



18074 - PANCHO: Piloting a Novel Calibration for H2 Observations

Cycle: 33, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
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

<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) IC1613-B3	COS/FUV COS/NUV	4	26-Jan-2026 22:00:33.0	yes
02	(1) IC1613-B3	COS/FUV COS/NUV	4	26-Jan-2026 22:00:35.0	yes
03	(1) IC1613-B3	COS/FUV COS/NUV	3	26-Jan-2026 22:00:36.0	yes
05	(2) IC1613-A13	COS/FUV COS/NUV	4	26-Jan-2026 22:00:37.0	yes
06	(2) IC1613-A13	COS/FUV COS/NUV	4	26-Jan-2026 22:00:39.0	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>
07	(2) IC1613-A13	COS/FUV COS/NUV	4	26-Jan-2026 22:00:41.0	yes
08	(2) IC1613-A13	COS/FUV COS/NUV	3	26-Jan-2026 22:00:42.0	yes

26 Total Orbits Used

ABSTRACT

Very low metallicity galaxies are a frontier in modern astrophysics. Locally, they represent the extreme 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 sightlines 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

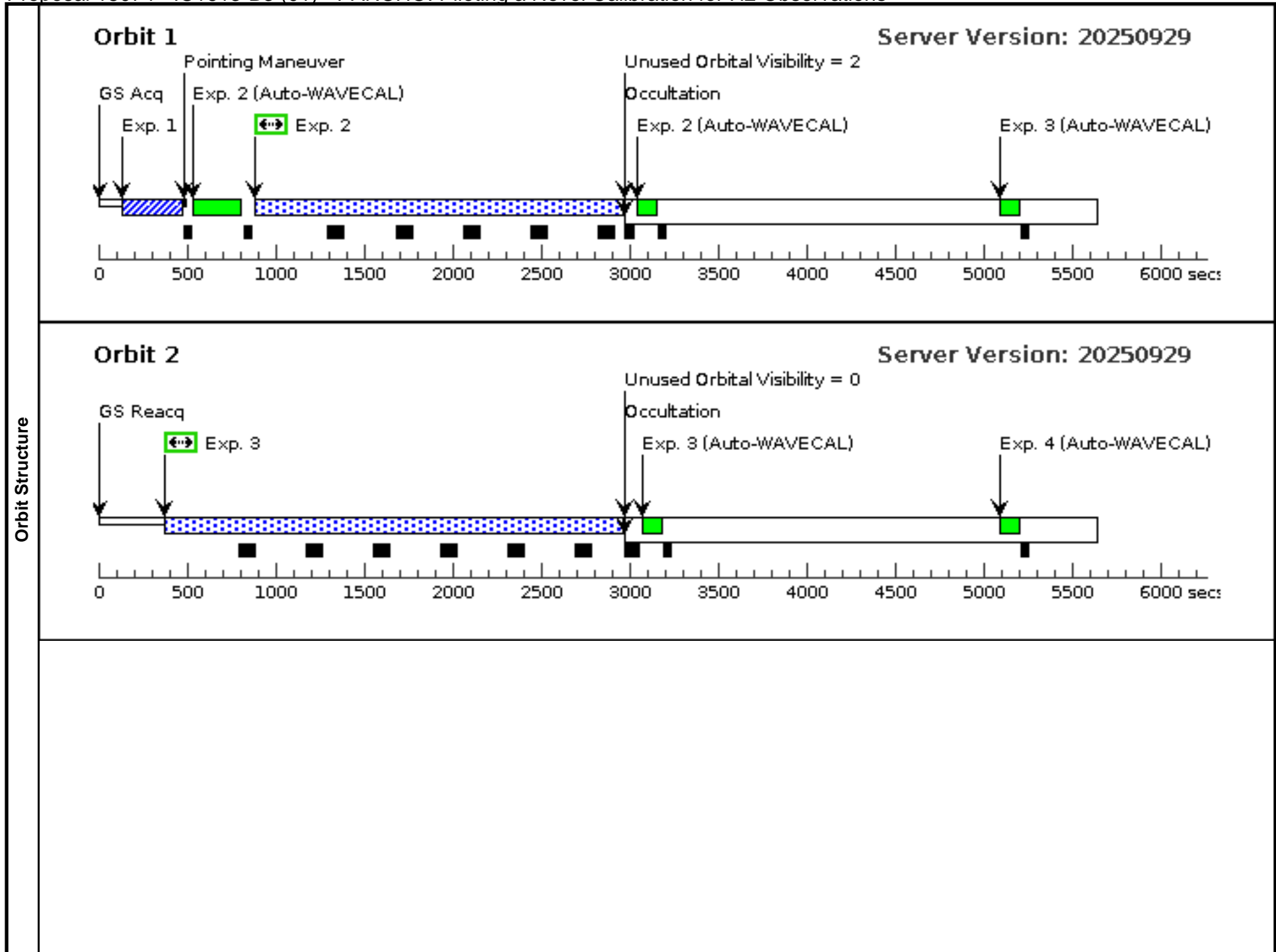
This is a pilot program to use HST COS to obtain spatially resolved molecular hydrogen measurements in absorption along two individual sightlines toward FUV-bright stars. The approved observing program involves two individual spectroscopic pointings, one for each star, with G130M (and central wavelength of 1096Å). 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.

