



17221 - Lyman alpha measurements from two mini Neptunes around one star

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Michael Zhang (PI) (Contact)	University of Chicago
Dr. Heather A. Knutson (CoI)	California Institute of Technology
Dr. James Edward Owen (CoI)	University of California - Los Angeles
Prof. Fei Dai (CoI)	University of Hawaii
Prof. Jacob L. Bean (CoI)	University of Chicago

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) HD-73583 WAVE	STIS/CCD STIS/FUV-MAMA	6	26-Nov-2024 12:00:17.0	yes
02	(1) HD-73583 WAVE	STIS/CCD STIS/FUV-MAMA	4	26-Nov-2024 12:00:19.0	yes
03	(1) HD-73583 WAVE	STIS/CCD STIS/FUV-MAMA	5	26-Nov-2024 12:00:21.0	yes
04	(1) HD-73583 WAVE	STIS/CCD STIS/FUV-MAMA	5	26-Nov-2024 12:00:22.0	yes

20 Total Orbits Used

ABSTRACT

Multi-planet systems are ideal for studying mass loss because the two planets share the same high-energy irradiation history and similar formation histories. TOI 560c is the outer companion of TOI 560b, the first young mini Neptune with measured helium absorption from its escaping atmosphere. We propose to observe this planet with STIS/G140M to measure Lyman alpha absorption from its outflow. Atmospheric escape is especially interesting to probe in the young mini Neptune regime because it predominantly occurs in the active youth of a star's life, creating the radius gap which divides super-Earths (1--1.8 R_{Earth}) from mini-Neptunes (2--3 R_{Earth}). These observations will allow us to test recently published theoretical models of Lyman alpha absorption, in particular differentiating between different regimes of mass loss and constraining the wind launching mechanism. The TOI 560c observations, combined with existing Ly alpha and helium observations of TOI 560b, will enable a comparative study of mass loss from planets in the same system.

OBSERVING DESCRIPTION

Our program will observe 3 transits of HD 73583c. Each transit observation will consist of 5 consecutive orbits, of which 2 are in-transit. We set the phase requirements to ± 0.5 hours for all visits. We may adjust the phase requirements as visits are completed to try to maximize the phase coverage. The ephemeris uncertainty is around 6 minutes at the end of the year.

We planned our observations so that the first orbit of each visit has an ACQ and ACQ-PEAKUP exposure, followed by a science exposure and wavelength calibration. Subsequent orbits only have a science exposure and a wavelength calibration exposure, with no ACQ or ACQ-PEAKUP. Because the few minutes' difference in orbital visibility due to precession has minimal impact on our science, we change the schedulability parameter from 30 to 90 to make scheduling easier. If possible, we kindly ask the Program Coordinator to expand our science observations to fill up the entire orbital visibility for the orbits that are actually scheduled.

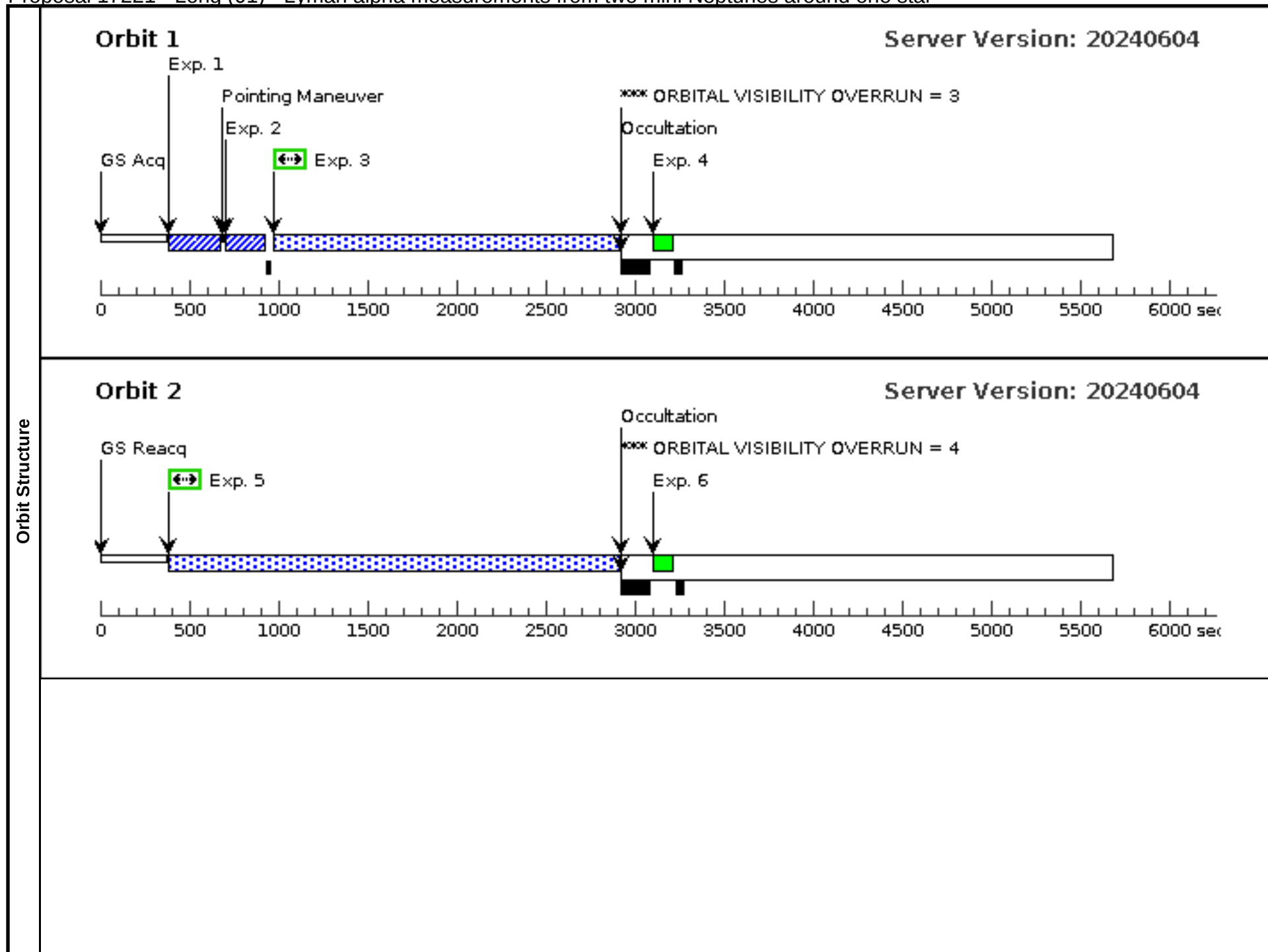
Reduced gyro mode impacts our program by limiting the number of scheduling opportunities. Otherwise, we do not foresee major impacts from RGM.

