18074 - PANCHO: Piloting a Novel Calibration for H2 Observations

Cycle: 33, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Ava Polzin (PI) (Contact)	**University of Chicago**
Prof. Hsiao-Wen Chen (CoI) (CoPI) (Contact)	University of Chicago
Dr. Zhijie Qu (CoI) (CoPI) (Contact)	Tsinghua University
Dr. Andrey V. Kravtsov (CoI)	University of Chicago
Prof. Nickolay Gnedin (CoI)	Fermi National Accelerator Laboratory (FNAL)
Dr. Vadim Semenov (CoI)	Harvard University

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) IC1613-B3	COS/FUV COS/NUV	4	10-Aug-2026 13:00:15.0	yes
02	(1) IC1613-B3	COS/FUV COS/NUV	4	10-Aug-2026 13:00:17.0	yes
03	(1) IC1613-B3	COS/FUV COS/NUV	3	10-Aug-2026 13:00:19.0	yes
13	(1) IC1613-B3	COS/FUV COS/NUV	2	10-Aug-2026 13:00:20.0	yes
05	(2) IC1613-A13	COS/FUV COS/NUV	4	10-Aug-2026 13:00:21.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
06	(2) IC1613-A13	COS/FUV COS/NUV	4	10-Aug-2026 13:00:23.0	yes
07	(2) IC1613-A13	COS/FUV COS/NUV	4	10-Aug-2026 13:00:25.0	yes
08	(2) IC1613-A13	COS/FUV COS/NUV	3	10-Aug-2026 13:00:26.0	yes

28 Total Orbits Used

ABSTRACT

Very low metallicity galaxies are a frontier in modern astrophysics. Locally, they represent the exreme low mass end of galaxy formation. At early cosmic time, when the global metallicity is lower, they are the result of some of the earliest galaxy formation in the universe. Despite their importance on a range of scales, understanding the formation and evolution of such galaxies - including the connection between their chemical and physical properties - is a significant challenge due to their generally low masses and/or high redshifts. There is a disparity between observed star formation in low metallicity galaxies and the most common models of star formation inferred from more numerous observations of higher metallicity, often higher mass, galaxies. As a result, the mechanism and medium for star formation in less metal-enriched galaxies is uncertain. A primary constraint can be placed on the nature of star formation using directly measured molecular hydrogen abundance. To date, this has been a challenge since absorption spectroscopy, by necessity, covers only a limited angular extent toward a sometimes ionizing background source. This pilot program capitalizes on the molecular and atomic lines in the HST COS FUV bands to, in conjunction with archival 21 cm emission maps, obtain spatially resolved molecular hydrogen content along two sightines in IC1613. IC1613 is one of best-studied low metallicity galaxies, providing a unique testbed for star formation models. These observations will: (1) extend UV absorption constraints of H2 to external galaxies and (2) place initial constraints on the nature and regulation of star formation in low metallicity galaxies.

OBSERVING DESCRIPTION

This is a pilot program to use HST COS to obtain spatially resolved molecular hydrogen measurements in absorption along two individual sightlines toward FUV-bright stars. The approved observing program involves two individual spectroscopic pointings, one for each star, with G130M (and central wavelength of 1096AA). A total of 26 orbits are approved with 11 orbits on one target and 15 orbits for the second to ensure consistent signal-to-noise ratios for both targets.

Both targets are in a nearby galaxy, and IC1613-A13 is in a less dense environment, while IC1613-B3 is in a more crowded environment that necessitates careful acquisition.

Visit

Proposal 18074, IC1613-B3 (01), scheduled Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

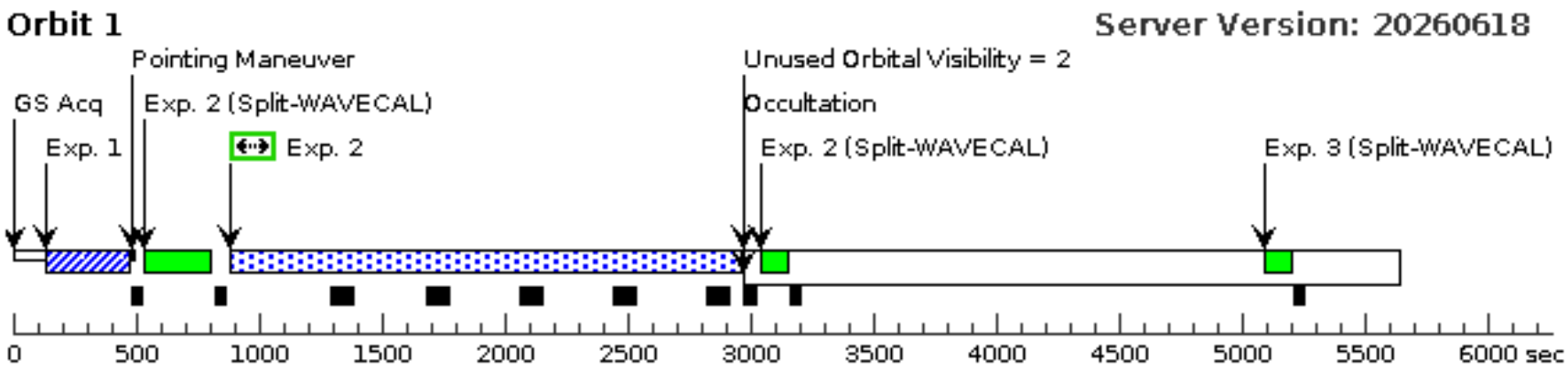
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC1613-B3	RA: 01 05 6.3767 (16.2765696d) Dec: +02 09 31.39 (2.15872d) Equinox: J2000		V=17.81	Reference Frame: ICRS

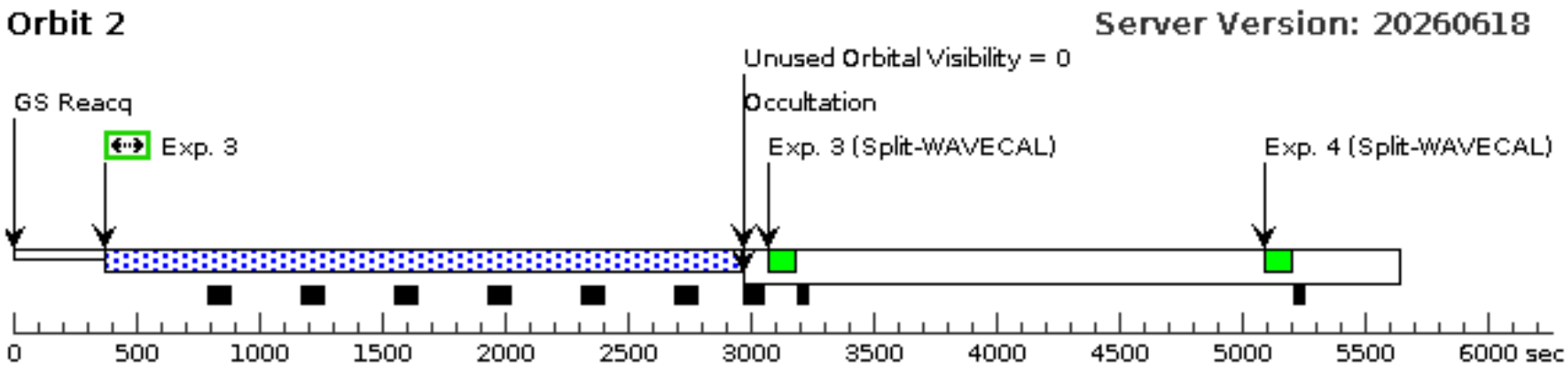
Comments: Coordinates from WFC3 F275W image.
Category=STAR
Description=[B0-B2 III-I]
Extended=NO