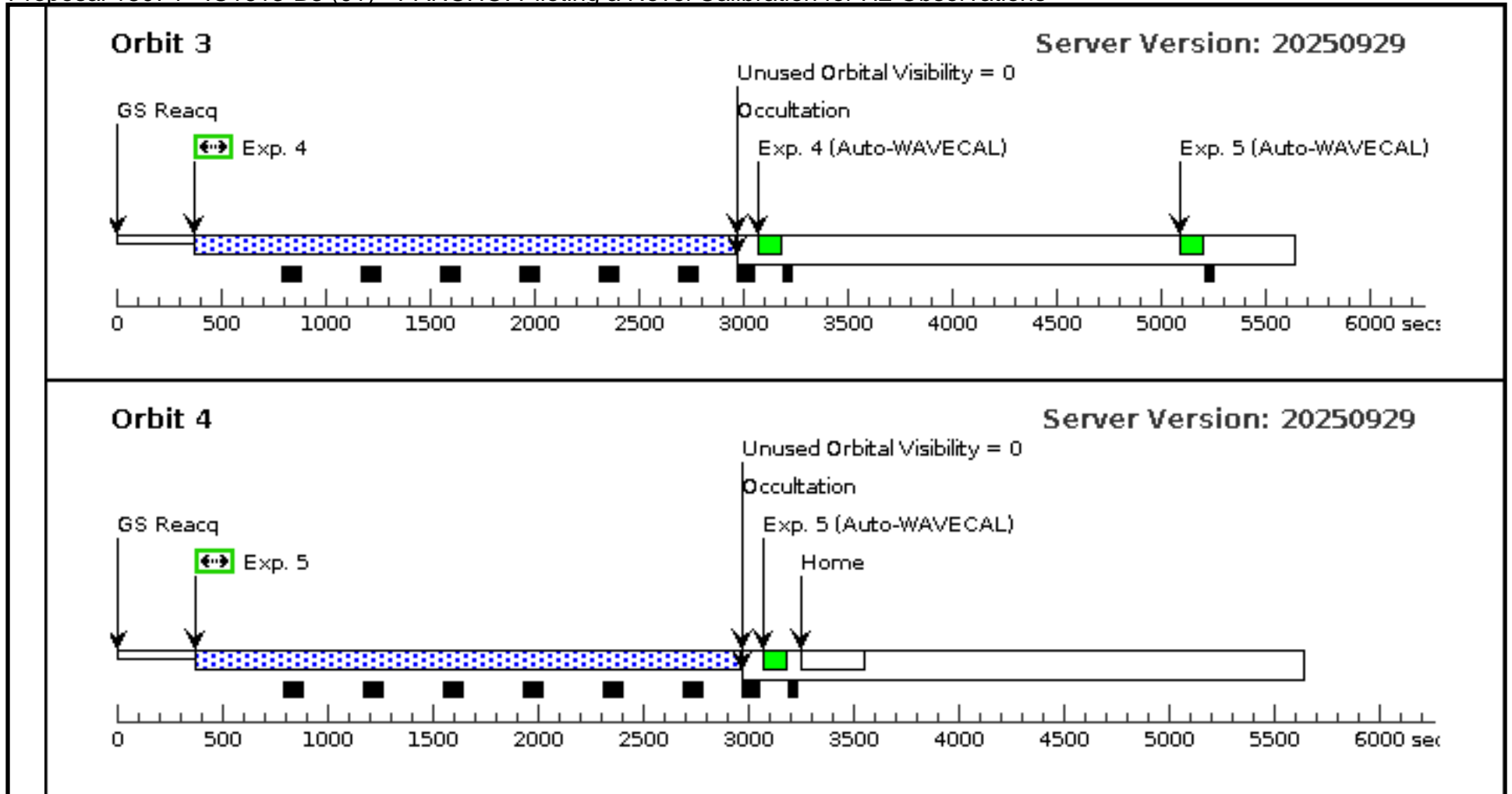
Both targets are in a nearby galaxy, and IC1613-A13 is in a less dense environment, while IC1613-B3 is in a more crowded environment that necessitates careful acquisition.

Proposal 18074 - IC1613-B3 (01) - PANCHO: Piloting a Novel Calibration for H2 Observations

Tue Jan 27 03:00:42 GMT 2026

Visit	Proposal 18074, IC1613-B3 (01), implementation 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 <i>Comments: Coordinates from WFC3 F275W image.</i> 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/IMAG E (COS.ta.226 9811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB					15 Secs (15 Secs) [==>]	[1]
	2	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=38 0				2029 Secs (2029 Secs) [==>]	[1]
	<i>Comments: The ETC is for the full integration (11 orbits).</i>										
	3	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=38 0				2539 Secs (2539 Secs) [==>]	[2]
	4	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=38 0				2539 Secs (2539 Secs) [==>]	[3]
	<i>Comments: ETC is for full integration (11 orbits).</i>										
5	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=4; BUFFER-TIME=38 0				2539 Secs (2539 Secs) [==>]	[4]	
<i>Comments: ETC is for full integration (11 orbits).</i>											