Proposal 17221 - Long (01) - Lyman alpha measurements from two mini Neptunes around one star

Visit	Proposal 17221, Long (01), completed					Tue Nov 26 17:00:23 GMT 2024
	Diagnostic Status: Warning					
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA					
	Special Requirements: SCHED 90%; Period 18.879270 D AND ZERO-PHASE HJD2459628.63239					
Diagnostics	(Long (01)) Warning (Orbit Planner): LONG STIS MAMA VISIT LIKELY TO INTERSECT THE SAA					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Long (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	HD-73583	RA: 08 38 45.1904 (129.6882933d)	Proper Motion RA: -63.83 mas/yr	V=9.63	Reference Frame: ICRS
		Alt Name1: TOI-560	Dec: -13 15 23.48 (-13.25652d)	Proper Motion Dec: 38.48 mas/yr		
			Equinox: J2000	Parallax: 0.03166"		
				Epoch of Position: 2016		
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.					
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Description=[K V-IV]						
Extended=NO						

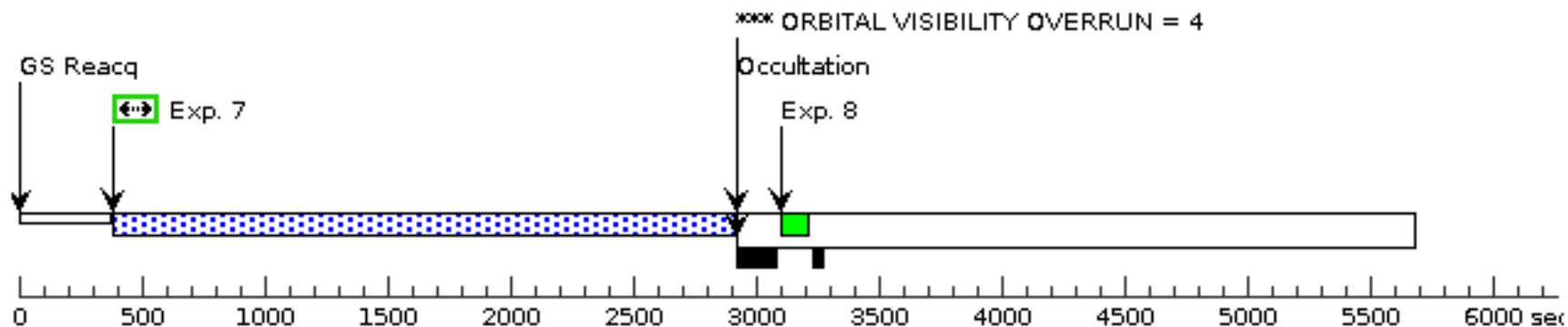
Proposal 17221 - Long (01) - Lyman alpha measurements from two mini Neptunes around one star

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.152 2729)	(1) HD-73583	STIS/CCD, ACQ, F28X50OIII	MIRROR		PHASE 0.9908 TO 0.99335	Sequence 1-4 Non-Int in Long (01)	5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK (STIS.ta.152 2727)	(1) HD-73583	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR			Sequence 1-4 Non-Int in Long (01)	0.1 Secs (0.1 Secs) [==>]	[1]
	3	Science (STIS.sp.15 22731)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 1-4 Non-Int in Long (01)	1802 Secs (1802 Secs) [==>]	[1]
	4	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 1-4 Non-Int in Long (01)	[==>]	[1]
	5	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 5-6 Non-Int in Long (01)	2517 Secs (2517 Secs) [==>]	[2]
	6	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 5-6 Non-Int in Long (01)	[==>]	[2]
	7	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 7-8 Non-Int in Long (01)	2517 Secs (2517 Secs) [==>]	[3]
	8	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 7-8 Non-Int in Long (01)	[==>]	[3]
	9	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 9-10 Non-Int in Long (01)	2517 Secs (2517 Secs) [==>]	[4]
	10	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 9-10 Non-Int in Long (01)	[==>]	[4]
	11	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 11-12 Non-Int in Long (01)	2517 Secs (2517 Secs) [==>]	[5]
	12	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 11-12 Non-Int in Long (01)	[==>]	[5]
	13	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=1500		Sequence 13-14 Non-Int in Long (01)	2517 Secs (2517 Secs) [==>]	[6]
	14	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 13-14 Non-Int in Long (01)	[==>]	[6]