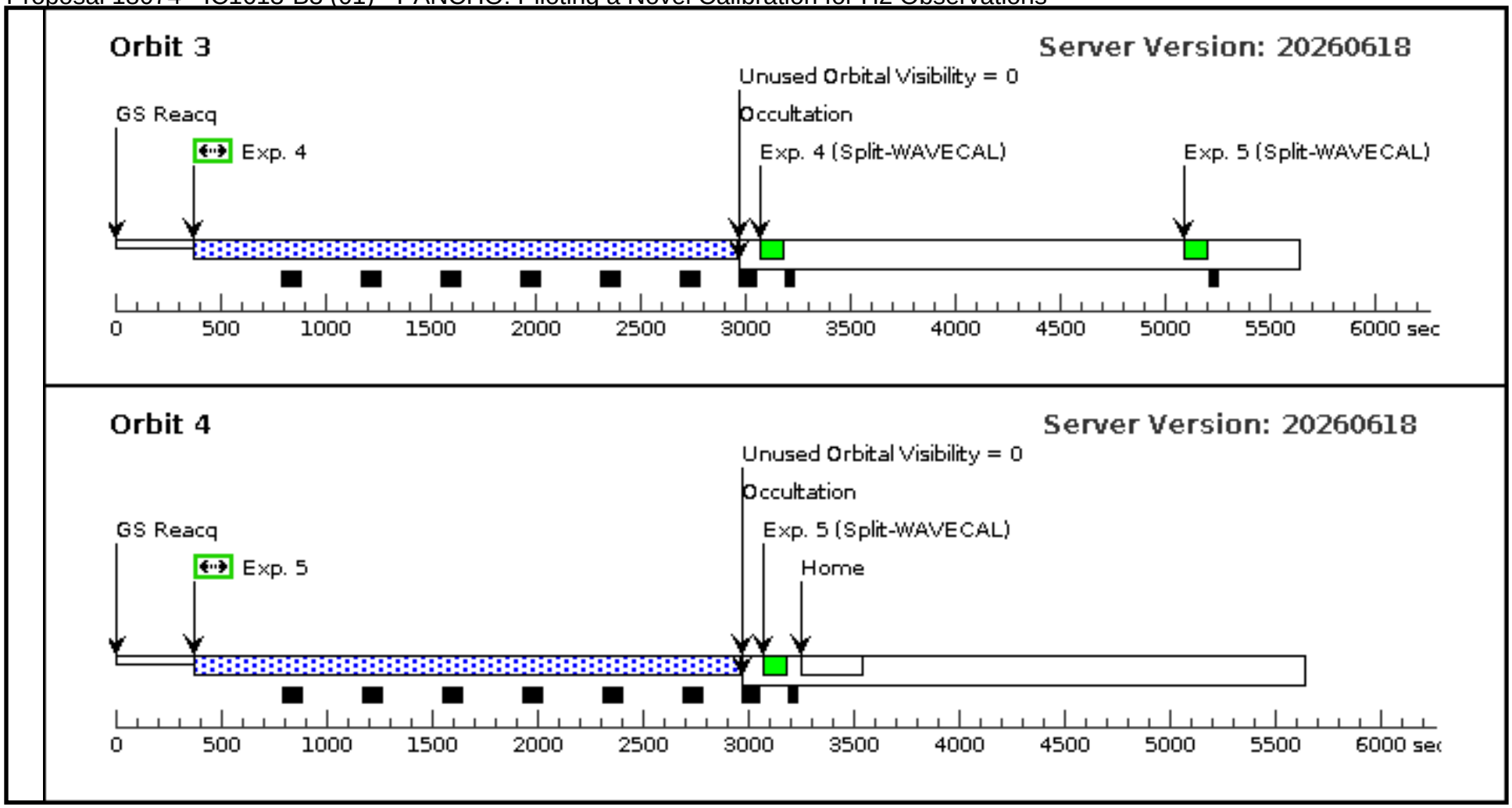
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2269811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	***[1]***
2	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2029 Secs (2029 Secs) *[==>]*	***[1]***
Comments: The ETC is for the full integration (11 orbits).									
3	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
4	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (11 orbits).									
5	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[4]***
Comments: ETC is for full integration (11 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Exp. 5 (Split-WAVECAL)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 4
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 5
Exp. 5 (Split-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC1613-B3 (02), scheduled Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

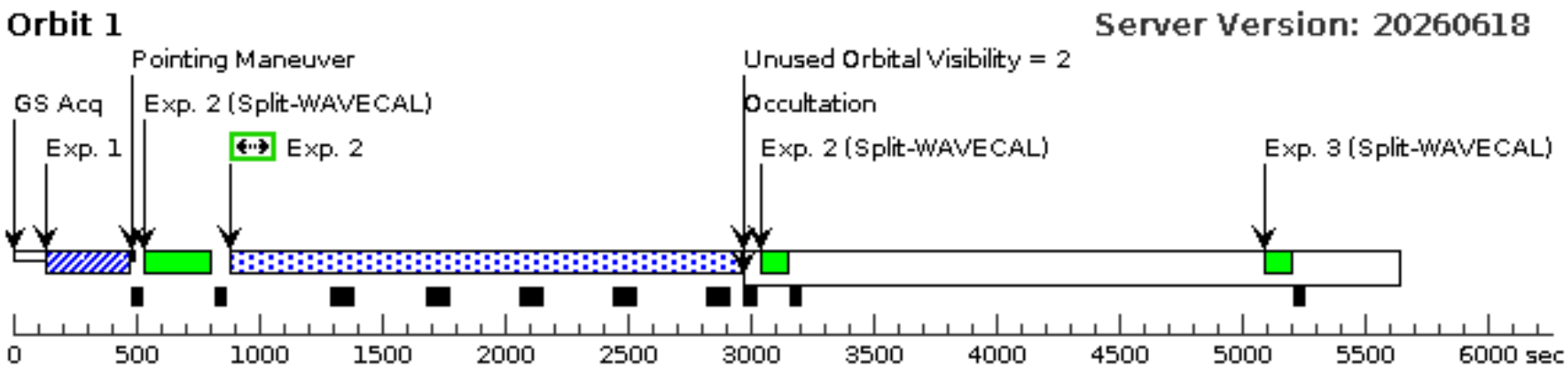
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC1613-B3	RA: 01 05 6.3767 (16.2765696d) Dec: +02 09 31.39 (2.15872d) Equinox: J2000		V=17.81	Reference Frame: ICRS

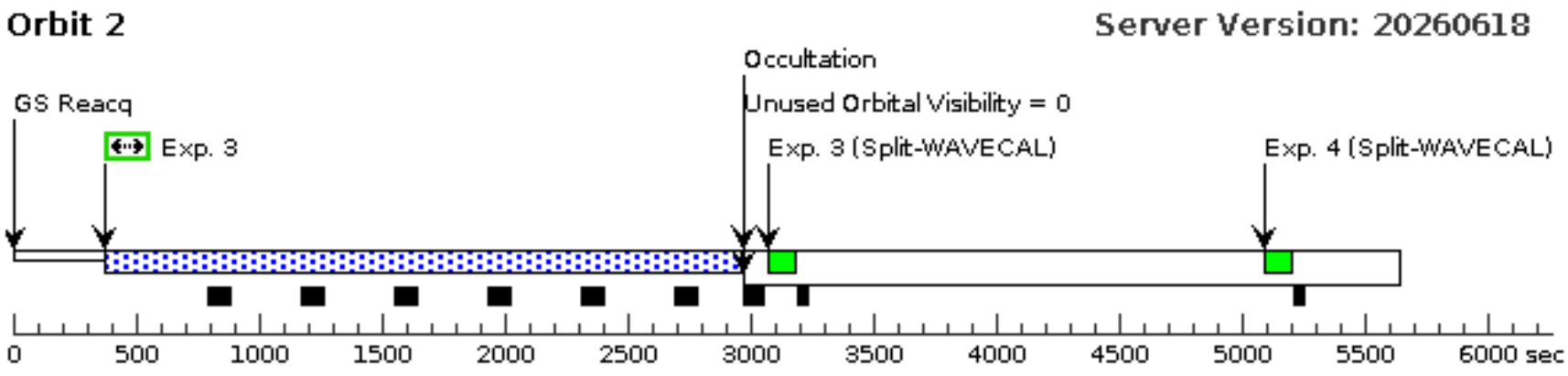
Comments: Coordinates from WFC3 F275W image.
Category=STAR
Description=[B0-B2 III-I]
Extended=NO