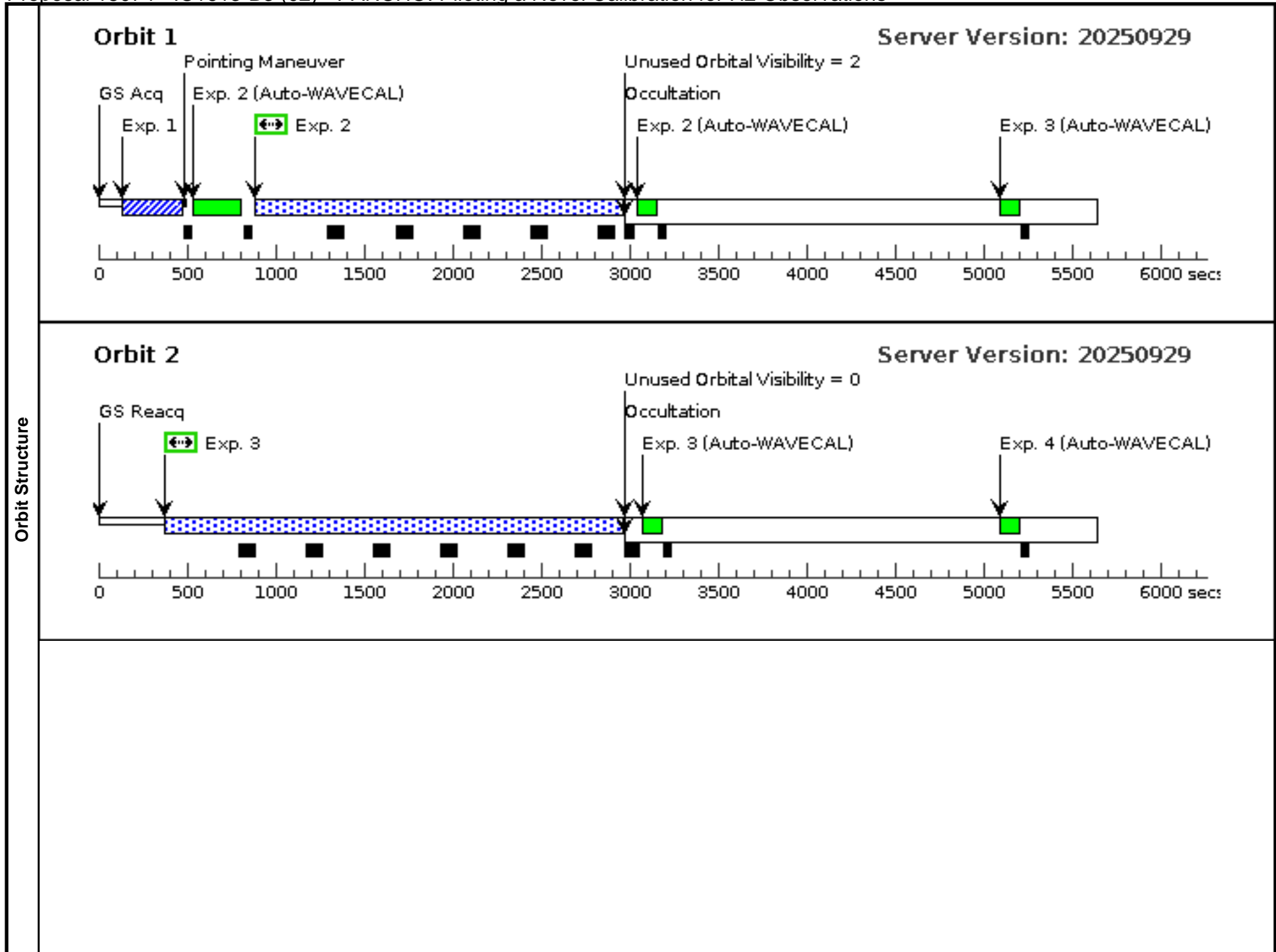


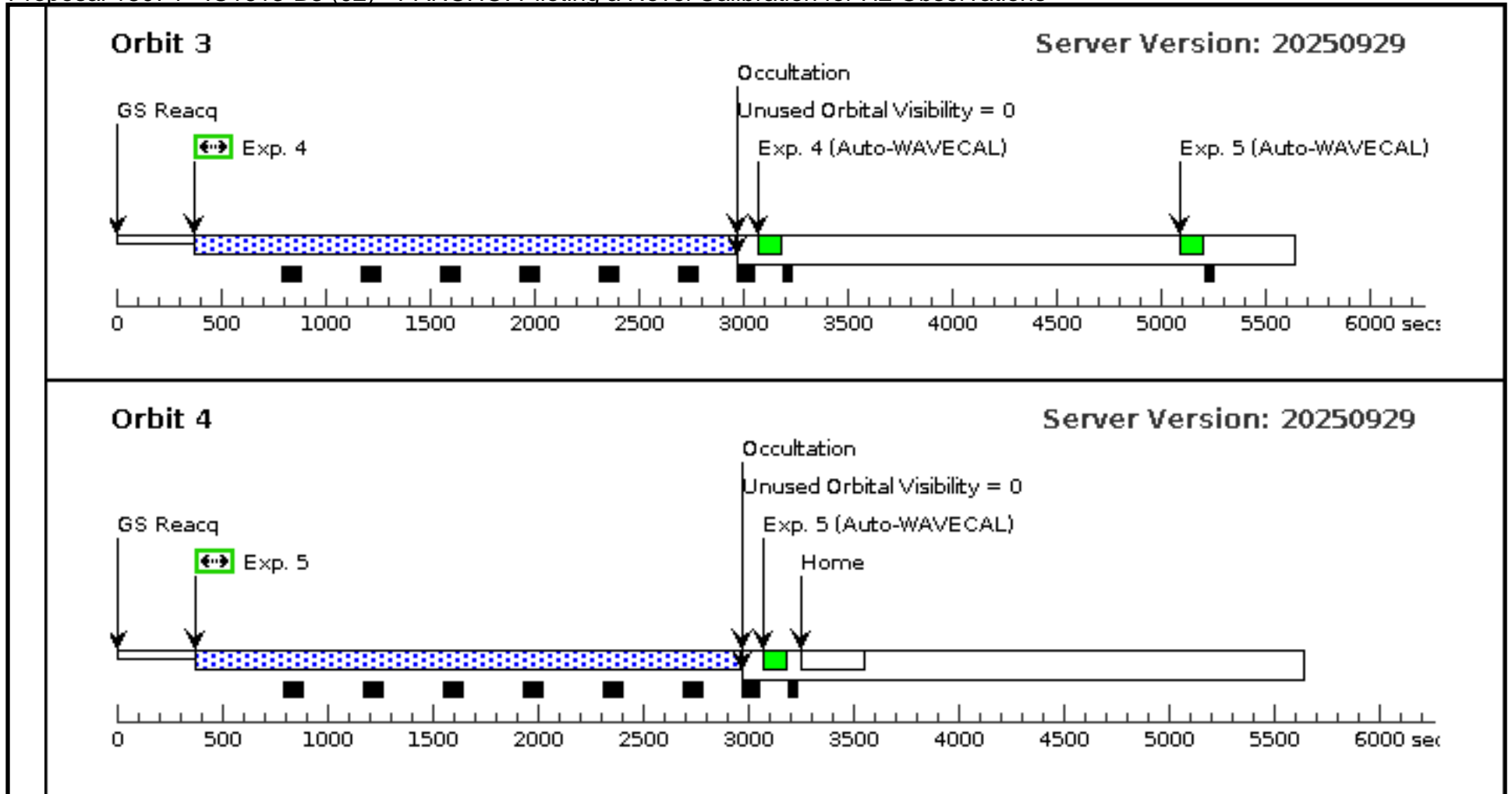


Proposal 18074 - IC1613-B3 (02) - PANCHO: Piloting a Novel Calibration for H2 Observations