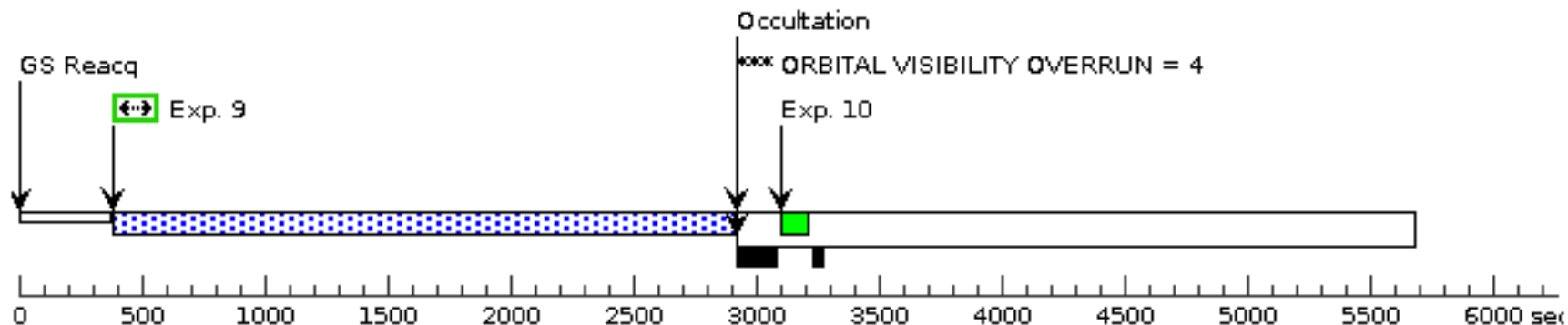
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Server Version: 20240604



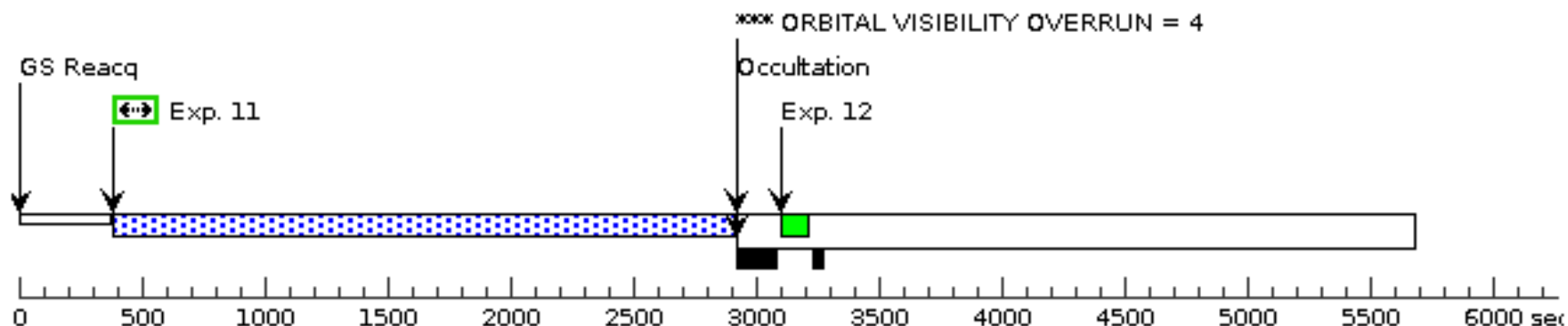
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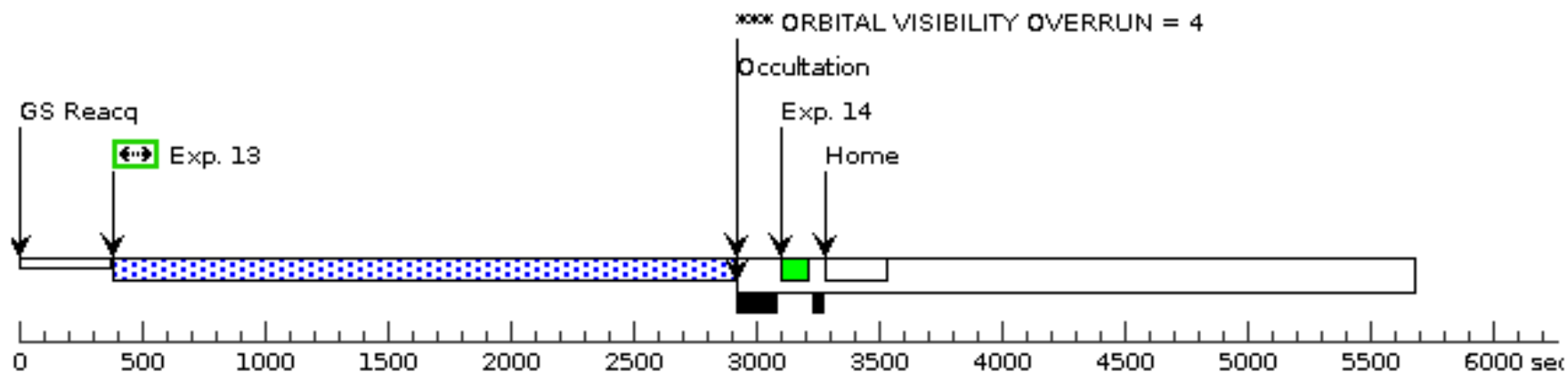