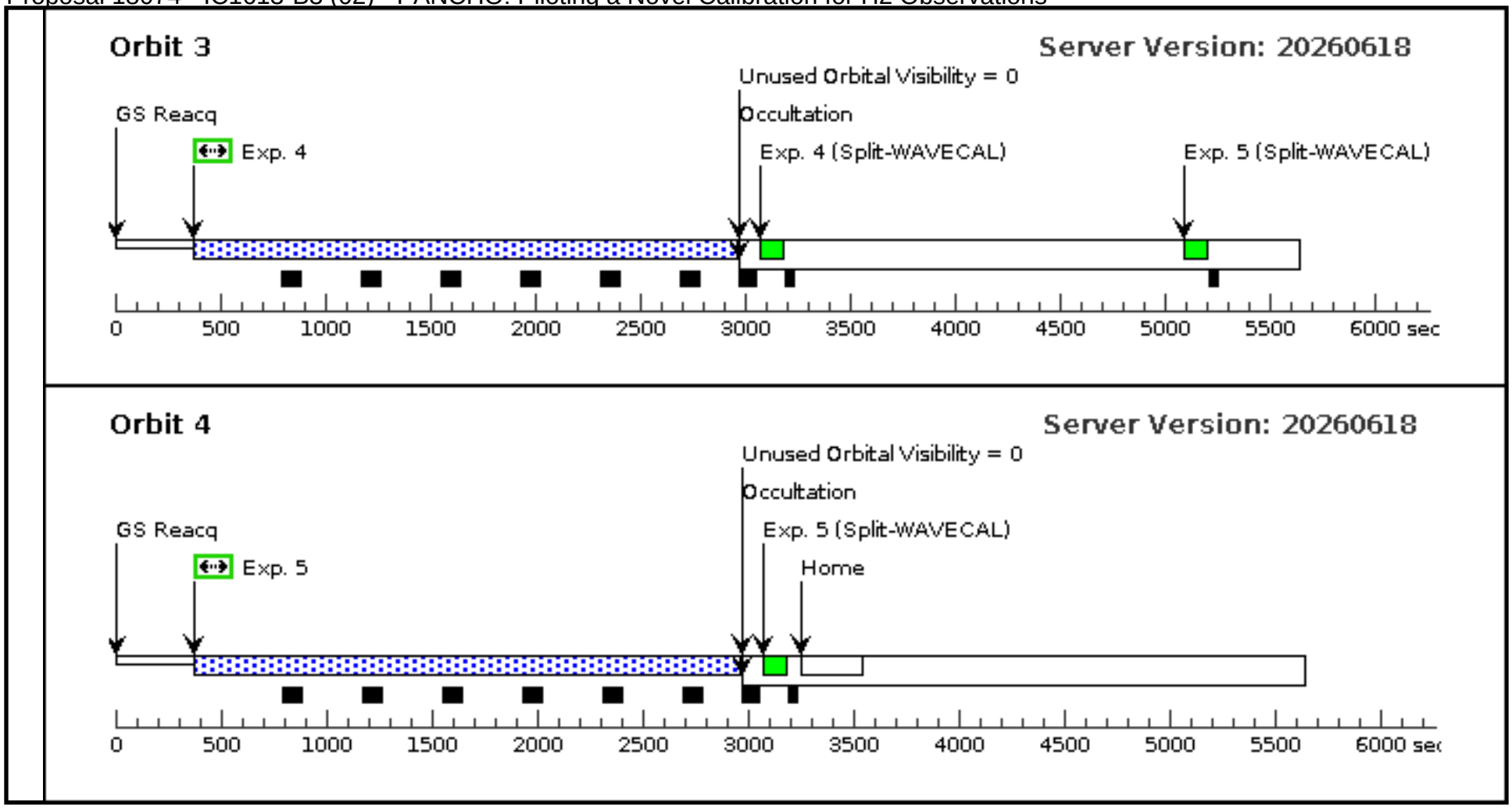
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2269811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	***[1]***
2	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2029 Secs (2029 Secs) *[==>]*	***[1]***
Comments: ETC is for full integration (11 orbits).									
3	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
4	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (11 orbits).									
5	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[4]***
Comments: ETC is for full integration (11 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Exp. 5 (Split-WAVECAL)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 4
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 5
Exp. 5 (Split-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC1613-B3 (03), failed

Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

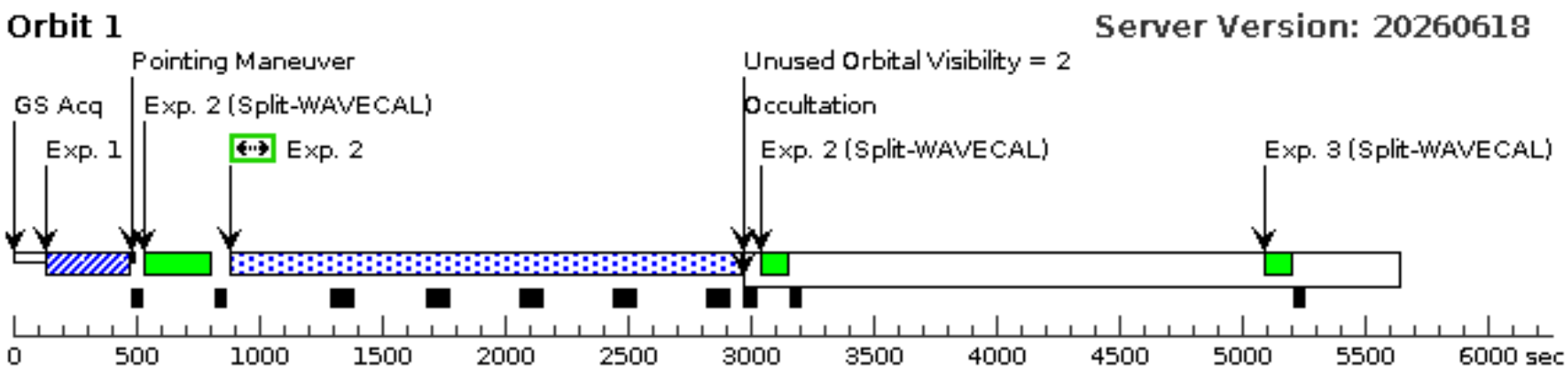
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC1613-B3	RA: 01 05 6.3767 (16.2765696d) Dec: +02 09 31.39 (2.15872d) Equinox: J2000		V=17.81	Reference Frame: ICRS

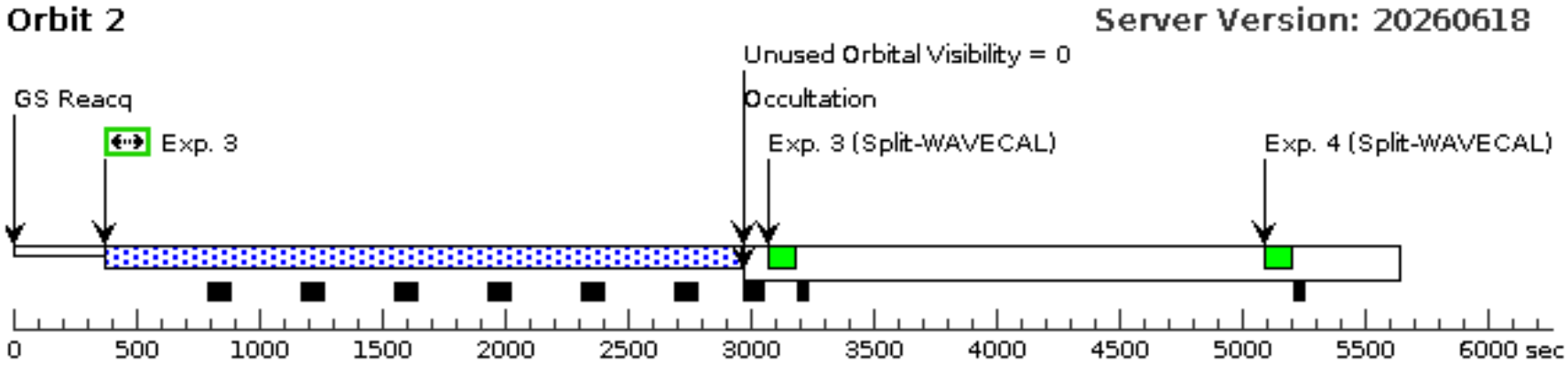
Comments: Coordinates from WFC3 F275W image.
Category=STAR
Description=[B0-B2 III-I]
Extended=NO