Tue Jan 27 03:00:43 GMT 2026

Visit	Proposal 18074, IC1613-B3 (02), implementation 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			
	<i>Comments: Coordinates from WFC3 F275W image.</i> 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/IMAG E (COS.ta.226 9811)	(1) IC1613-B3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) [==>]	[1]
	2	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=38 0			2029 Secs (2029 Secs) [==>]	[1]
	<i>Comments: ETC is for full integration (11 orbits).</i>									
	3	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=2; BUFFER-TIME=38 0			2539 Secs (2539 Secs) [==>]	[2]
	4	(COS.sp.202 5596)	(1) IC1613-B3	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=3; BUFFER-TIME=38 0			2539 Secs (2539 Secs) [==>]	[3]
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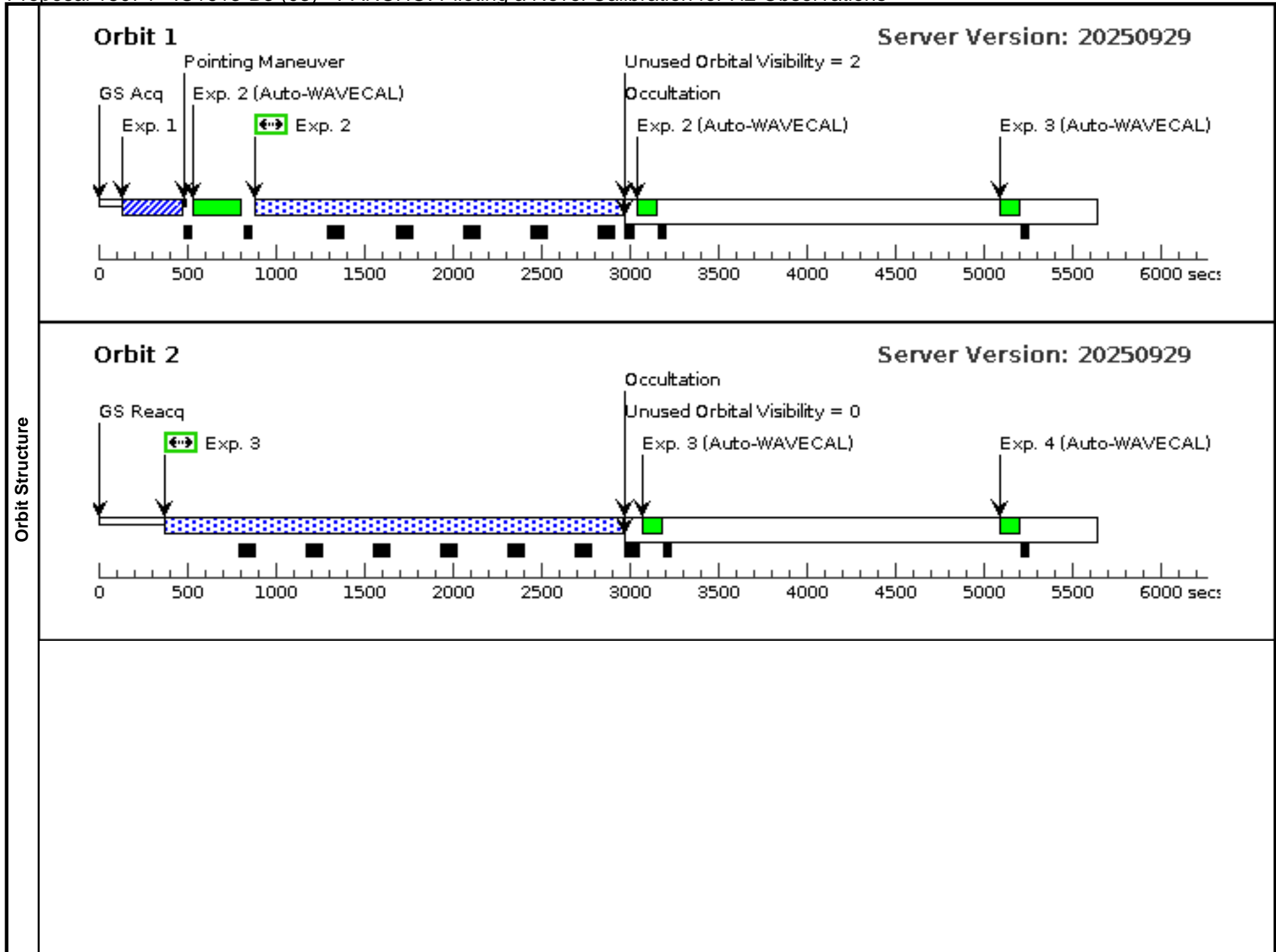


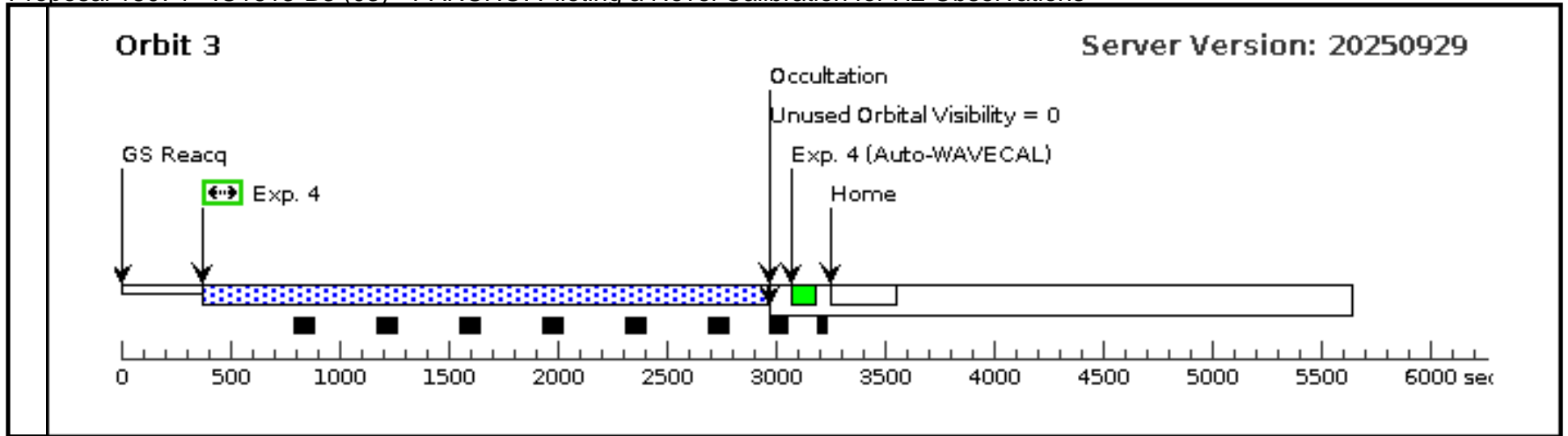


Proposal 18074 - IC1613-B3 (03) - PANCHO: Piloting a Novel Calibration for H2 Observations