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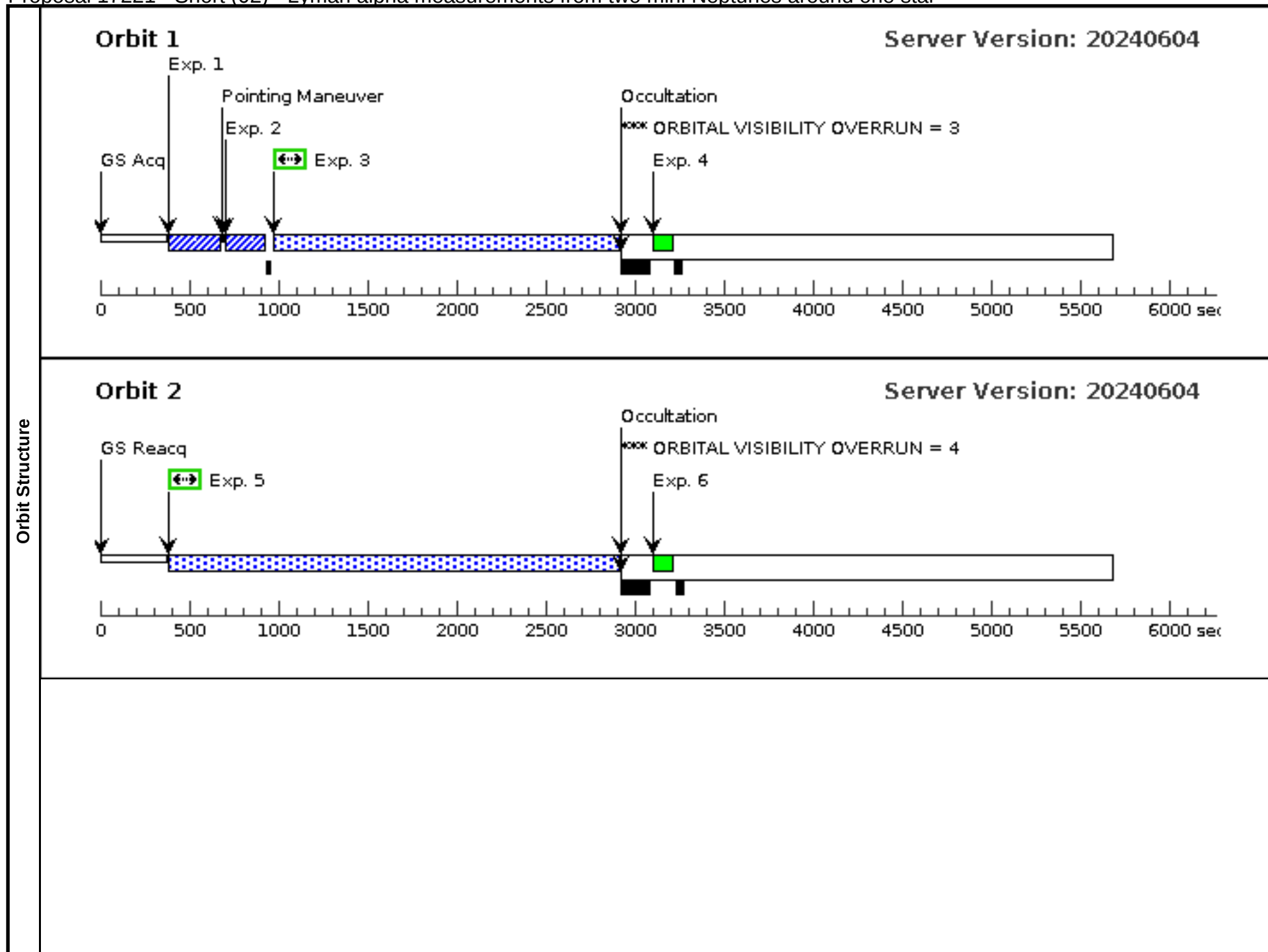
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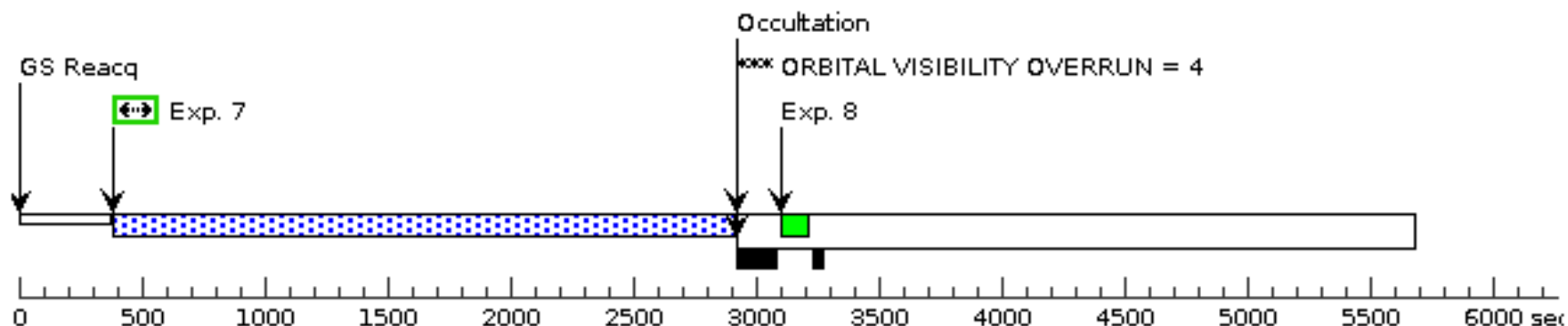
Proposal 17221 - Short (02) - Lyman alpha measurements from two mini Neptunes around one star