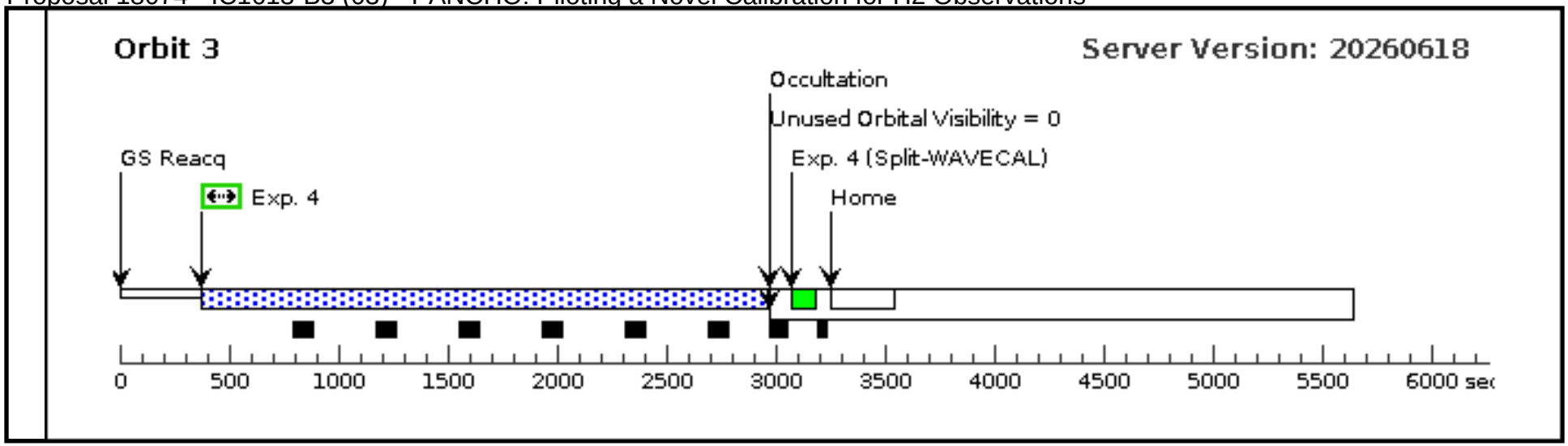
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2269811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	***[1]***
2	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2029 Secs (2029 Secs) *[==>]*	***[1]***
Comments: ETC is for full integration (11 orbits).									
3	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
Comments: ETC is for full integration (11 orbits).									
4	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (11 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 4 (Split-WAVECAL)
Exp. 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC1613-B3 (13) Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

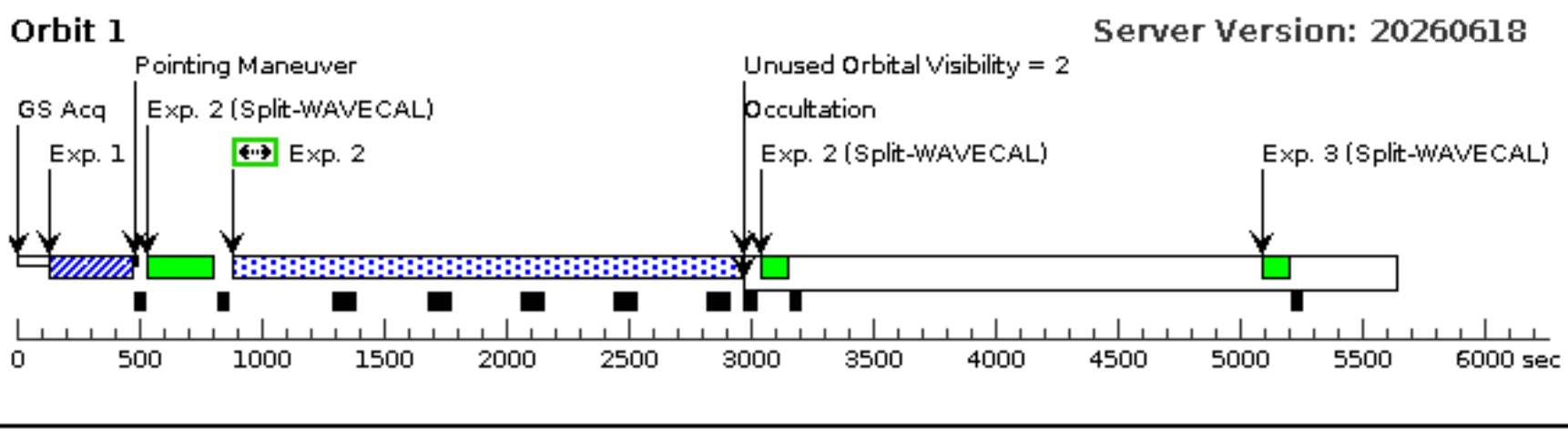
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	IC1613-B3	RA: 01 05 6.3767 (16.2765696d) Dec: +02 09 31.39 (2.15872d) Equinox: J2000		V=17.81	Reference Frame: ICRS

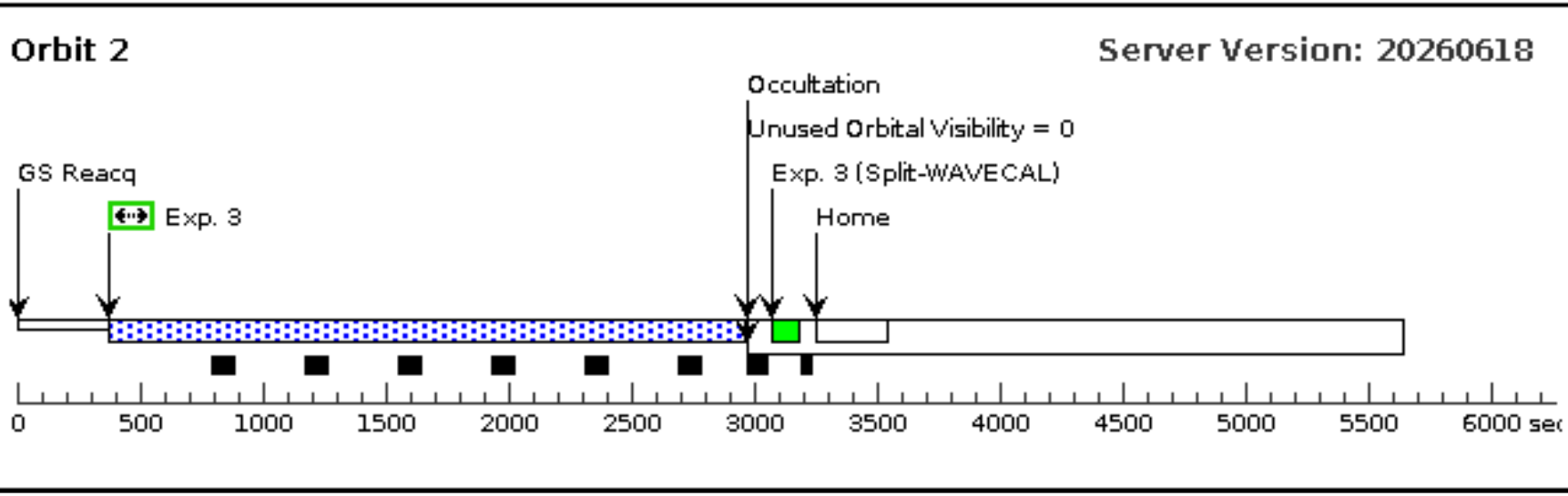
Comments: Coordinates from WFC3 F275W image.
Category=STAR
Description=[B0-B2 III-I]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2269811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	***[1]***
2	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2029 Secs (2029 Secs) *[==>]*	***[1]***
Comments: ETC is for full integration (11 orbits).									
3	(COS.sp.2025596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
Comments: ETC is for full integration (11 orbits).									

Orbit Structure





Visit

Proposal 18074, IC16113-A13 (05), scheduled Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

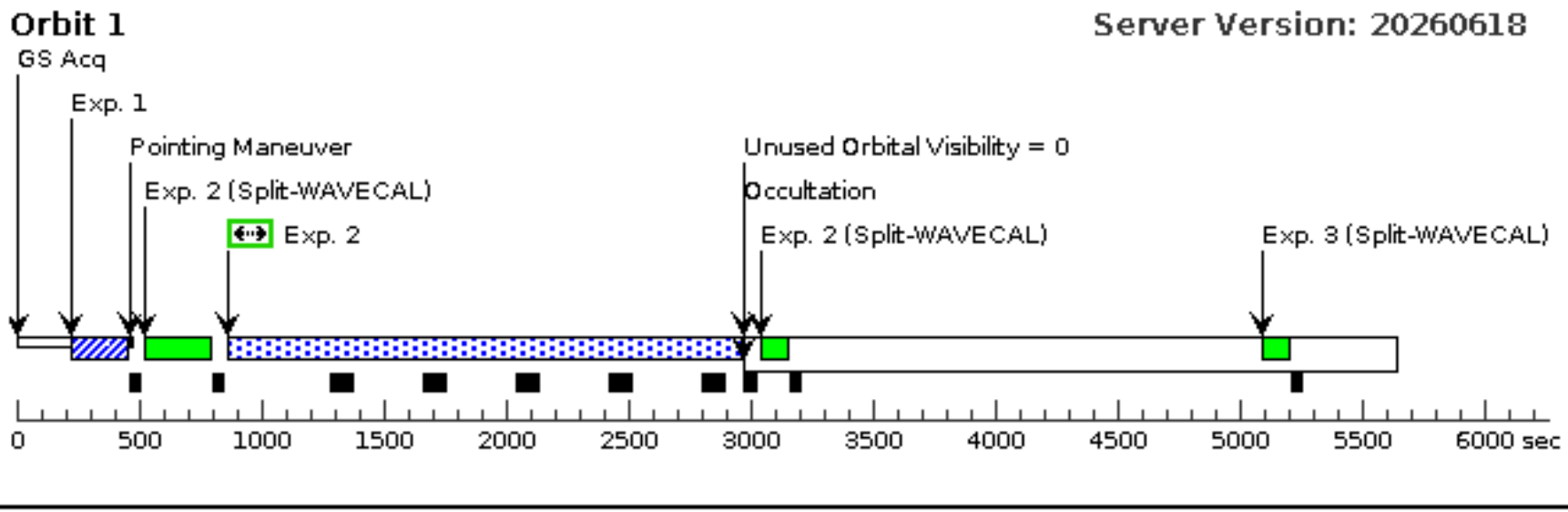
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IC1613-A13	RA: 01 05 6.2560 (16.2760667d) Dec: +02 10 43.15 (2.17865d) Equinox: J2000		V=19.02	Reference Frame: ICRS