Tue Jan 27 03:00:43 GMT 2026

Visit	Proposal 18074, IC1613-B3 (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)																																																																																
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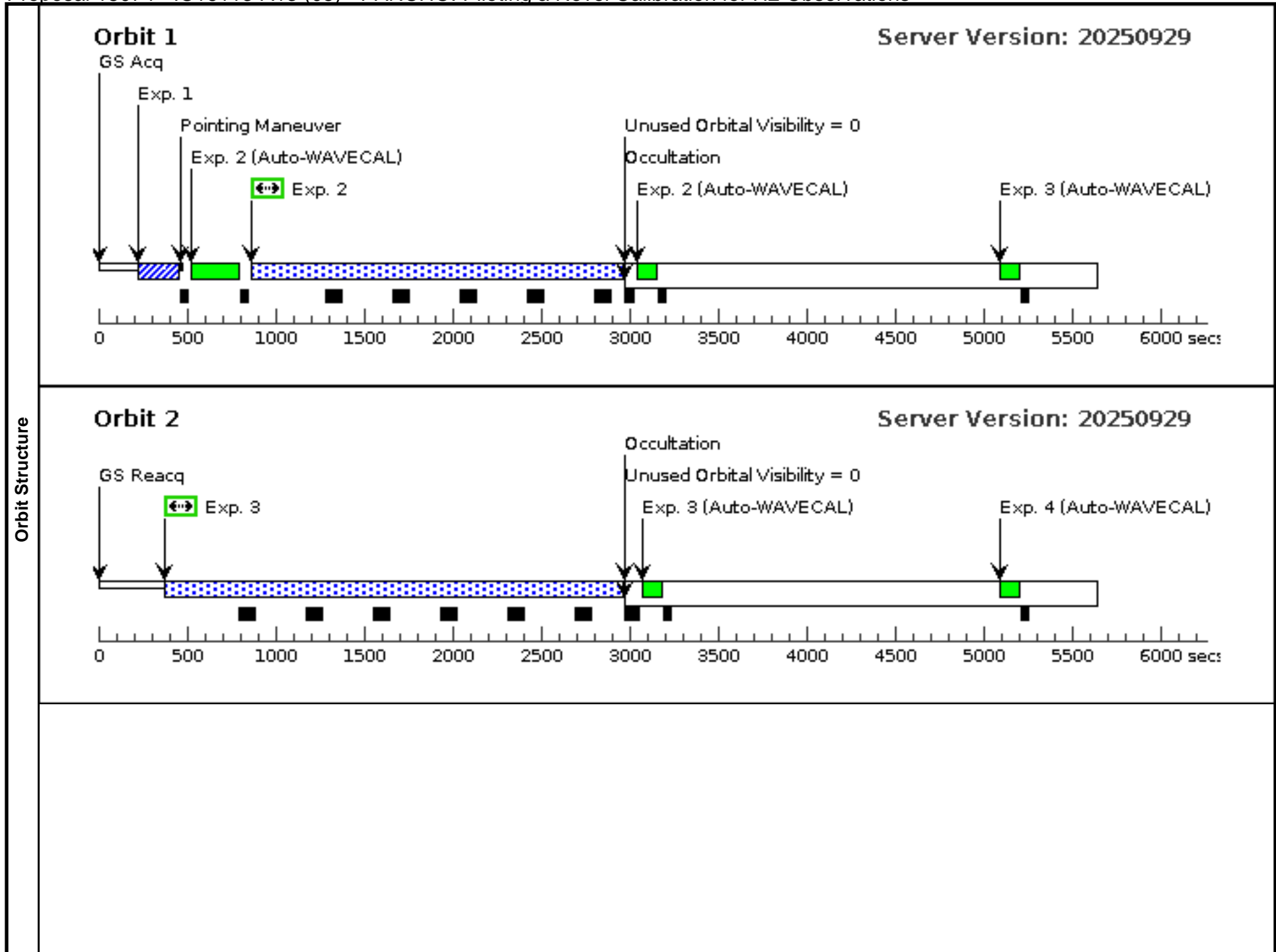