Visit	Proposal 17221, Short (02), completed										Tue Nov 26 17:00:23 GMT 2024	
	Diagnostic Status: Warning											
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA											
	Special Requirements: SCHED 90%; Period 18.879270 D AND ZERO-PHASE HJD2459628.63239											
Diagnostics	(Short (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN											
	(Short (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN											
	(Short (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN											
	(Short (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN											
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous						
	(1)	HD-73583	RA: 08 38 45.1904 (129.6882933d)	Proper Motion RA: -63.83 mas/yr	V=9.63	Reference Frame: ICRS						
		Alt Name1: TOI-560	Dec: -13 15 23.48 (-13.25652d)	Proper Motion Dec: 38.48 mas/yr								
			Equinox: J2000	Parallax: 0.03166"	Epoch of Position: 2016							
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.											
	Category=STAR											
	Description=[K V-IV]											
	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 (STIS.ta.152 2729)	(1) HD-73583	STIS/CCD, ACQ, F28X50III	MIRROR		PHASE 0.9900 TO 0.9943	Sequence 1-4 Non-Int in Short (02)	5 Secs (5 Secs)	[==>]	[1]	
	2	ACQ/PEAK (STIS.ta.152 2727)	(1) HD-73583	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR			Sequence 1-4 Non-Int in Short (02)	0.1 Secs (0.1 Secs)	[==>]	[1]	
	3	Science (STIS.sp.15 22731)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 1-4 Non-Int in Short (02)	1802 Secs (1802 Secs)	[==>]	[1]	
	4	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 1-4 Non-Int in Short (02)	[==>]		[1]	
	5	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 5-6 Non-Int in Short (02)	2517 Secs (2517 Secs)	[==>]	[2]	
	6	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 5-6 Non-Int in Short (02)	[==>]		[2]	
	7	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 7-8 Non-Int in Short (02)	2517 Secs (2517 Secs)	[==>]	[3]	
	8	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 7-8 Non-Int in Short (02)	[==>]		[3]	
	9	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 9-10 Non-Int in Short (02)	2517 Secs (2517 Secs)	[==>]	[4]	
	10	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 9-10 Non-Int in Short (02)	[==>]		[4]	