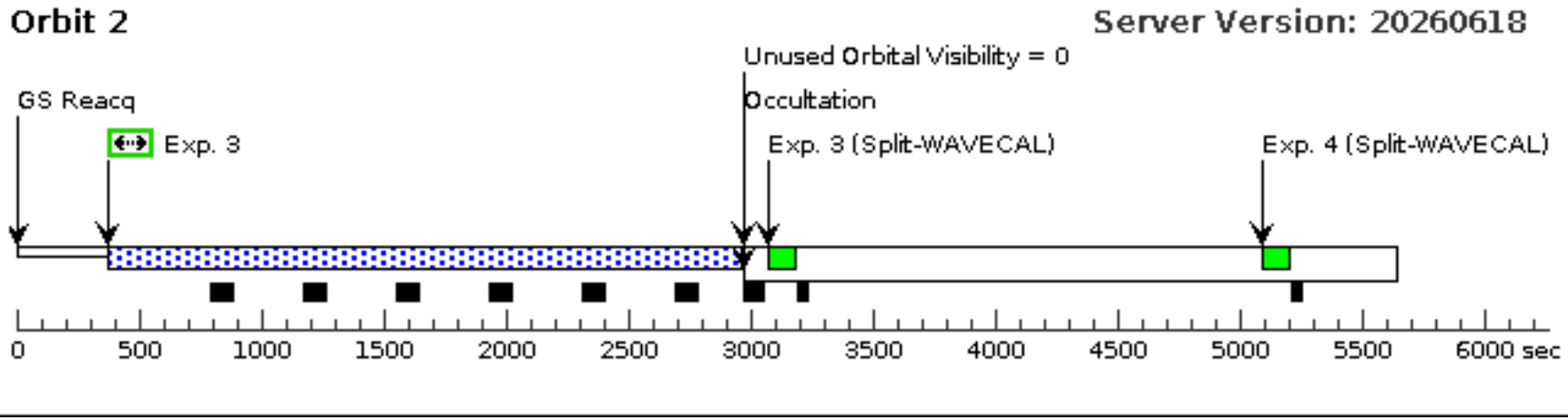
Comments: Coordinates from HST GO-12587
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

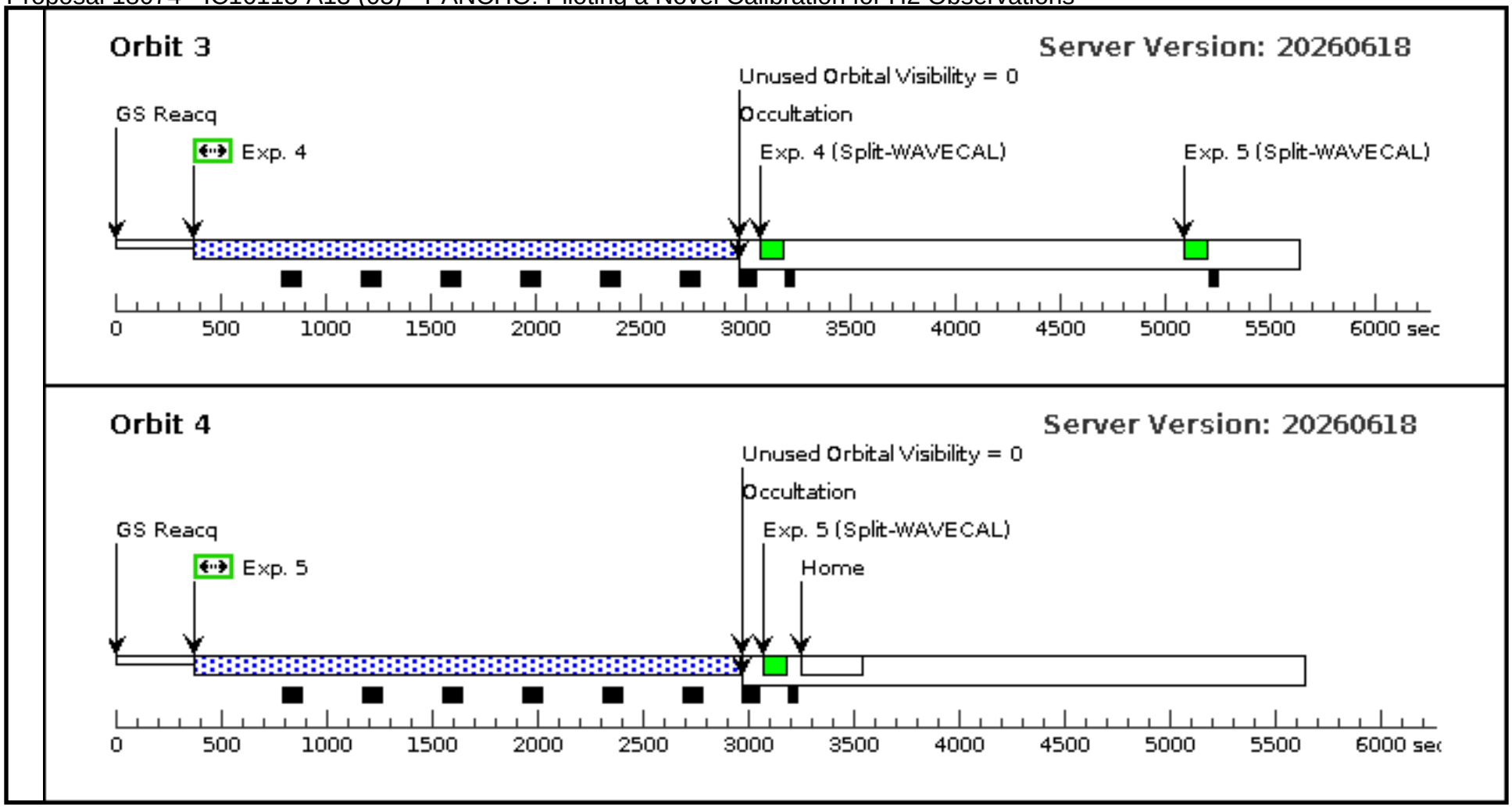
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2025586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) *[==>]*	***[1]***
2	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2047 Secs (2047 Secs) *[==>]*	***[1]***
Comments: ETC for full integration (15 orbits).									
3	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
4	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (15 orbits).									
5	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[4]***
Comments: ETC is for full integration (15 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Exp. 5 (Split-WAVECAL)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 4
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 5
Exp. 5 (Split-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC16113-A13 (06), scheduled Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