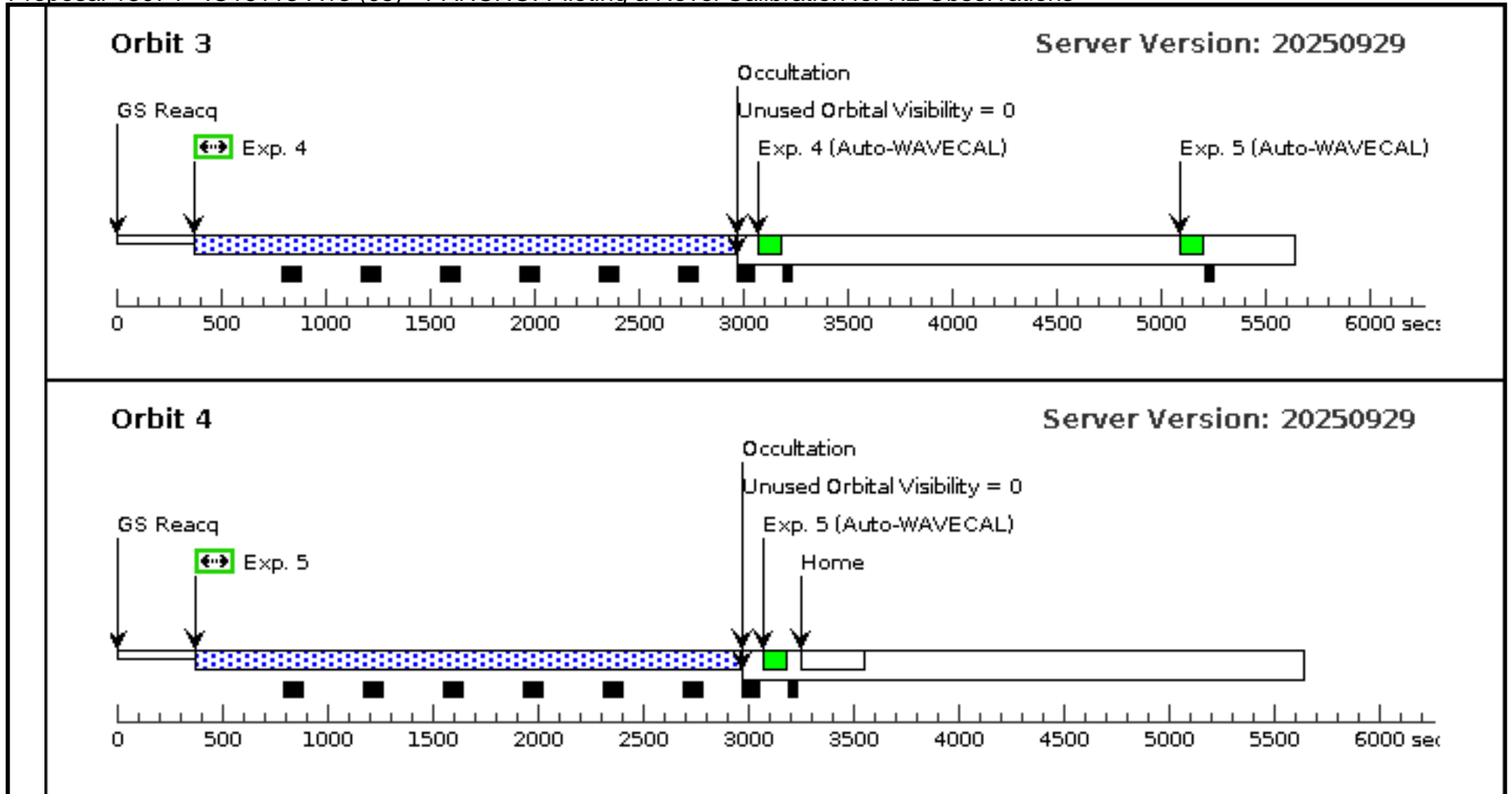


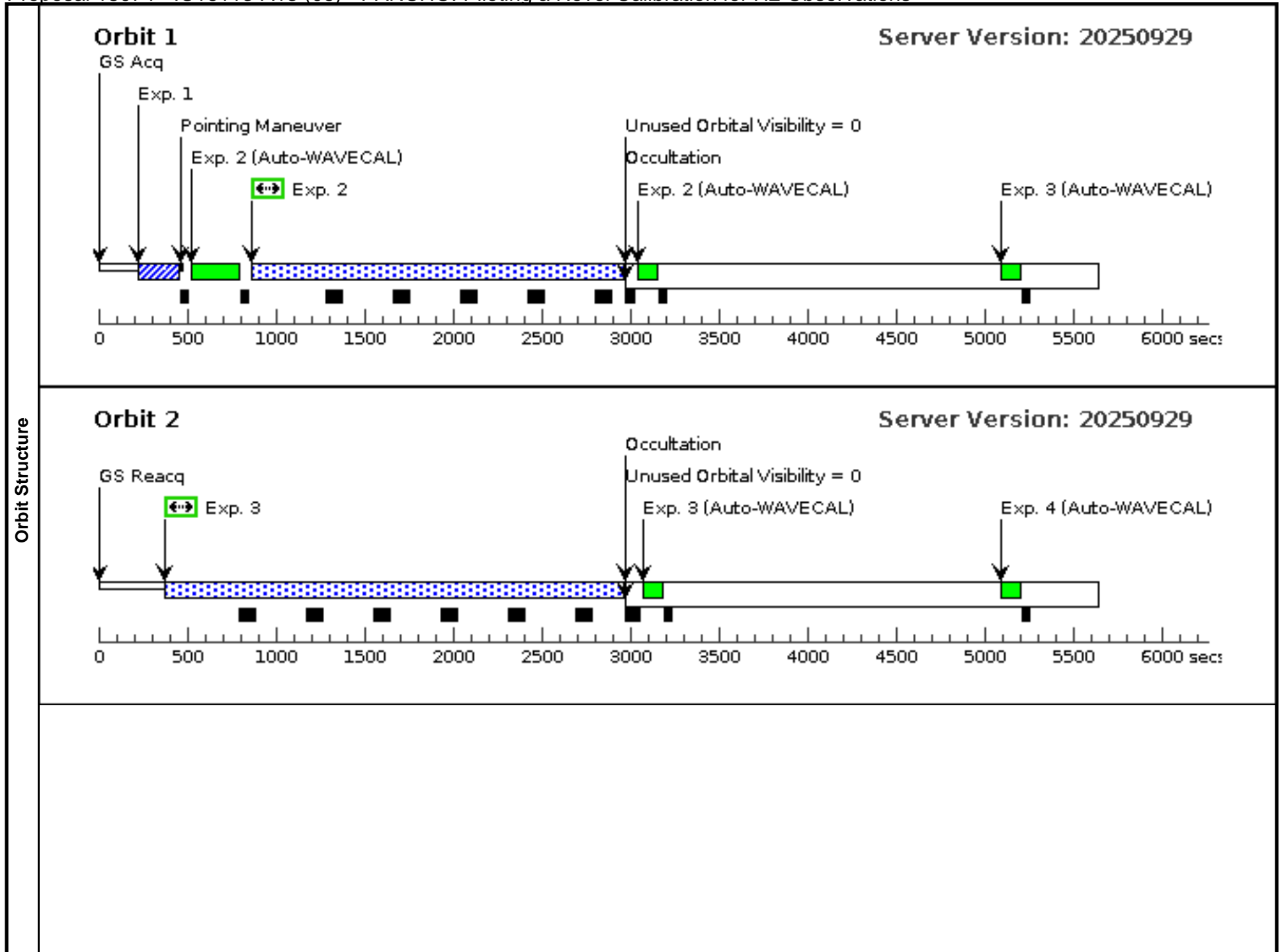
Proposal 18074 - IC16113-A13 (05) - PANCHO: Piloting a Novel Calibration for H2 Observations