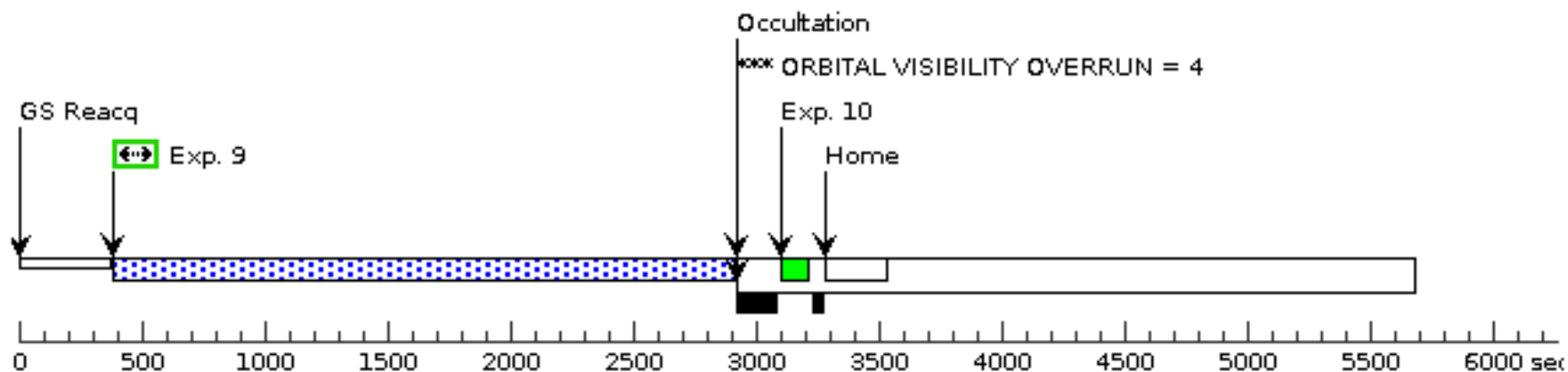
Orbit 3

Server Version: 20240604



Orbit 4

Server Version: 20240604

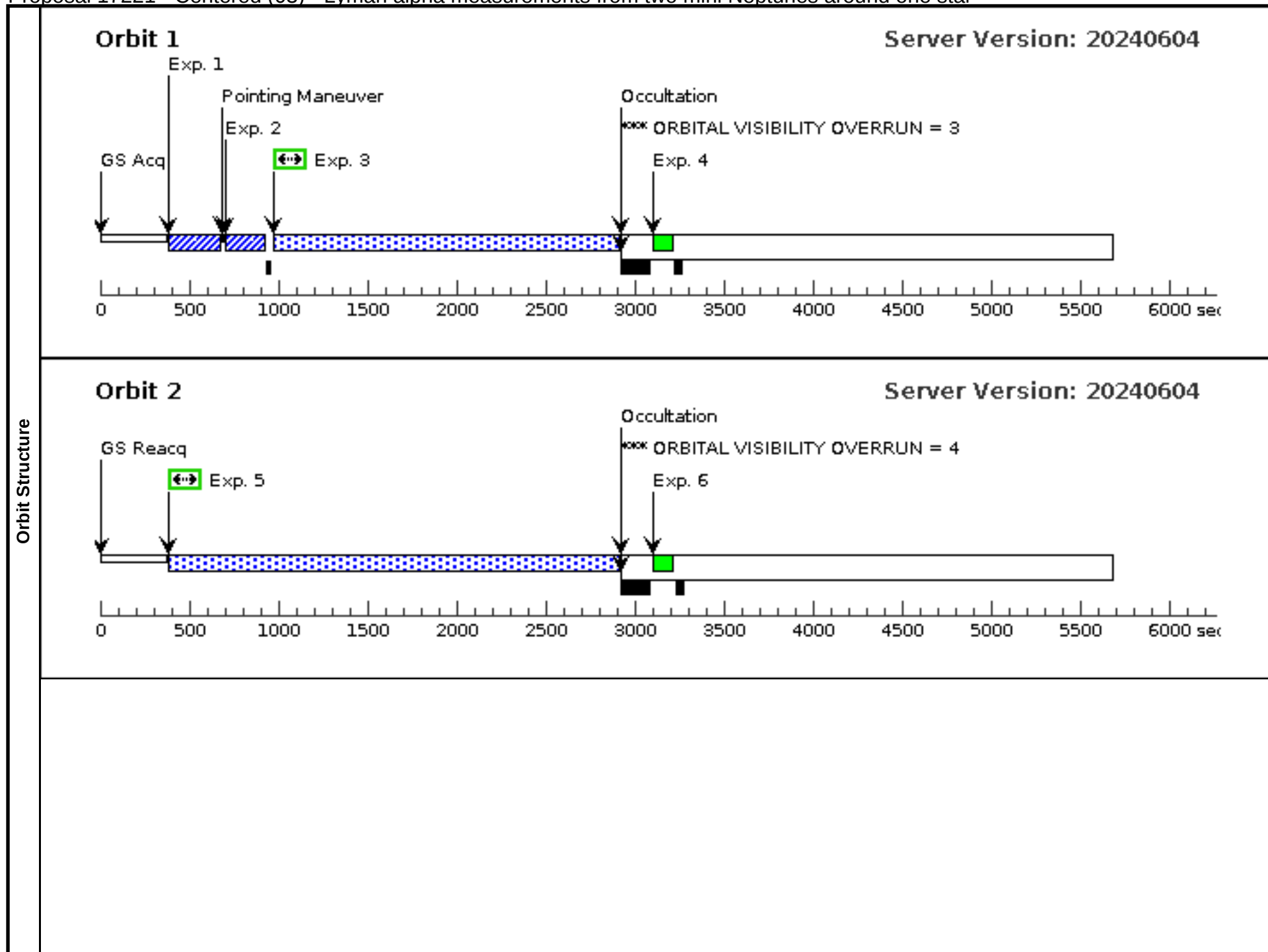


Proposal 17221 - Centered (03) - Lyman alpha measurements from two mini Neptunes around one star

Visit	Proposal 17221, Centered (03), failed					Tue Nov 26 17:00:23 GMT 2024
	Diagnostic Status: Warning					
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA					
	Special Requirements: SCHED 90%; Period 18.87955 D AND ZERO-PHASE HJD2459647.518					
Diagnostics	(Centered (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
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	(Centered (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
	(Centered (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	HD-73583	RA: 08 38 45.1904 (129.6882933d)	Proper Motion RA: -63.83 mas/yr	V=9.63	Reference Frame: ICRS
		Alt Name1: TOI-560	Dec: -13 15 23.48 (-13.25652d)	Proper Motion Dec: 38.48 mas/yr		
			Equinox: J2000	Parallax: 0.03166"		
				Epoch of Position: 2016		
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.					
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Description=[K V-IV]						
Extended=NO						

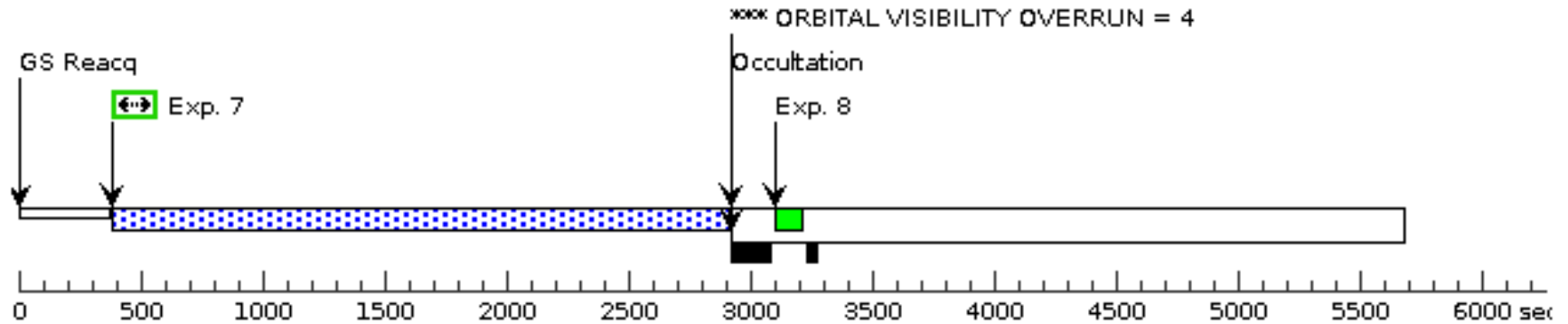
Proposal 17221 - Centered (03) - Lyman alpha measurements from two mini Neptunes around one star

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.152 2729)	(1) HD-73583	STIS/CCD, ACQ, F28X50OIII	MIRROR		PHASE 0.98786 TO 0.99007	Sequence 1-4 Non-Int in Centered (03)	5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK (STIS.ta.152 2727)	(1) HD-73583	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR			Sequence 1-4 Non-Int in Centered (03)	0.1 Secs (0.1 Secs) [==>]	[1]
	3	Science (STIS.sp.15 22731)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 1-4 Non-Int in Centered (03)	1802 Secs (1802 Secs) [==>]	[1]
	4	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 1-4 Non-Int in Centered (03)	[==>]	[1]
	5	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 5-6 Non-Int in Centered (03)	2517 Secs (2517 Secs) [==>]	[2]
	6	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 5-6 Non-Int in Centered (03)	[==>]	[2]
	7	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 7-8 Non-Int in Centered (03)	2517 Secs (2517 Secs) [==>]	[3]
	8	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 7-8 Non-Int in Centered (03)	[==>]	[3]
	9	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 9-10 Non-Int in Centered (03)	2517 Secs (2517 Secs) [==>]	[4]
	10	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 9-10 Non-Int in Centered (03)	[==>]	[4]
	11	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 11-12 Non-Int in Centered (03)	2517 Secs (2517 Secs) [==>]	[5]
	12	WAVECAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 11-12 Non-Int in Centered (03)	[==>]	[5]