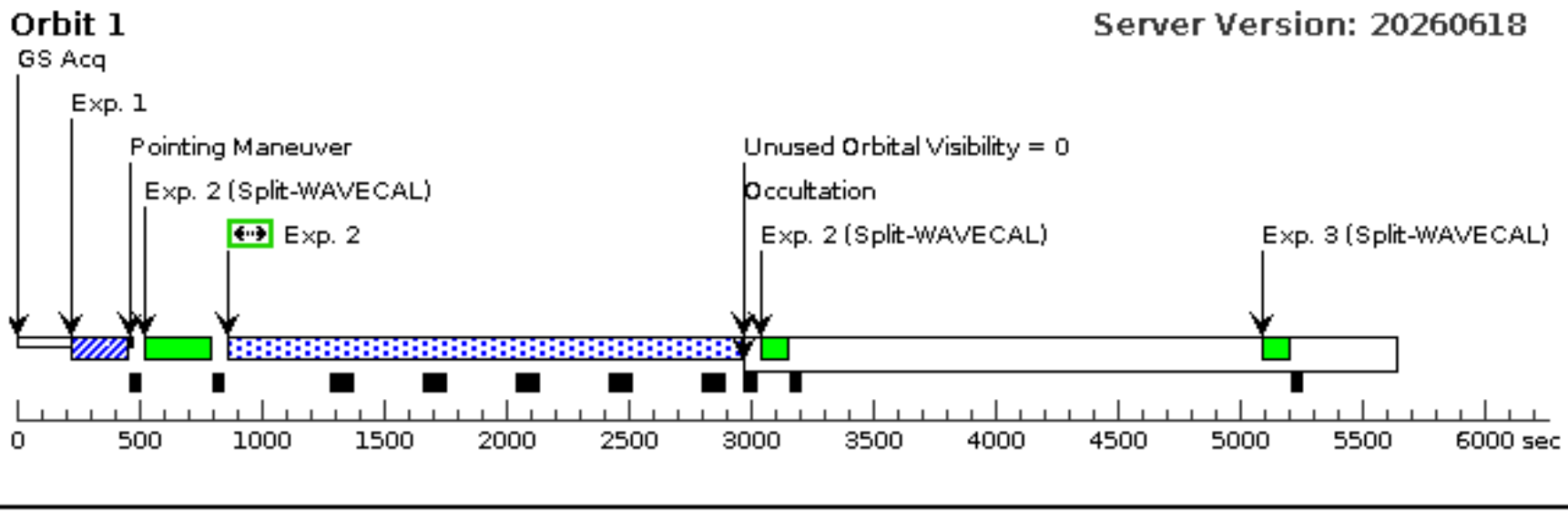
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IC1613-A13	RA: 01 05 6.2560 (16.2760667d) Dec: +02 10 43.15 (2.17865d) Equinox: J2000		V=19.02	Reference Frame: ICRS

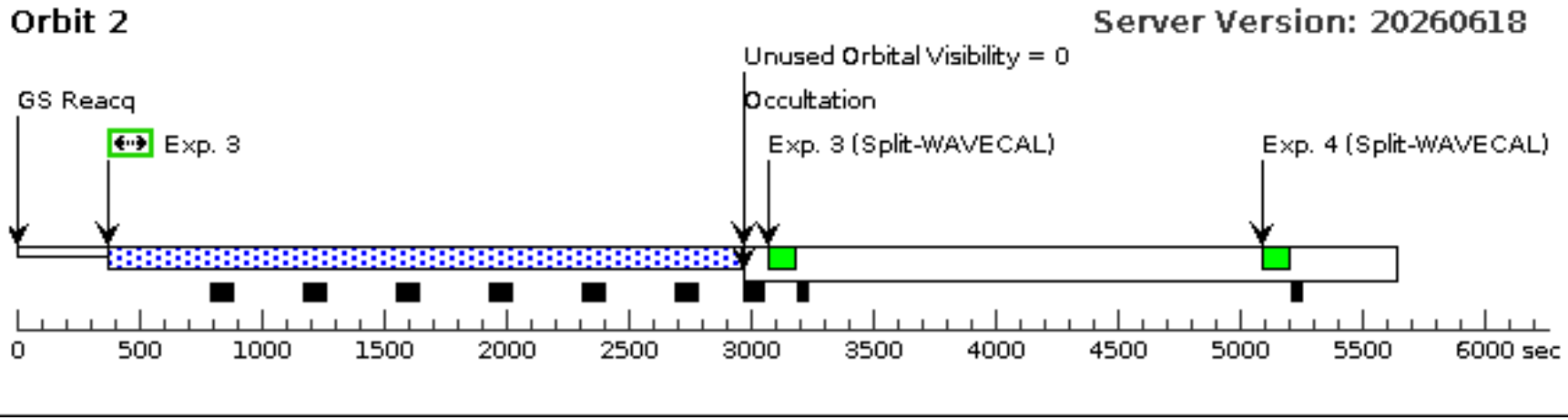
Comments: Coordinates from HST GO-12587
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

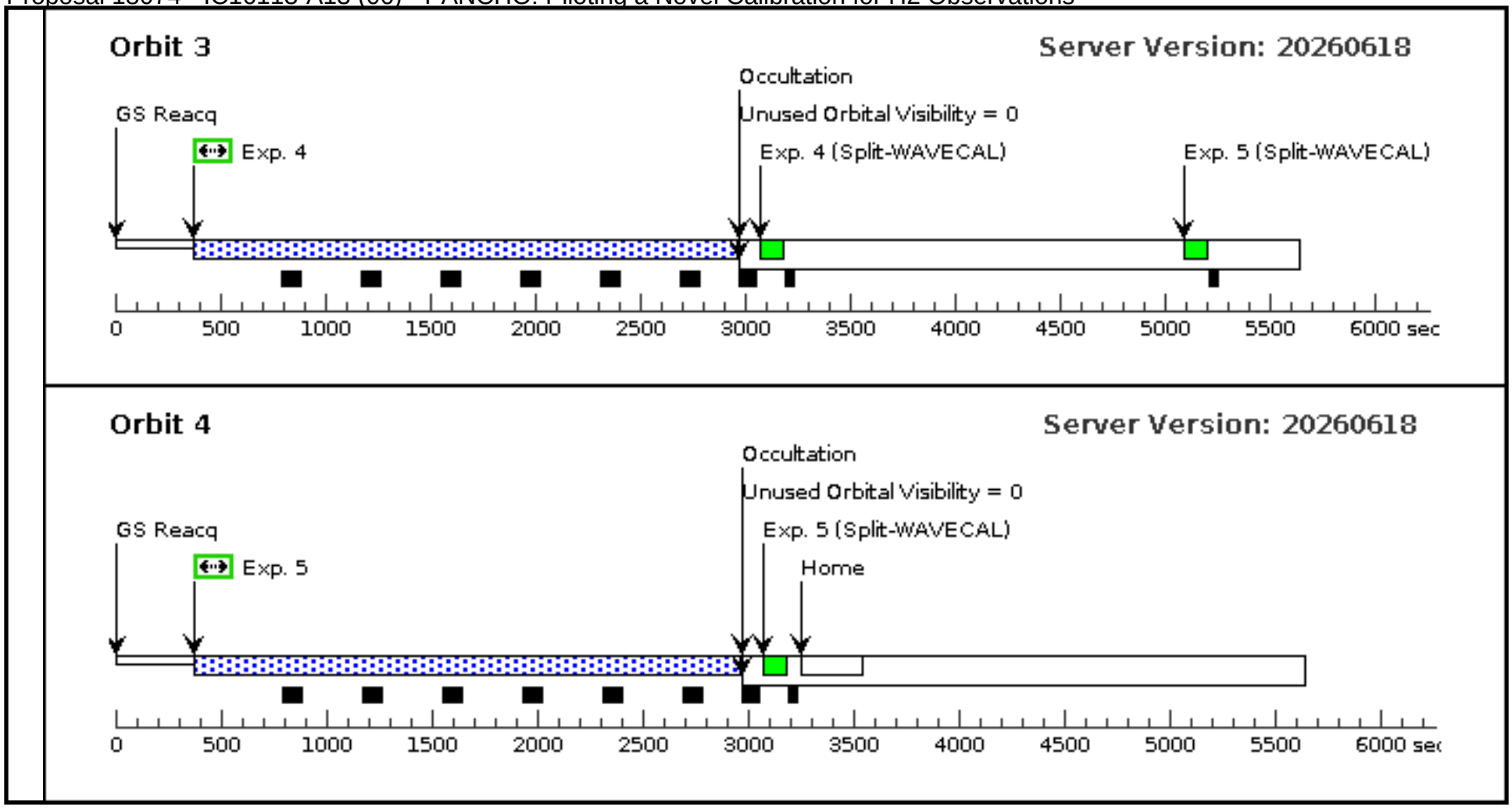
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2025586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) *[==>]*	***[1]***
2	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2047 Secs (2047 Secs) *[==>]*	***[1]***
Comments: ETC is for full integration (15 orbits).									
3	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
4	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (15 orbits).									
5	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[4]***
Comments: ETC is for full integration (15 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Exp. 5 (Split-WAVECAL)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 4
Server Version: 20260618
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 5
Exp. 5 (Split-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC16113-A13 (07), scheduled Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

