETC										
	3	SCI-FP3 (COS.sp.236 6610)	(3) 39627959371301 130	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=3; FLASH=YES; BUFFER-TIME=13 00			2550 Secs (2550 Secs)		
									[==>]		[2]
	Comments: Buffer Time set to 2/3 of Buffer Fill time which is 2000s on the ETC										
	4	SCI-FP4 (COS.sp.236 6610)	(3) 39627959371301 130	COS/NUV, TIME-TAG, PSA	G230L 2950 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2550 Secs (2550 Secs)		
									[==>]		[3]
Comments: Buffer Time set to 2/3 of Buffer Fill time which is 2000s on the ETC											



Proposal 18354 - T4-G230L-2950 (05) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T4-G230L-2950 (05)										Wed Aug 19 19:00:35 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/NUV											
	Special Requirements: (none)											
	Comments: Three-orbit COS/NUV G230L/2950 visit. FP-POS values 3, 4, and 4 prioritize retention of the blue O III] component; the repeated FP-POS=4 exposure is deliberate.											
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(4)	39633389581502446		RA: 07 56 14.1897 (119.0591237d) Dec: +60 18 14.39 (60.30400d) Equinox: J2000		Redshift: 0.0047		V=13.8 z=0.0047		Reference Frame: ICRS		
	Comments:											
	Category=GALAXY											
	Description=[DWARF COMPACT, STARBURST] Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	ACQ (COS.ta.236 6614)	(4) 39633389581502 446	COS/NUV, ACQ/IMAGE, PSA		MIRRORB				60 Secs (60 Secs)		
										[==>]		[1]
	Comments: Target ACQ/IMAGE requires MirrorB as GALEX FUV is 17 mag, set to recommended SN 50.											
	2	SCI-FP3 (COS.sp.236 6611)	(4) 39633389581502 446	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=3; FLASH=YES; BUFFER-TIME=13 00			2300 Secs (2300 Secs)		
										[==>]		[1]
	Comments: Buffer time set as 2/3 of fill time from etc (2000s)											
	3	SCI-FP4A (COS.sp.236 6611)	(4) 39633389581502 446	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2650 Secs (2650 Secs)		
										[==>]		[2]
	Comments: Buffer time set as 2/3 of fill time from etc (2000s)											
4	SCI-FP4B (COS.sp.236 6611)	(4) 39633389581502 446	COS/NUV, TIME-TAG, PSA		G230L 2950 A	FP-POS=4; FLASH=YES; BUFFER-TIME=13 00			2650 Secs (2650 Secs)			
									[==>]		[3]	
Comments: Buffer time set as 2/3 of fill time from etc (2000s)												



Proposal 18354 - T4-G140L-1105 (07) - Unveiling the Elusive Population of Local Nitrogen Emitters

Visit	Proposal 18354, T4-G140L-1105 (07) Wed Aug 19 19:00:35 GMT 2026				
	Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none) <i>Comments: Three-orbit COS/FUV G140L/1105 visit. The four FP-POS settings are specified individually in increasing order. FP-POS 2 and 3 are split across adjacent orbits to balance cumulative exposure among all four positions while minimizing grating-motion overhead.</i>				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
	(4)	39633389581502446	RA: 07 56 14.1897 (119.0591237d) Dec: +60 18 14.39 (60.30400d) Equinox: J2000	Redshift: 0.0047	V=13.8 z=0.0047
<i>Comments:</i> Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=NO					
Reference Frame: ICRS					

Proposal 18354 - T4-G140L-1105 (07) - Unveiling the Elusive Population of Local Nitrogen Emitters

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ (COS.ta.236 6614)	(4) 39633389581502 446	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs (60 Secs) [==>]	[1]
	Comments: Target ACQ/IMAGE requires Mirror B as GALEX FUV is 17 mag, set to SNR=50									
	2	SCI-ALL1 (COS.sp.236 6749)	(4) 39633389581502 446	COS/FUV, TIME-TAG, PSA	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=1; FLASH=YES; BUFFER-TIME=50 00			1765 Secs (1765 Secs) [==>]	[1]
	Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup									
	3	SCI-ALL2 (COS.sp.236 6749)	(4) 39633389581502 446	COS/FUV, TIME-TAG, PSA	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=2; FLASH=YES; BUFFER-TIME=50 00			330 Secs (330 Secs) [==>]	[1]
	Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup									
	4	SCI-ALL2.2 (COS.sp.236 6749)	(4) 39633389581502 446	COS/FUV, TIME-TAG, PSA	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=2; FLASH=YES; BUFFER-TIME=50 00			1430 Secs (1430 Secs) [==>]	[2]
	Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup									
	5	SCI-ALL3 (COS.sp.236 6749)	(4) 39633389581502 446	COS/FUV, TIME-TAG, PSA	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=3; FLASH=YES; BUFFER-TIME=50 00			1060 Secs (1060 Secs) [==>]	[2]
	Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup									
	6	SCI-ALL3.2 (COS.sp.236 6749)	(4) 39633389581502 446	COS/FUV, TIME-TAG, PSA	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=3; FLASH=YES; BUFFER-TIME=50 00			720 Secs (720 Secs) [==>]	[3]
	Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup									

Proposal 18354 - T4-G140L-1105 (07) - Unveiling the Elusive Population of Local Nitrogen Emitters

7	SCI-ALL4 (4) 39633389581502 COS/FUV, TIME-TAG, PSA (COS.sp.236 446 6749)	G140L 1105 A	LIFETIME-POS=LP 11; SEGMENT=A; FP-POS=4; FLASH=YES; BUFFER-TIME=50 00	1780 Secs (1780 Secs)	
				[==>]	[3]
				Comments: Buffer time set as 2/3 of fill time from etc (8000s). ETC linked is combined exposure, ETC yields an SNR 23 per resel for the 4 FP-POS setup	