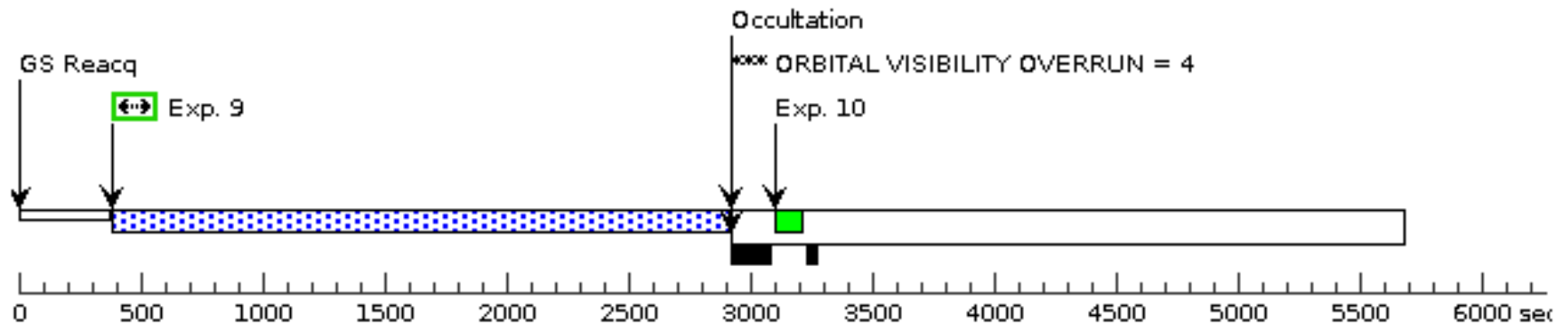
Orbit 3

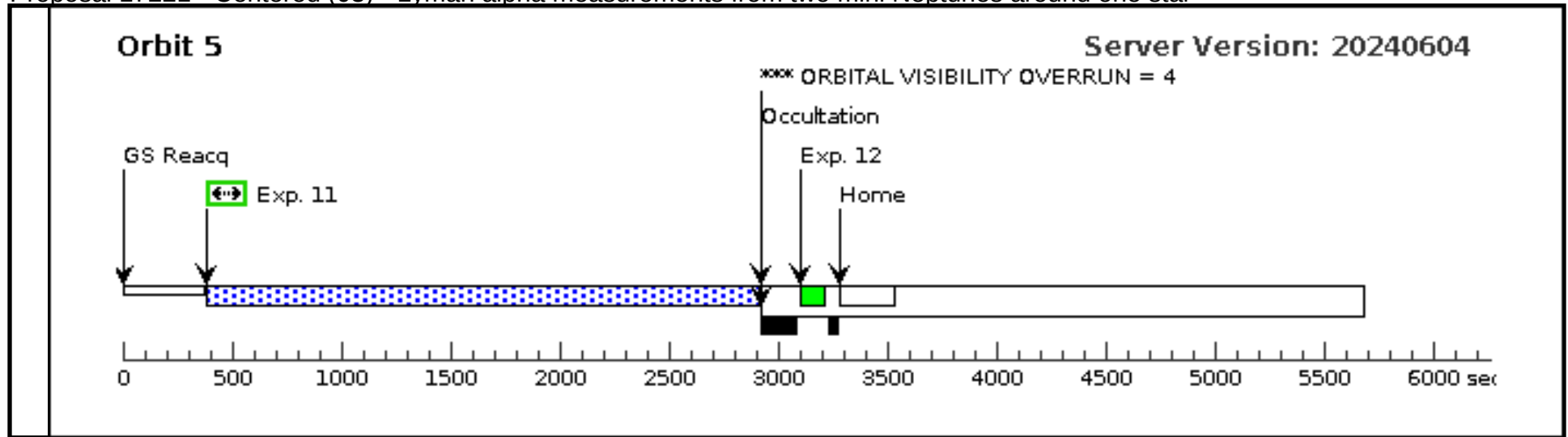
Server Version: 20240604



Orbit 4

Server Version: 20240604



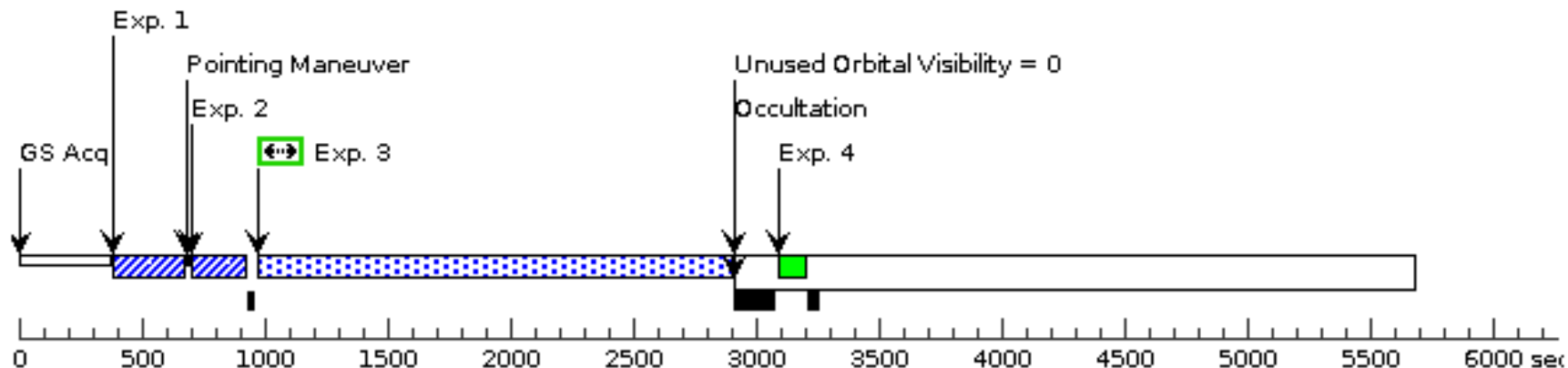


Proposal 17221 - Centered (04) - Lyman alpha measurements from two mini Neptunes around one star