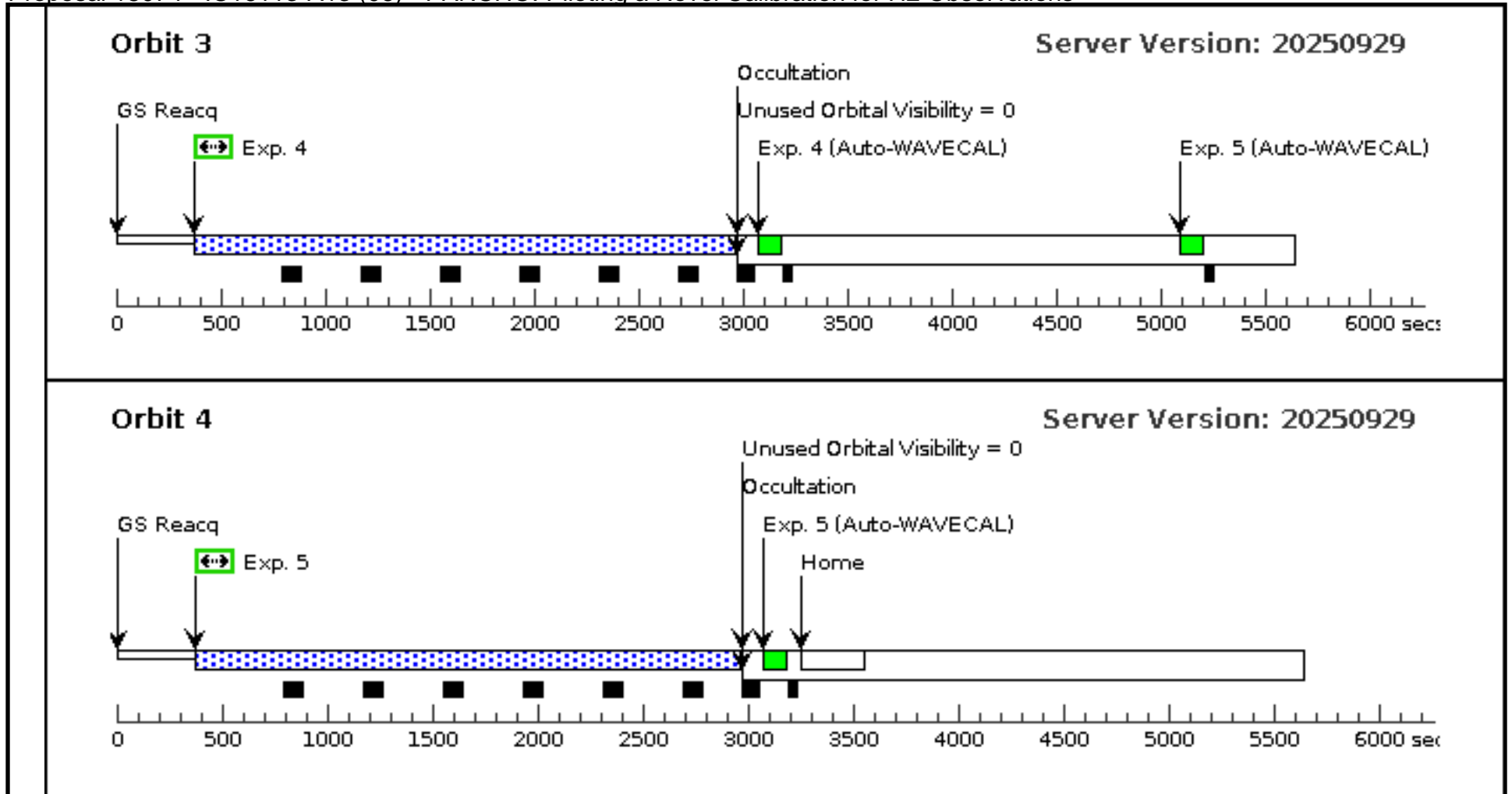
Tue Jan 27 03:00:43 GMT 2026

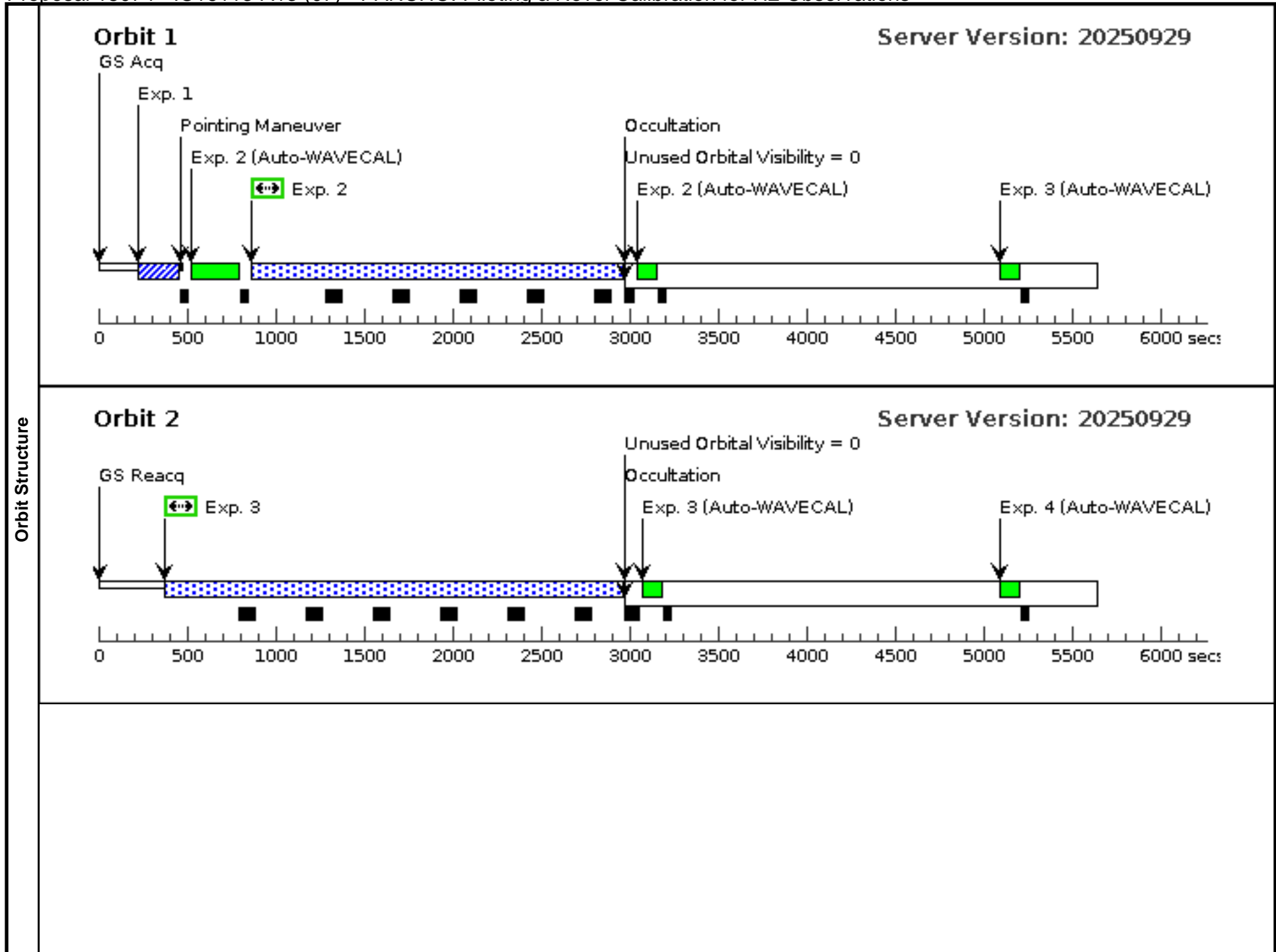
Visit	Proposal 18074, IC16113-A13 (05), implementation Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)																											
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	1	ACQ/IMAG E (COS.ta.202 5586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) [==>]	[1]																		
	2	(COS.sp.202 5600)	(2) IC1613-A13	COS/FUV, TIME-TAG, PSA	G130M 1096 A	FP-POS=1; BUFFER-TIME=38 0			2047 Secs (2047 Secs) [==>]	[1]																		
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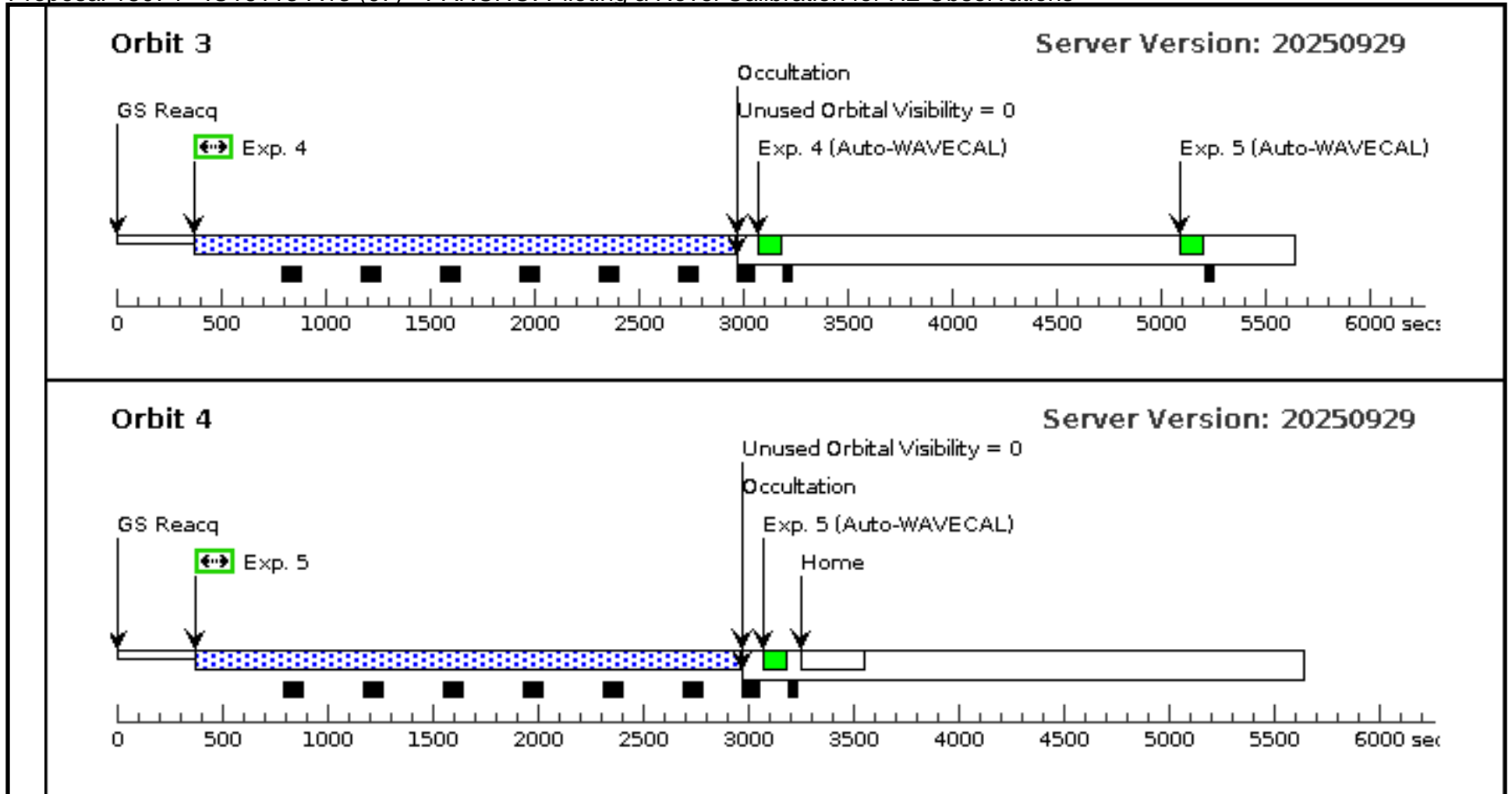












Proposal 18074 - IC16113-A13 (08) - PANCHO: Piloting a Novel Calibration for H2 Observations

Tue Jan 27 03:00:43 GMT 2026

Visit	Proposal 18074, IC16113-A13 (08), implementation 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				
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	1	ACQ/IMAG E (COS.ta.202 5586)	(2) IC1613-A13	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				6.5 Secs (6.5 Secs) [==>]	[1]
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