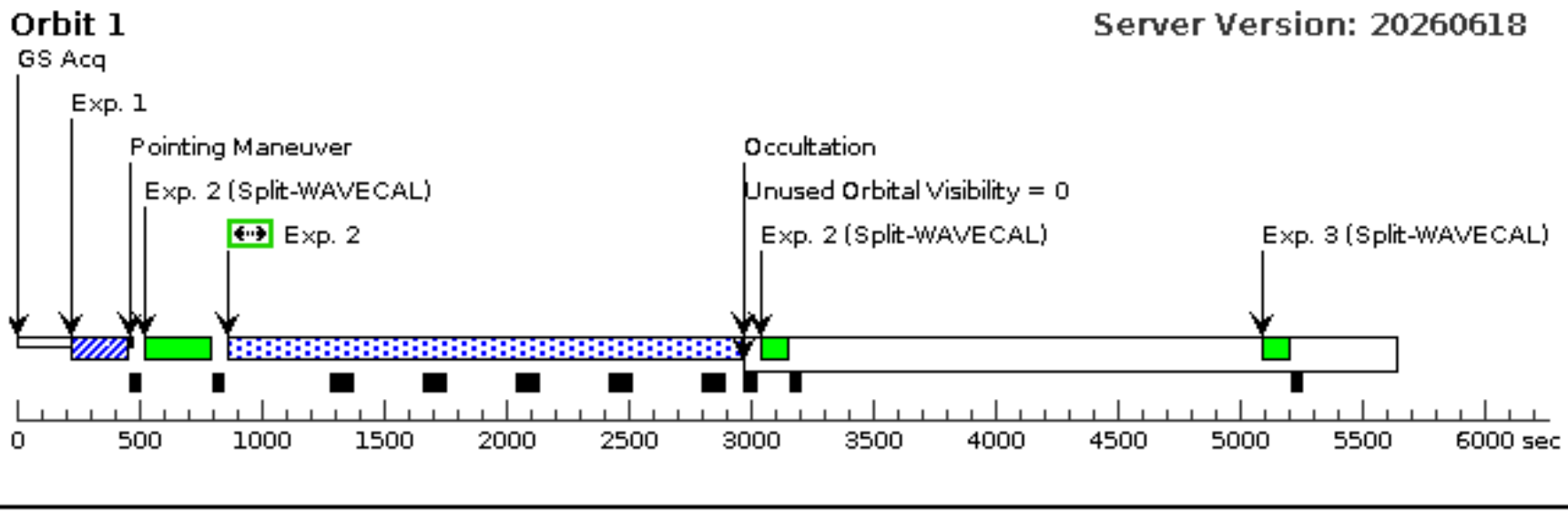
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IC1613-A13	RA: 01 05 6.2560 (16.2760667d) Dec: +02 10 43.15 (2.17865d) Equinox: J2000		V=19.02	Reference Frame: ICRS

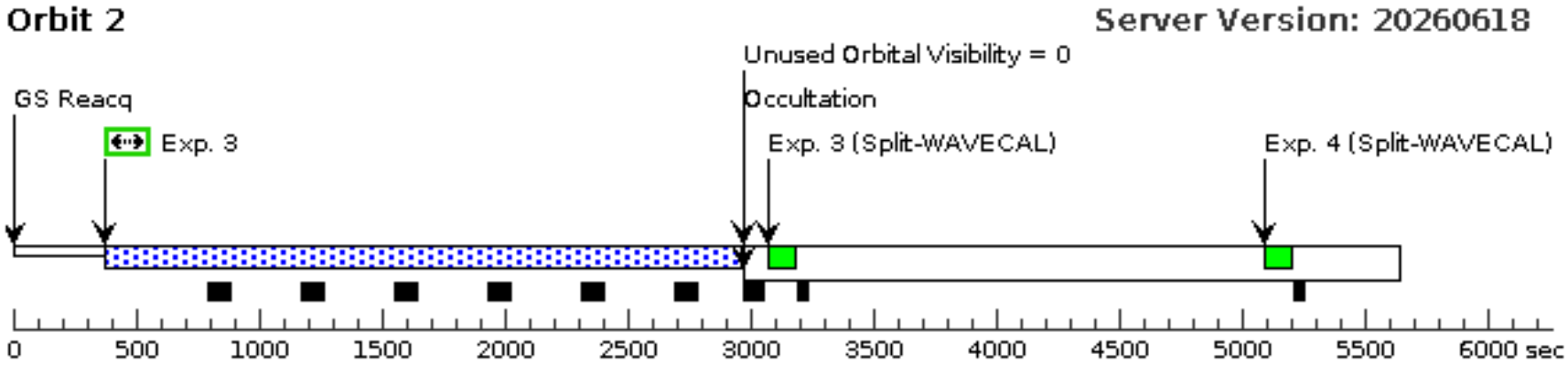
Comments: Coordinates from HST GO-12587
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

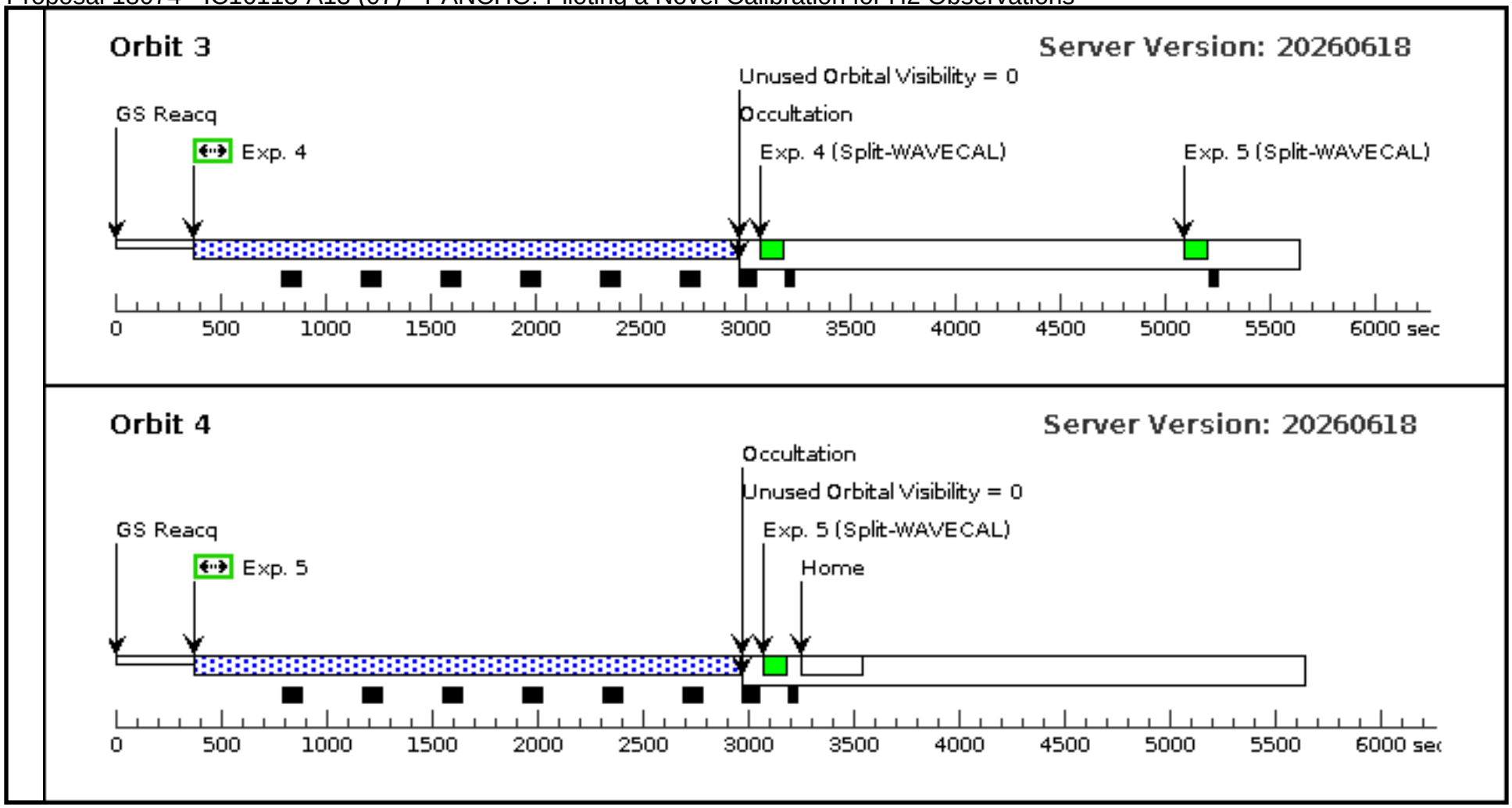
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2025586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) *[==>]*	***[1]***
2	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2047 Secs (2047 Secs) *[==>]*	***[1]***
Comments: ETC is for full integration (15 orbits).									
3	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[2]***
4	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[3]***
Comments: ETC is for full integration (15 orbits).									
5	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	***[4]***
Comments: ETC is for full integration (15 orbits).									