Visit	Proposal 17221, Centered (04), implementation										Tue Nov 26 17:00:23 GMT 2024
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: STIS/CCD, STIS/FUV-MAMA										
	Special Requirements: SCHED 100%; Period 18.879270 D AND ZERO-PHASE HJD2459628.63239										
	Comments: HOPR copy of visit 03										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
	(1)	HD-73583	RA: 08 38 45.1904 (129.6882933d)	Proper Motion RA: -63.83 mas/yr	V=9.63	Reference Frame: ICRS					
		Alt Name1: TOI-560	Dec: -13 15 23.48 (-13.25652d)	Proper Motion Dec: 38.48 mas/yr							
			Equinox: J2000	Parallax: 0.03166"							
				Epoch of Position: 2016							
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.											
Category=STAR											
Description=[K V-IV]											
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 (STIS.ta.152 2729)	(1) HD-73583	STIS/CCD, ACQ, F28X50OIII	MIRROR		PHASE 0.9935 TO 0.9946	Sequence 1-4 Non-Int in Centered (04)	5 Secs (5 Secs)		
									[==>]		[1]
	2	ACQ/PEAK (STIS.ta.152 2727)	(1) HD-73583	STIS/CCD, ACQ/PEAK, 52X0.1	MIRROR			Sequence 1-4 Non-Int in Centered (04)	0.1 Secs (0.1 Secs)		
									[==>]		[1]
	3	Science (STIS.sp.15 22731)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 1-4 Non-Int in Centered (04)	1802 Secs (1789 Secs)		
									[==>1789.0 Secs]		[1]
	4	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 1-4 Non-Int in Centered (04)	[==>]		[1]
	5	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 5-6 Non-Int in Centered (04)	2517 Secs (2503 Secs)		
									[==>2503.0 Secs]		[2]
	6	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 5-6 Non-Int in Centered (04)	[==>]		[2]
	7	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 7-8 Non-Int in Centered (04)	2517 Secs (2503 Secs)		
									[==>2503.0 Secs]		[3]
	8	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 7-8 Non-Int in Centered (04)	[==>]		[3]
9	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 9-10 Non-Int in Centered (04)	2517 Secs (2503 Secs)			
								[==>2503.0 Secs]		[4]	
10	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 9-10 Non-Int in Centered (04)	[==>]		[4]	
11	Science (STIS.sp.15 22732)	(1) HD-73583	STIS/FUV-MAMA, TIME-TAG, 52X0.1	G140M 1222 A	WAVECAL=NO; BUFFER-TIME=15 00		Sequence 11-12 Non-Int in Centered (04)	2517 Secs (2503 Secs)			
								[==>2503.0 Secs]		[5]	
12	WAVECAL WAVE		STIS/FUV-MAMA, ACCUM, 52X0.1	G140M 1222 A			Sequence 11-12 Non-Int in Centered (04)	[==>]		[5]	

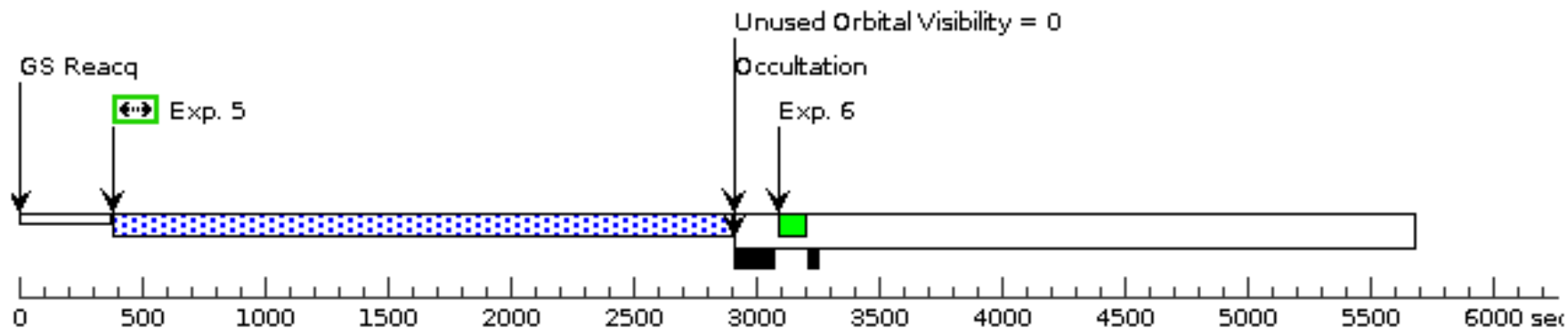
Orbit 1

Server Version: 20240604



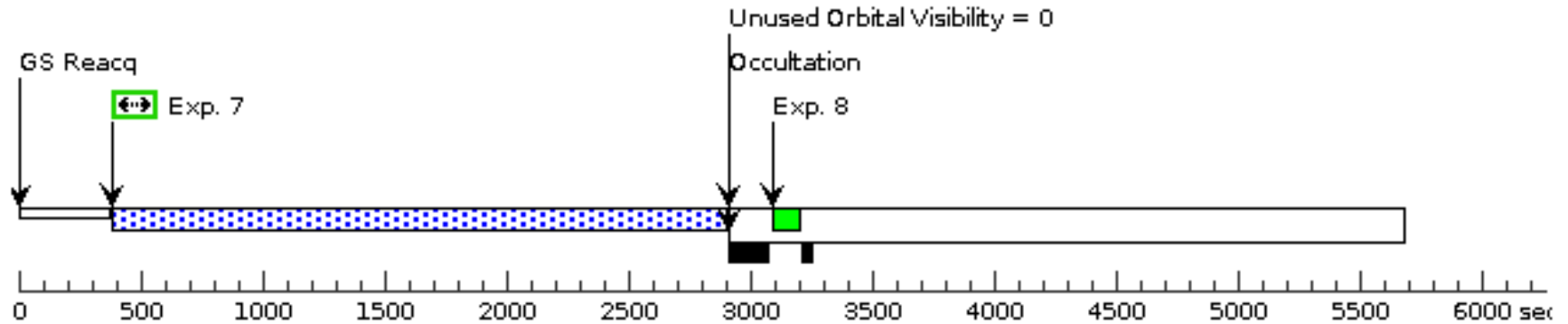
Orbit 2

Server Version: 20240604



Orbit 3

Server Version: 20240604



Orbit 4

Server Version: 20240604