Orbit Structure






Orbit 3
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Exp. 5 (Split-WAVECAL)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec
Orbit 4
Server Version: 20260618
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 5 (Split-WAVECAL)
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18074, IC16113-A13 (08), scheduling Mon Aug 10 17:00:27 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

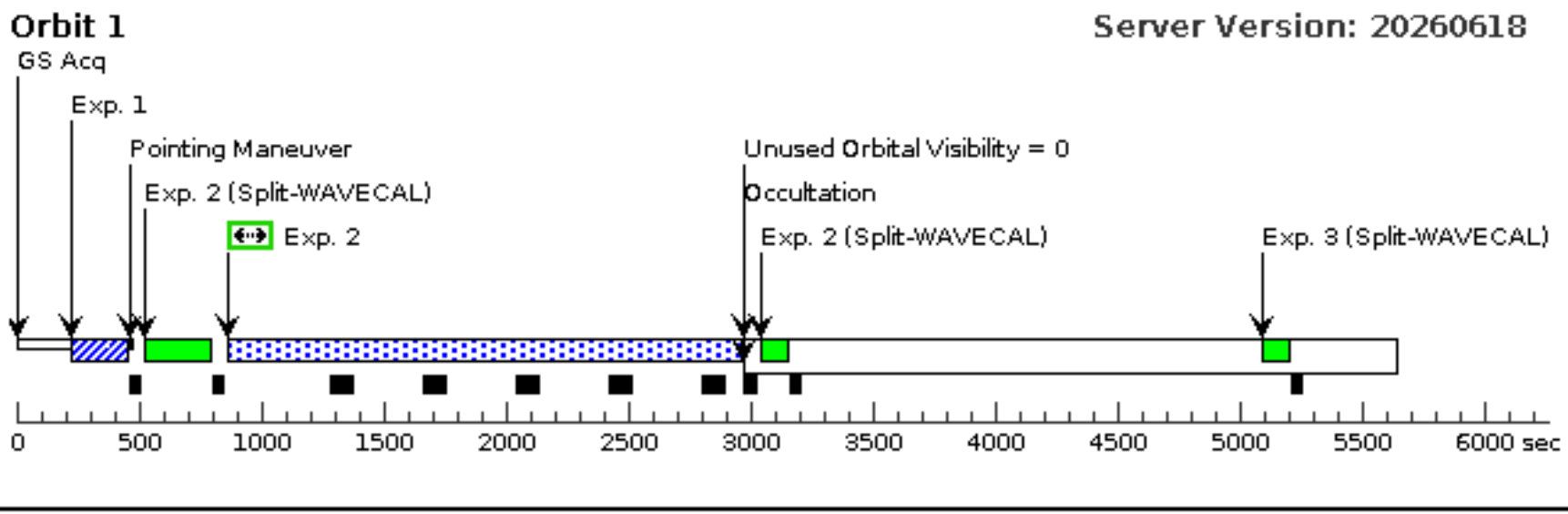
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	IC1613-A13	RA: 01 05 6.2560 (16.2760667d) Dec: +02 10 43.15 (2.17865d) Equinox: J2000		V=19.02	Reference Frame: ICRS

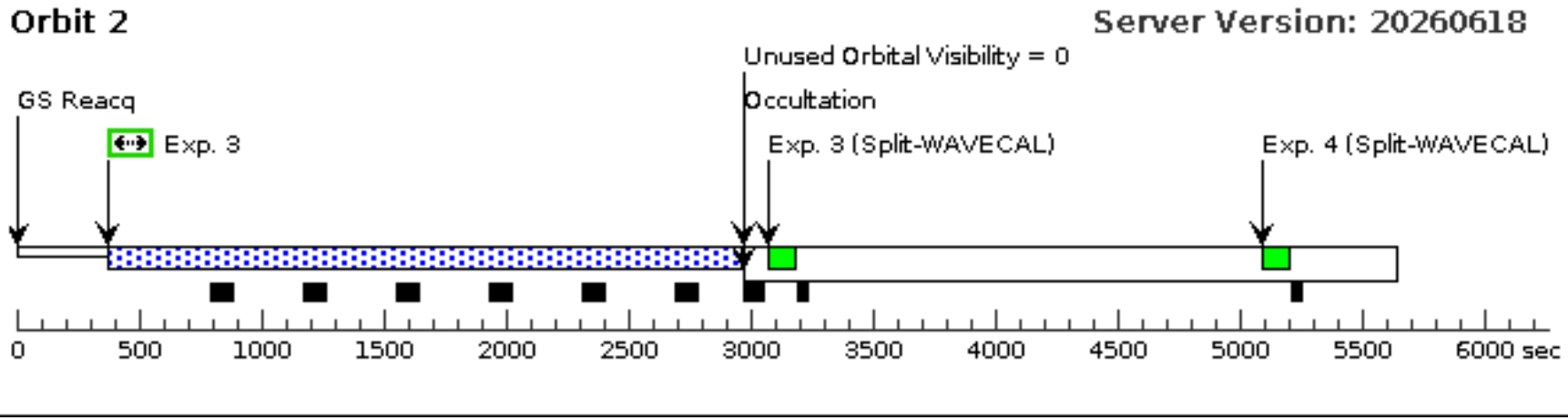
Comments: Coordinates from HST GO-12587
Category=STAR
Description=[MAIN SEQUENCE O]
Extended=NO

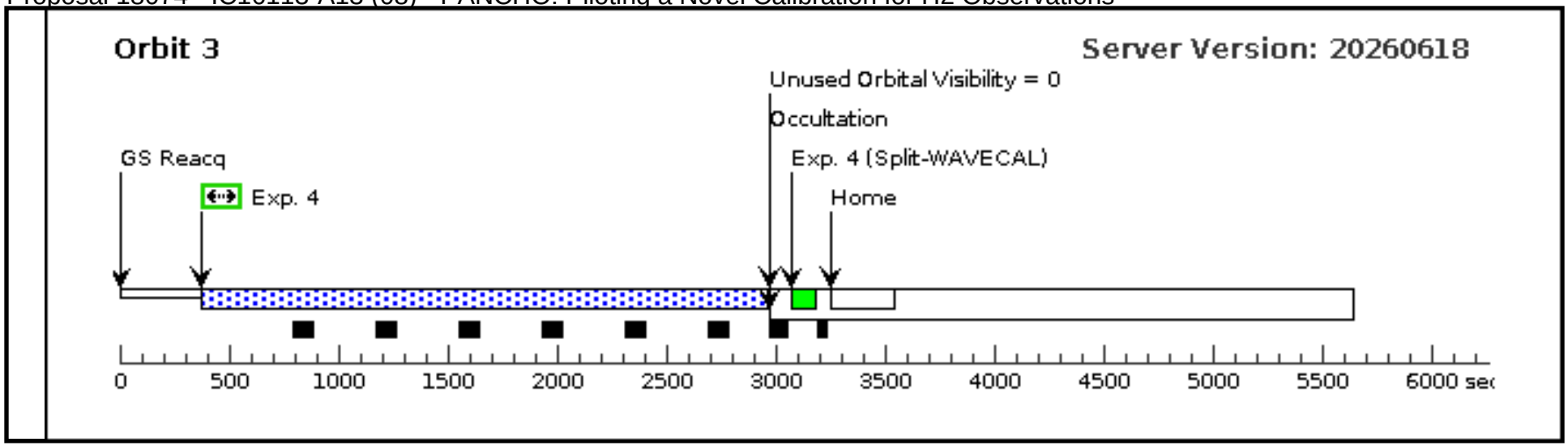
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (COS.ta.2025586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) *[==>]*	*[1]*
2	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=380			2047 Secs (2047 Secs) *[==>]*	*[1]*
	Comments: ETC is for full integration (15 orbits).								
3	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	*[2]*
	Comments: ETC is for full integration (15 orbits).								
4	(COS.sp.2025600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=380			2539 Secs (2539 Secs) *[==>]*	*[3]*
	Comments: ETC is for full integration (15 orbits).								

Orbit Structure






Orbit 3
Server Version: 20260618
Unused Orbital Visibility = 0
Occultation
GS Reacq
Exp. 4
Exp. 4 (Split-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec