16270 - Heavy Metal Bands: A Study of Ions Escaping from the Hottest Jovian Atmospheres

Cycle: 28, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD-195689 WAVE	STIS/CCD STIS/NUV-MAMA	5	05-Jan-2021 16:00:18.0	yes
02	(1) HD-195689 WAVE	STIS/CCD STIS/NUV-MAMA	5	05-Jan-2021 16:00:23.0	yes
03	(2) HD-201585 WAVE	STIS/CCD STIS/NUV-MAMA	5	05-Jan-2021 16:00:29.0	yes
04	(2) HD-201585 WAVE	STIS/CCD STIS/NUV-MAMA	5	05-Jan-2021 16:00:34.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
Z2	(1) HD-195689 WAVE	STIS/CCD STIS/NUV-MAMA	5	05-Jan-2021 16:00:40.0	yes

25 Total Orbits Used

ABSTRACT

HST is the only facility capable of probing the uppermost planetary layers in the ultraviolet, which is key to understanding and modeling the vigorous atmospheric mass-loss seen in highly irradiated exoplanets. Recent HST NUV observations of an ultra hot Jupiter (UHJ) have definitively shown that ionized heavy elements including iron and magnesium are driven by atmospheric escape beyond the Roche lobe. These observations indicate the gas is not gravitationally bound to the planet, resulting in enormous signals when seen in transit. These ionized species may be hydrodynamically escaping or could be magnetically confined to the planet. Here we propose to observe escaping ions from the atmospheres of two ultra-hot Jupiters orbiting two of the most UV-bright exoplanet host stars. By observing in the NUV, we can compare the escape rates of heavy elements, measure the velocity profiles, and determine the extent to which the Roche lobe is filled of several UHJs orbiting different spectral type host stars, thus testing mass-loss mechanisms across differing XUV irradiation levels. We will also search for asymmetries in the NUV transit light curves, which will constrain post-cometary evaporation tails and magnetically controlled outflow.

OBSERVING DESCRIPTION

All 4 visits observe an exoplanet transit event. The spirit of exoplanet transit observations is to attempt to gather as many spectra as possible before, during, and after a transit event with each image as identical as possible. As a transit observation consists of measuring a differential drop in stellar flux during the event, identical exposures are resistant to uncertainties in flat-fielding and very high photometric precisions are achievable. The STIS/E230M observations require 5 orbit visits, as the baseline stellar flux and instrument systematics need to be measured before and after the transit/eclipse event, with the transit/eclipse event taking about 2.5 orbits orbits and is phase constrained to occur mid-way through the visit. We will observe two transits of two different targets (for a total of 4 observed transits/visits). For each target, we seek to offset the phase constraints to obtain full coverage of the transit, allowing us to measure possible asymetries in the transit shape, which has important science consequences.

In the event of Reduced Gyro mode, scheduling of our phase-constrained observations will be the one major impact.

Visit

Proposal 16270, KELT-9b #1 (01), scheduling Tue Jan 05 21:00:42 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: Period 1.4811235 D AND ZERO-PHASE HJD2457095.68572

Comments: It is essential that all 5 orbits be scheduled in a continuous block. We have chosen WAVECAL=NO to avoid autowavecals at non-optimal times in the orbit and have scheduled wavecals manually, at the beginning of the visit and at the end of each orbit.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-195689	RA: 20 31 26.3534 (307.8598058d)	Proper Motion RA: 16.728 mas/yr	V=7.56	Reference Frame: ICRS
		Dec: +39 56 19.77 (39.93882d)	Proper Motion Dec: 21.478 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

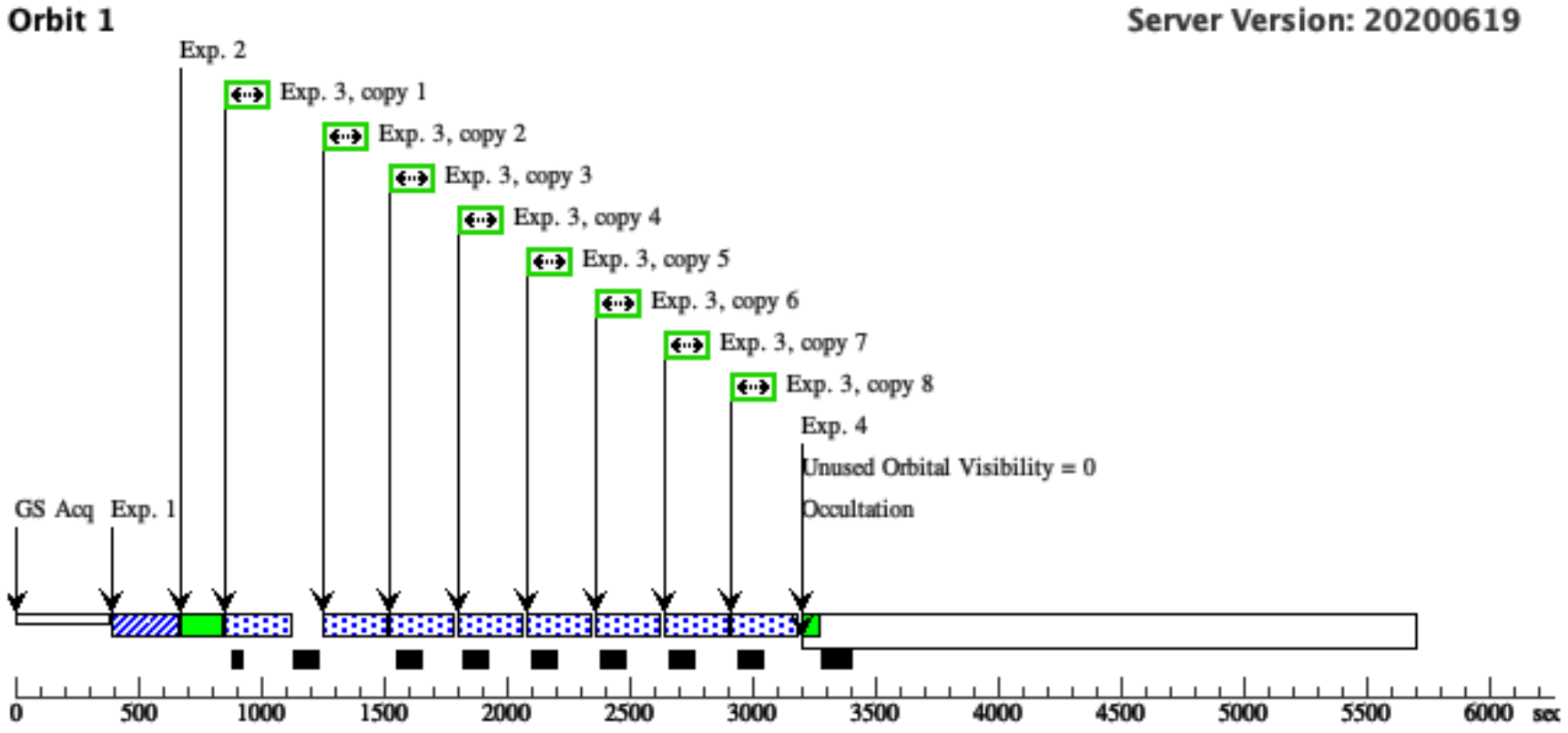
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Position and Proper motion from GAIA DR2.
Category=STAR
Description=[A0-A3 V-IV, EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM]
Extended=NO

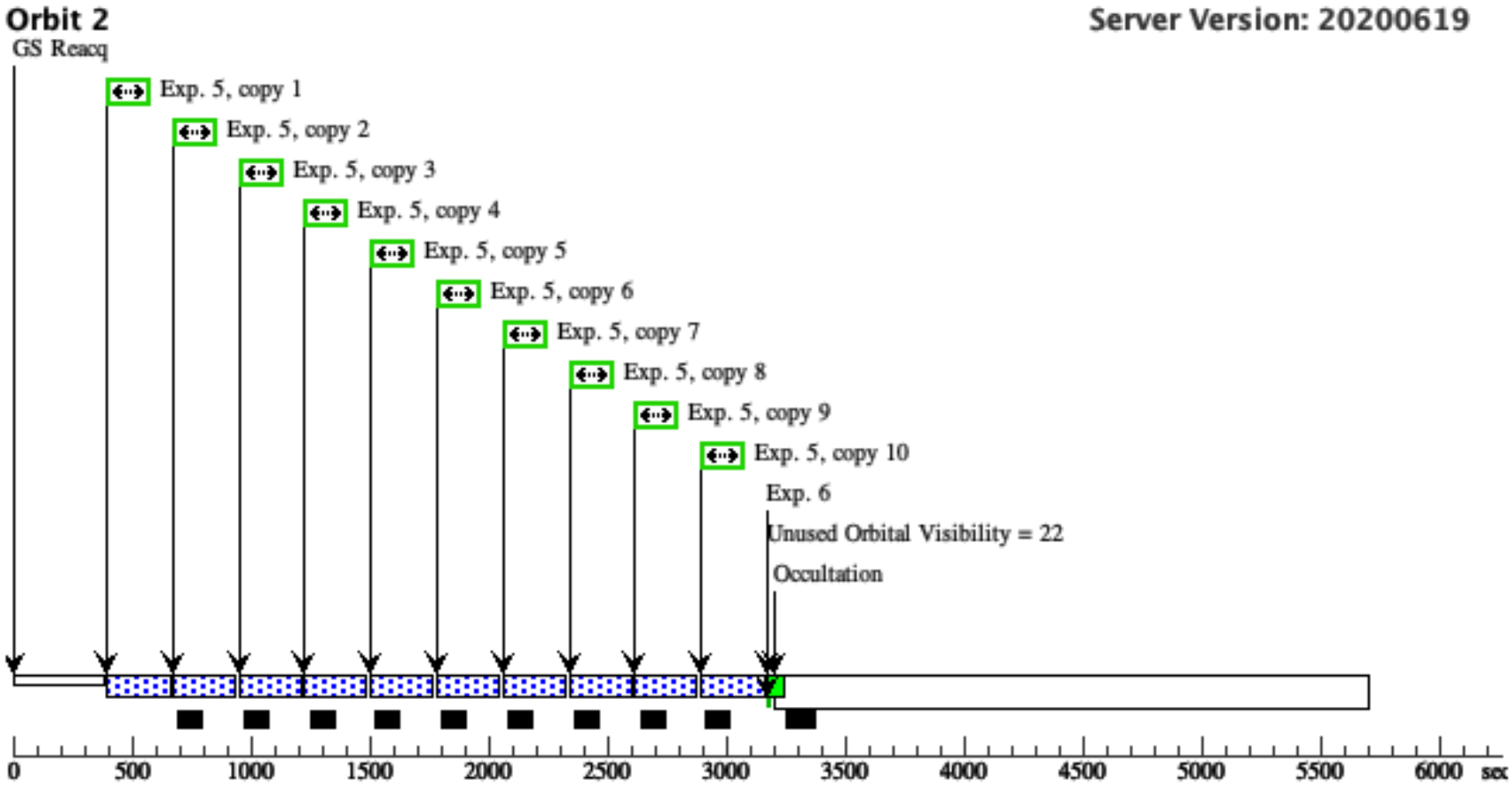
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ, phase constrained (STIS.ta.1448464)	(1) HD-195689	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.885 TO 0.894	Sequence 1-4 Non-Int in KELT-9b #1 (01)	2.5 Secs (2.5 Secs) *[==>]*	***[1]***
	Comments: Target is too bright for F28X50LP (saturation < minimum exposure time), so we use F28X50OII with a 2.5 second exposure to get SNR~300. We use STIS/CCD for this, though STIS/CCD was not explicitly requested in Phase I.								
2	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #1 (01)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
3	Orbit #1 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 1-4 Non-Int in KELT-9b #1 (01)	254 Secs X 8 (2032 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom. Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
4	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #1 (01)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
5	Orbit #2 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 5-6 Non-Int in KELT-9b #1 (01)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[2]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom.								
6	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 5-6 Non-Int in KELT-9b #1 (01)	*[==>]*	***[2]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

7	Orbit #3 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 7-8 Non-Int in KELT-9b #1 (01)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[3]***
8	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 7-8 Non-Int in KELT-9b #1 (01)	*[==>]*	***[3]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
9	Orbit #4 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 9-10 Non-Int in KELT-9b #1 (01)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[4]***
10	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 9-10 Non-Int in KELT-9b #1 (01)	*[==>]*	***[4]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
11	Orbit #5 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 11-12 Non-Int in KELT-9b #1 (01)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[5]***
12	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 11-12 Non-Int in KELT-9b #1 (01)	*[==>]*	***[5]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

Orbit Structure

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Exp. 6
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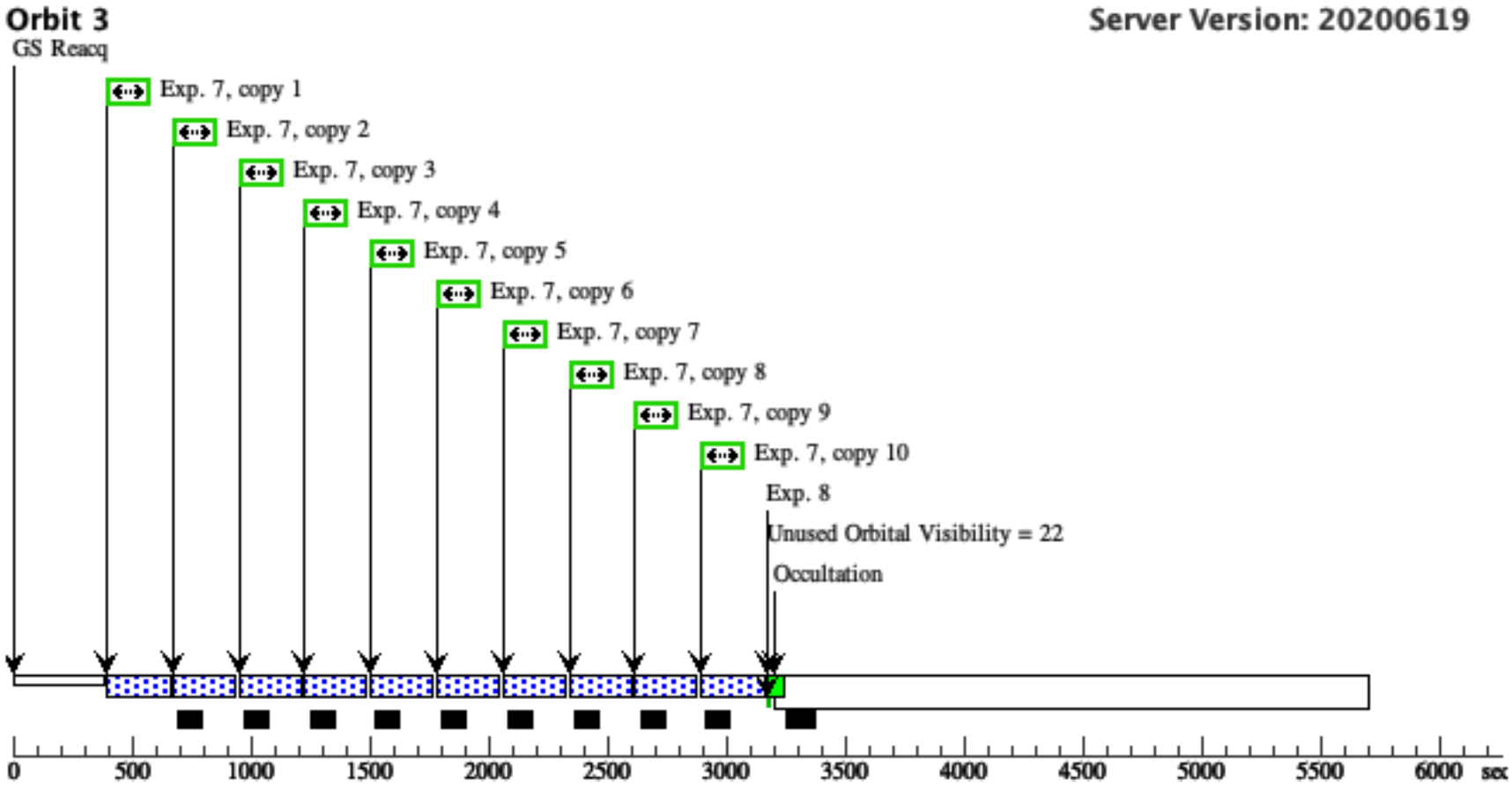
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Exp. 8
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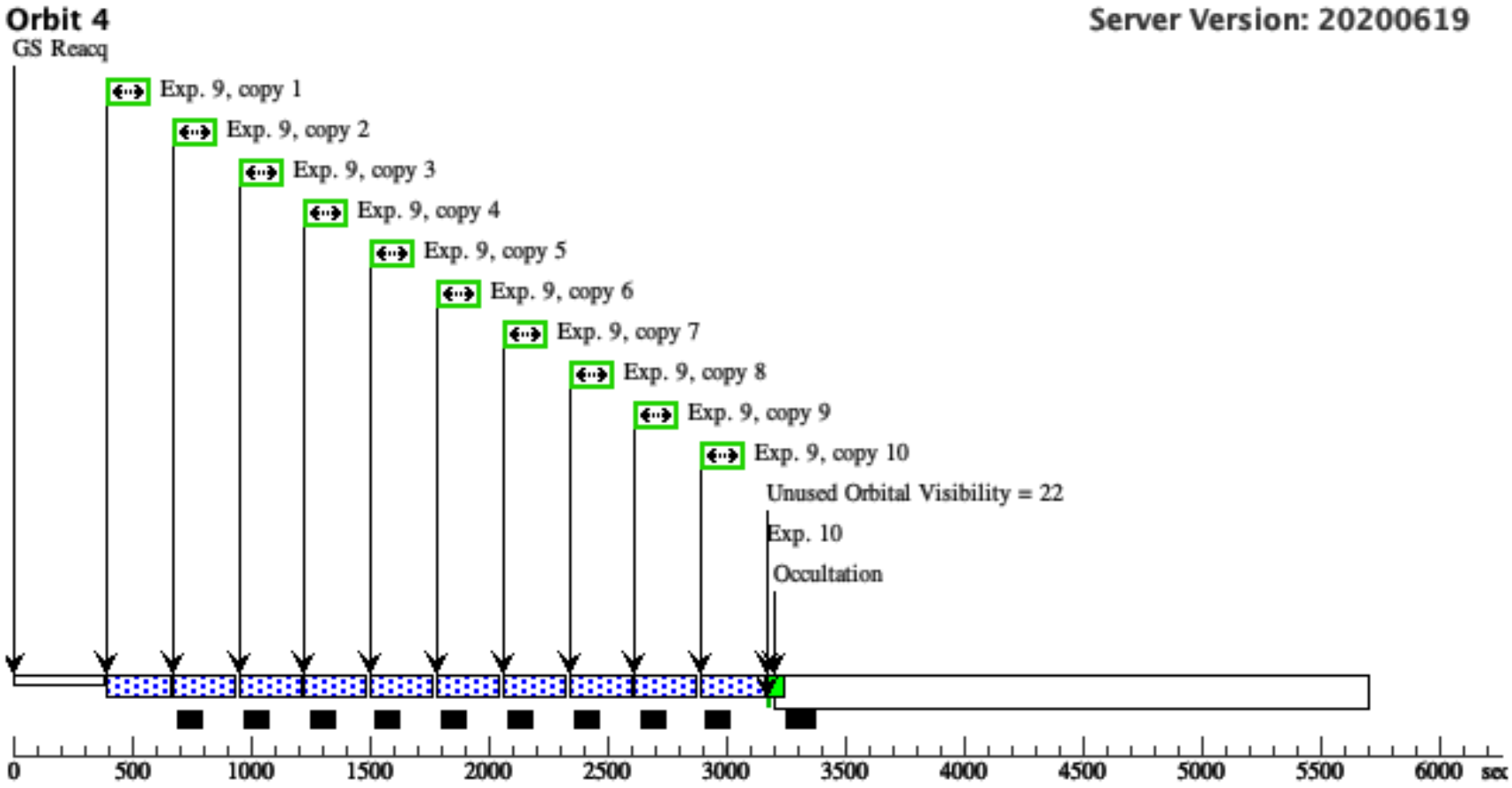
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Unused Orbital Visibility = 22
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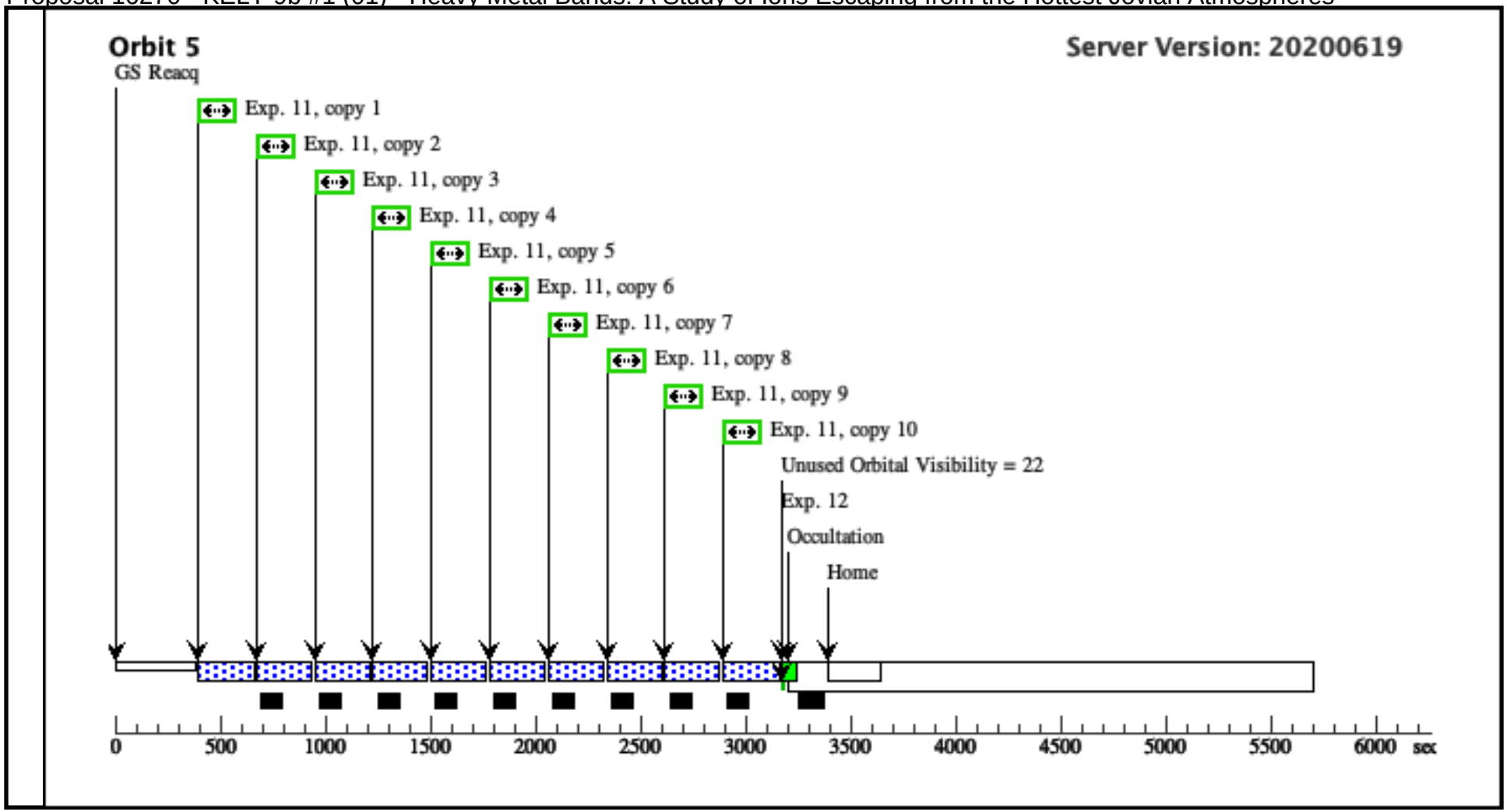
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Exp. 12
Occultation
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sec

Visit

Proposal 16270, KELT-9b #2 (02), failed Tue Jan 05 21:00:42 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: Period 1.4811235 D AND ZERO-PHASE HJD2457095.68572

Comments: It is essential that all 5 orbits be scheduled in a continuous block. We have chosen WAVECAL=NO to avoid autowavecals at non-optimal times in the orbit and have scheduled wavecals manually, at the beginning of the visit and at the end of each orbit.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
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		Dec: +39 56 19.77 (39.93882d)	Proper Motion Dec: 21.478 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

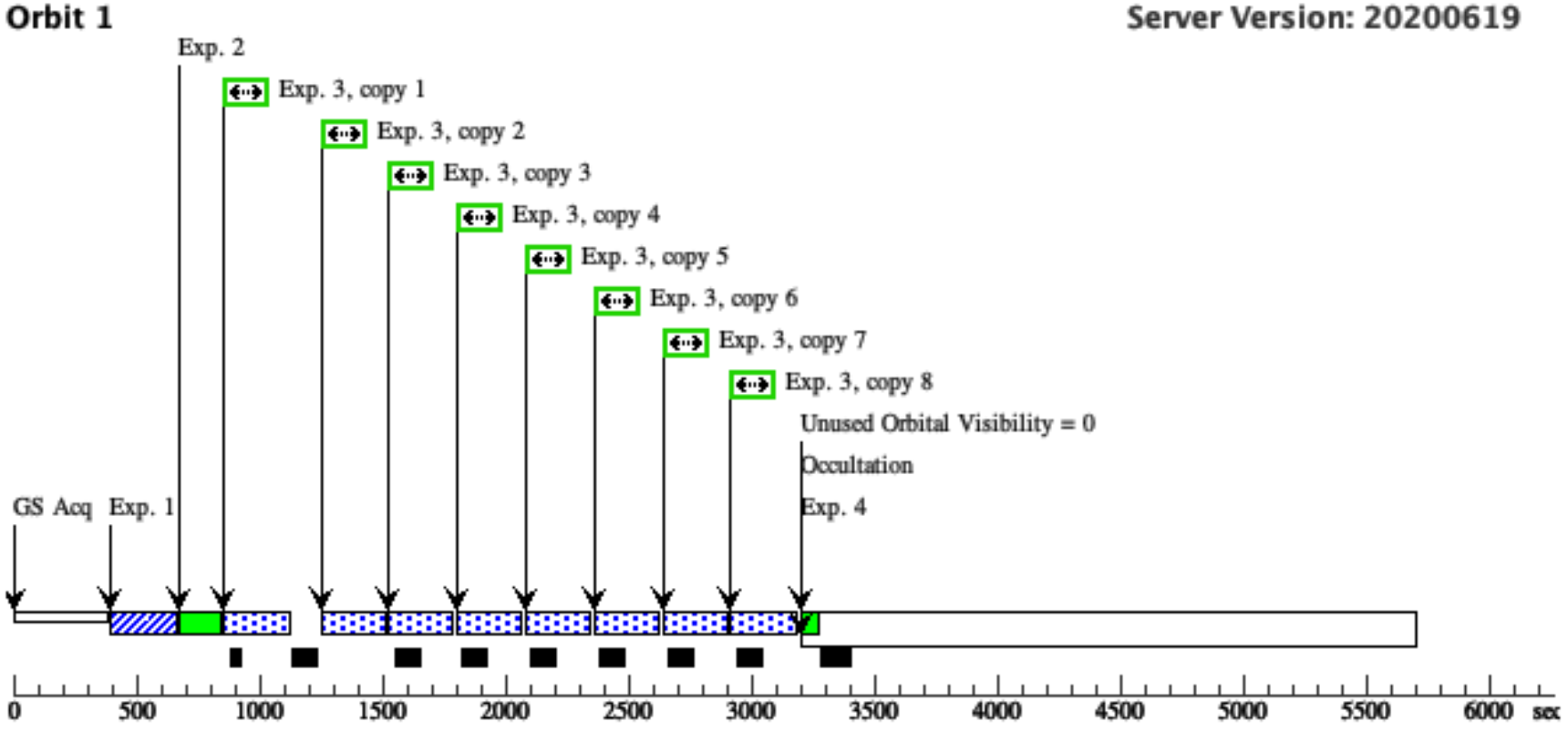
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Position and Proper motion from GAIA DR2.
Category=STAR
Description=[A0-A3 V-IV, EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM]
Extended=NO

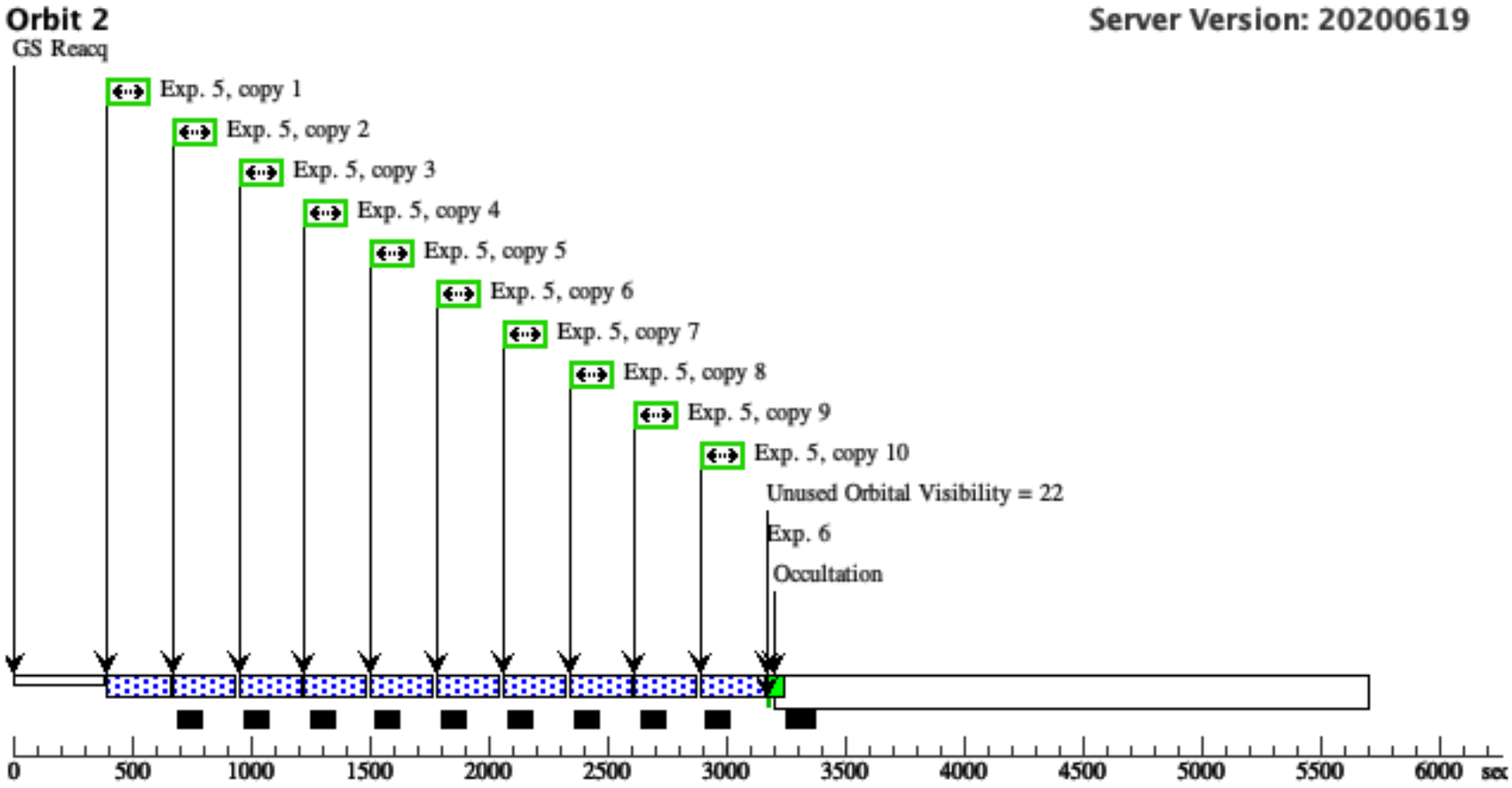
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ, phase constrained (STIS.ta.1448464)	(1) HD-195689	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.905 TO 0.915	Sequence 1-4 Non-Int in KELT-9b #2 (02)	2.5 Secs (2.5 Secs) *[==>]*	***[1]***
	Comments: Target is too bright for F28X50LP (saturation < minimum exposure time), so we use F28X50OII with a 2.5 second exposure to get SNR~300. We use STIS/CCD for this, though STIS/CCD was not explicitly requested in Phase I.								
2	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #2 (02)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
3	Orbit #1 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 1-4 Non-Int in KELT-9b #2 (02)	254 Secs X 8 (2032 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom.								
4	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #2 (02)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
5	Orbit #2 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 5-6 Non-Int in KELT-9b #2 (02)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[2]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom.								
6	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 5-6 Non-Int in KELT-9b #2 (02)	*[==>]*	***[2]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

7	Orbit #3 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 7-8 Non-Int in KELT-9b #2 (02)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[3]***
8	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 7-8 Non-Int in KELT-9b #2 (02)	*[==>]*	***[3]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
9	Orbit #4 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 9-10 Non-Int in KELT-9b #2 (02)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[4]***
10	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 9-10 Non-Int in KELT-9b #2 (02)	*[==>]*	***[4]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
11	Orbit #5 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 11-12 Non-Int in KELT-9b #2 (02)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[5]***
12	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 11-12 Non-Int in KELT-9b #2 (02)	*[==>]*	***[5]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

Orbit Structure

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Unused Orbital Visibility = 22
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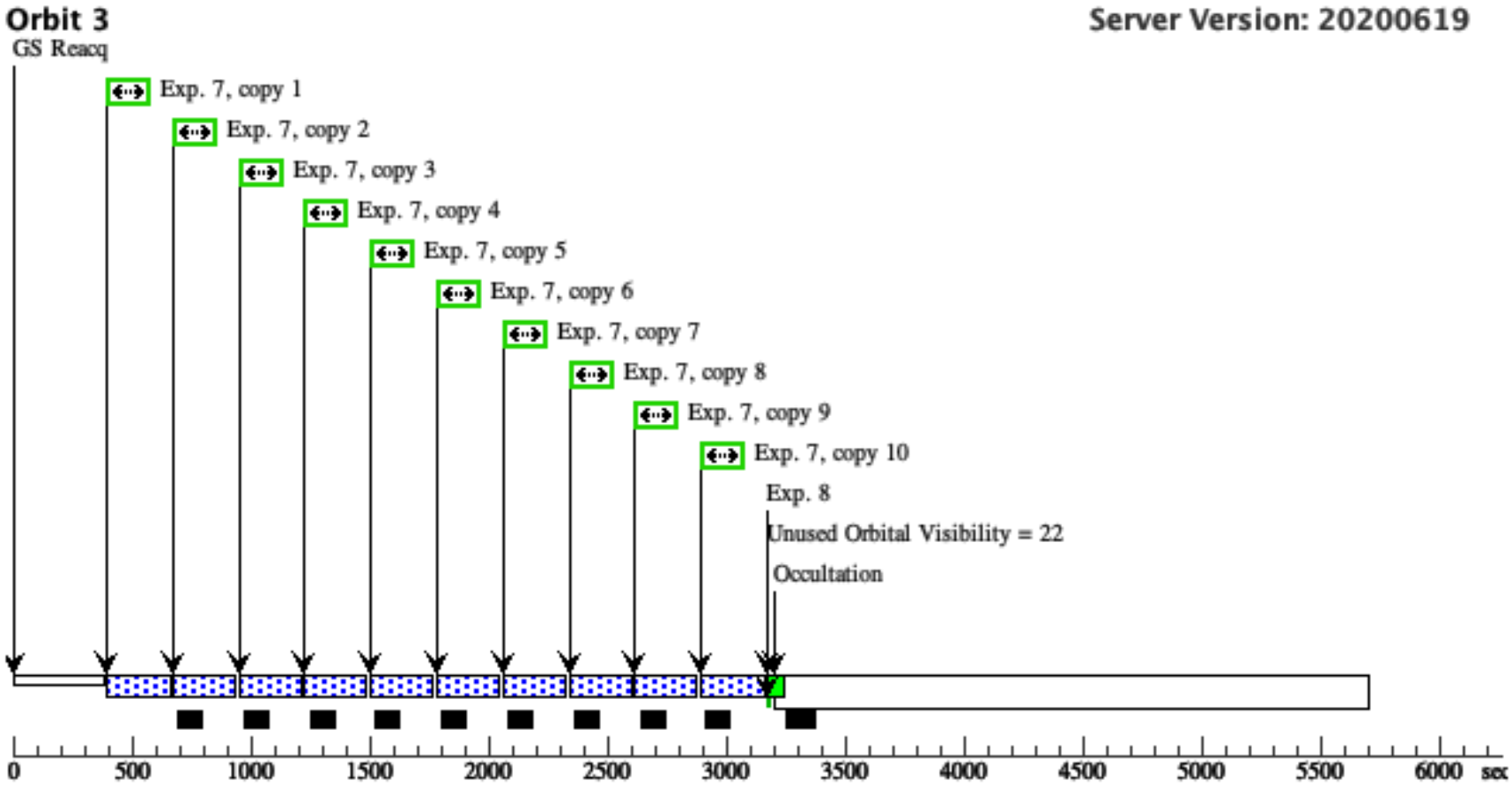
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Exp. 8
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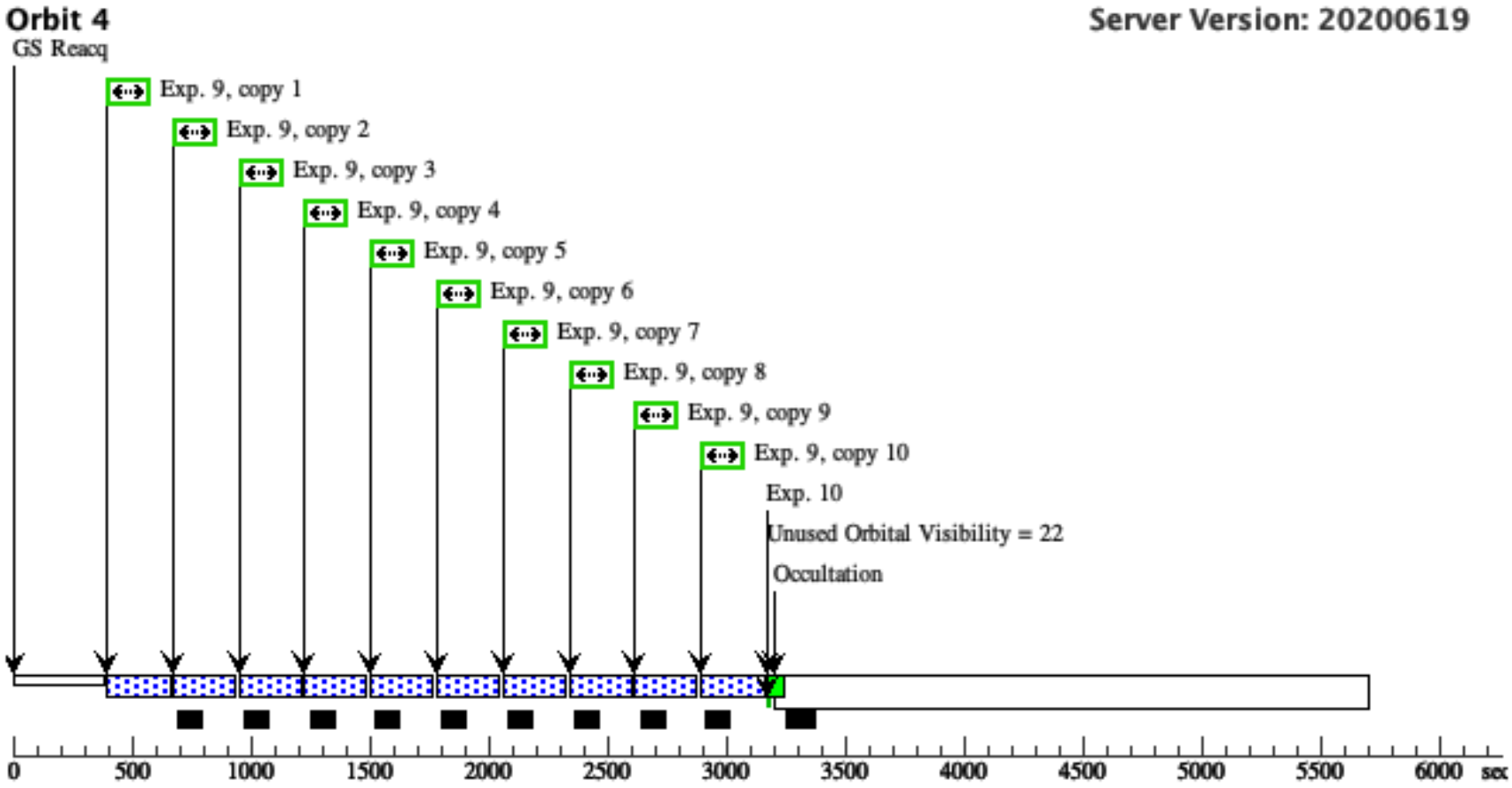
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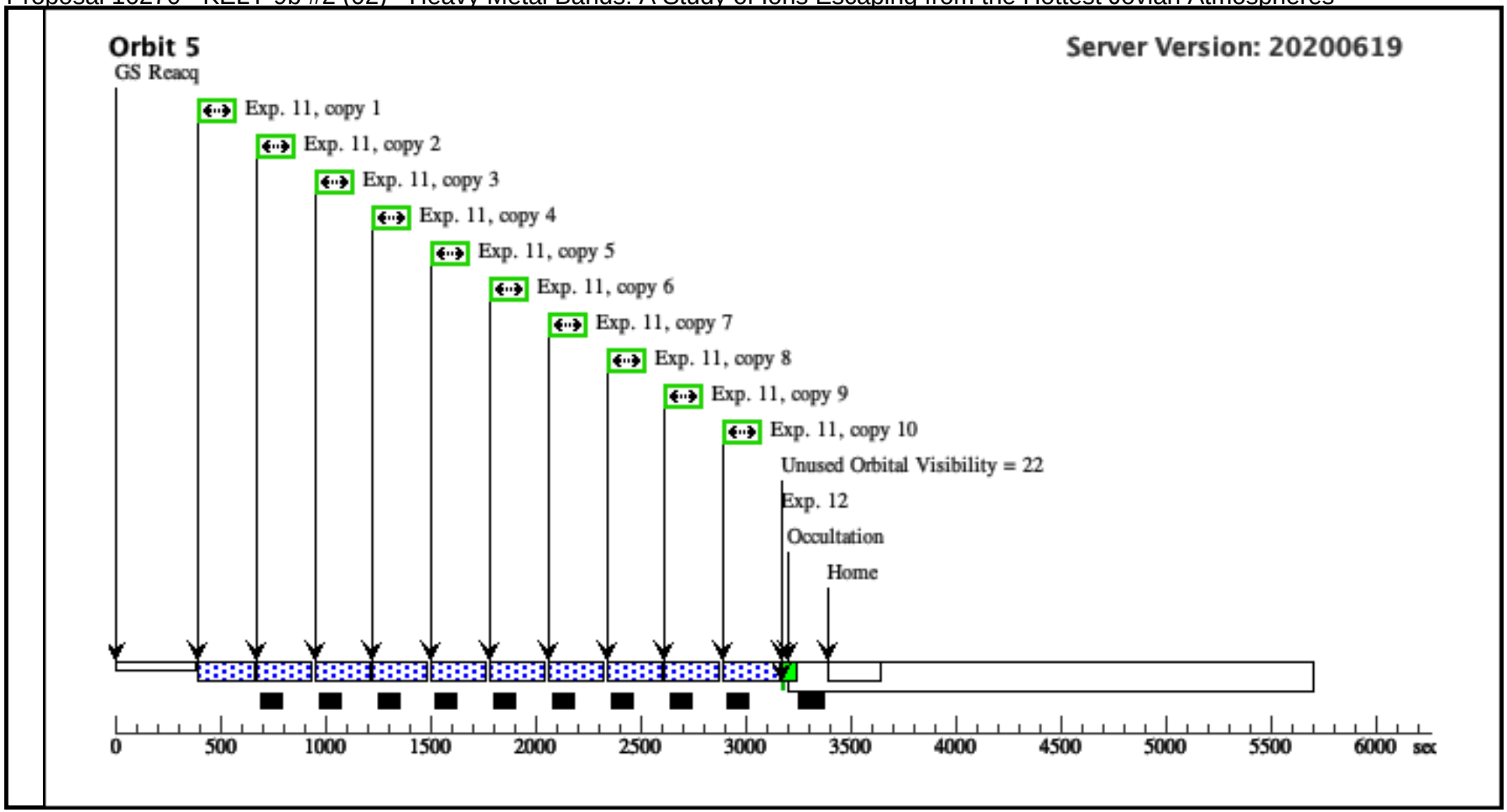
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Visit

Proposal 16270, MASCARA-1b #1 (03), completed Tue Jan 05 21:00:42 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: Period 2.148780 D AND ZERO-PHASE HJD2457097.278

Comments: It is essential that all 5 orbits be scheduled in a continuous block. We have chosen WAVECAL=NO to avoid autowavecals at non-optimal times in the orbit and have scheduled wavecals manually, at the beginning of the visit and at the end of each orbit.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD-201585	RA: 21 10 12.3723 (317.5515512d)	Proper Motion RA: -5.719 mas/yr	V=8.27	Reference Frame: ICRS
		Dec: +10 44 19.94 (10.73887d)	Proper Motion Dec: 5.379 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments: Position and Proper motion from GAIA DR2.
Category=STAR
Description=[A4-A9 V-IV, EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM]
Extended=NO

Exposures

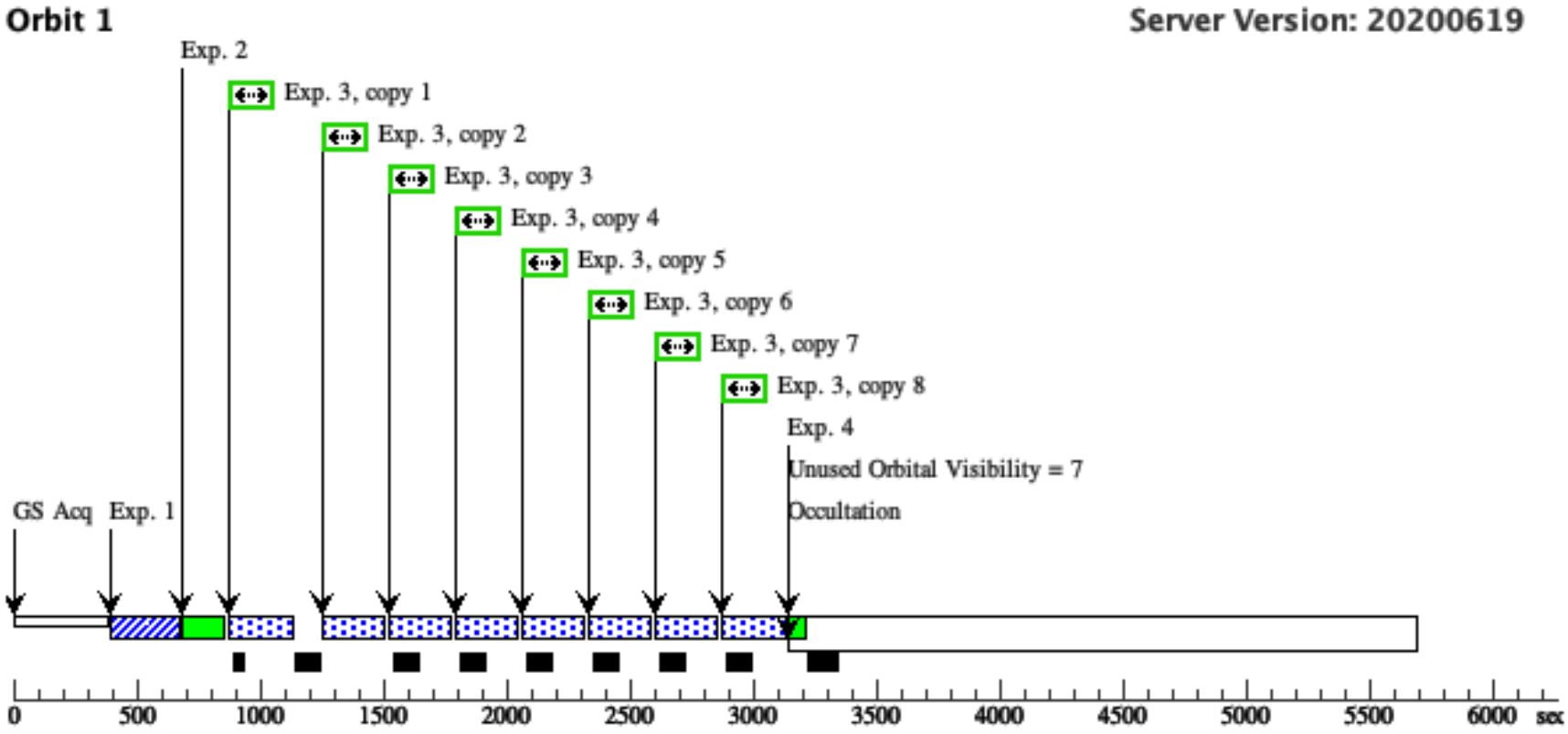
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ, phase constrained (STIS.ta.1448825)	(2) HD-201585	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.921 TO 0.92715	Sequence 1-4 Non-Int in MASCARA-1b #1 (03)	6.0 Secs (6 Secs) *[==>]*	***[1]***
	Comments: Target is too bright for F28X50LP (saturation < minimum exposure time), so we use F28X50OII with a 6.0 second exposure to get SNR>300. We use STIS/CCD for this, though STIS/CCD was not explicitly requested in Phase I.								
2	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in MASCARA-1b #1 (03)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
3	Orbit #1 (STIS.sp.1448828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 1-4 Non-Int in MASCARA-1b #1 (03)	245 Secs X 8 (1960 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom. Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
4	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in MASCARA-1b #1 (03)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
5	Orbit #2 (STIS.sp.1448828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 5-6 Non-Int in MASCARA-1b #1 (03)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[2]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
6	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 5-6 Non-Int in MASCARA-1b #1 (03)	*[==>]*	***[2]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

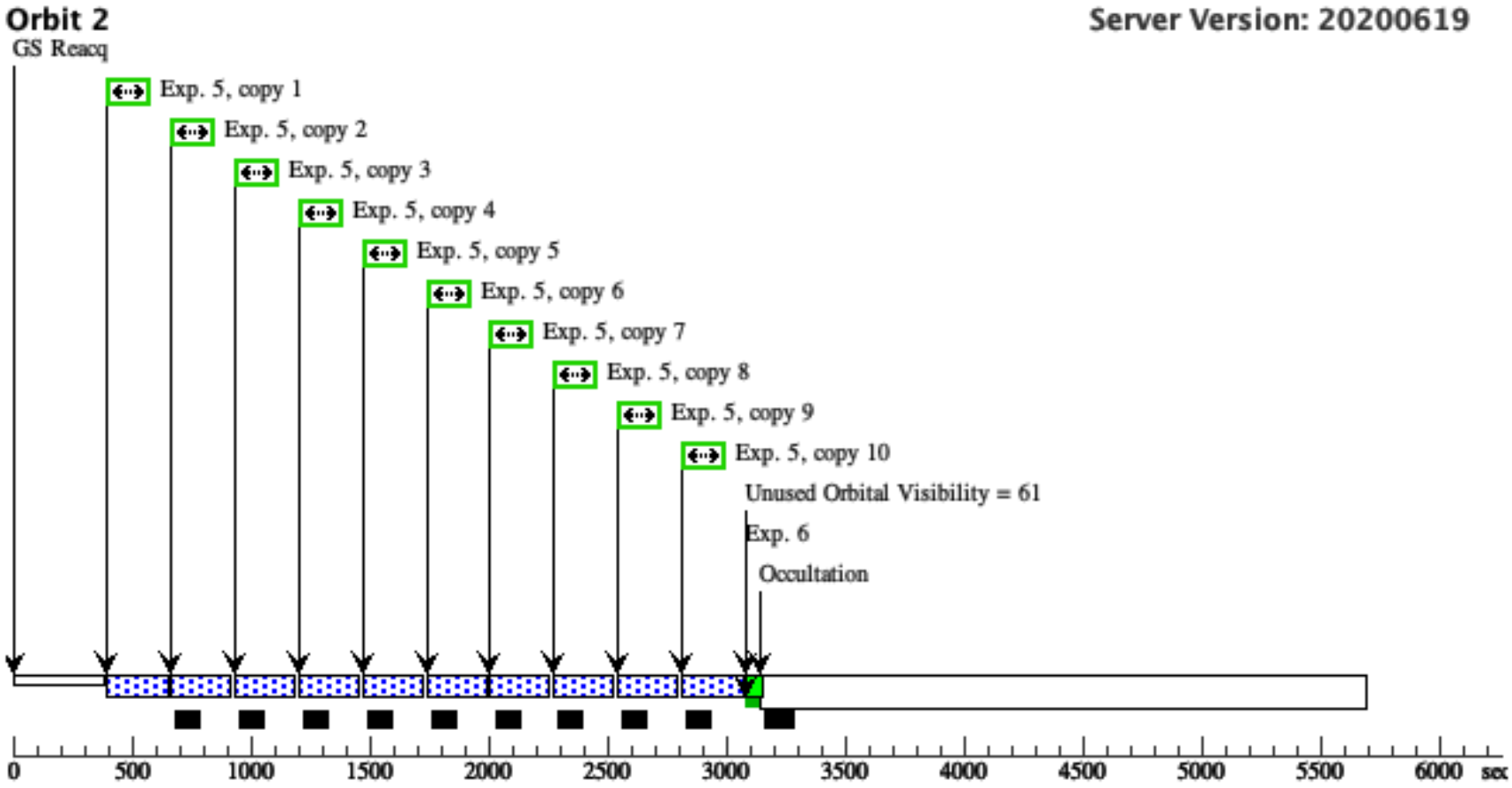
7	Orbit #3 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 7-8 Non-Int in MASCARA-1b #1 (03)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[3]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
8	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 7-8 Non-Int in MASCARA-1b #1 (03)	*[==>]*	***[3]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
9	Orbit #4 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 9-10 Non-Int in MASCARA-1b #1 (03)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[4]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
10	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 9-10 Non-Int in MASCARA-1b #1 (03)	*[==>]*	***[4]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
11	Orbit #5 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 11-12 Non-Int in MASCARA-1b #1 (03)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[5]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								

	12 WAVECAL WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	Sequence 11-12 Non -Int in MASCARA-1 b #1 (03)	*[==>]*	***[5]***

Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.

Orbit Structure

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Exp. 5, copy 9
Exp. 5, copy 10
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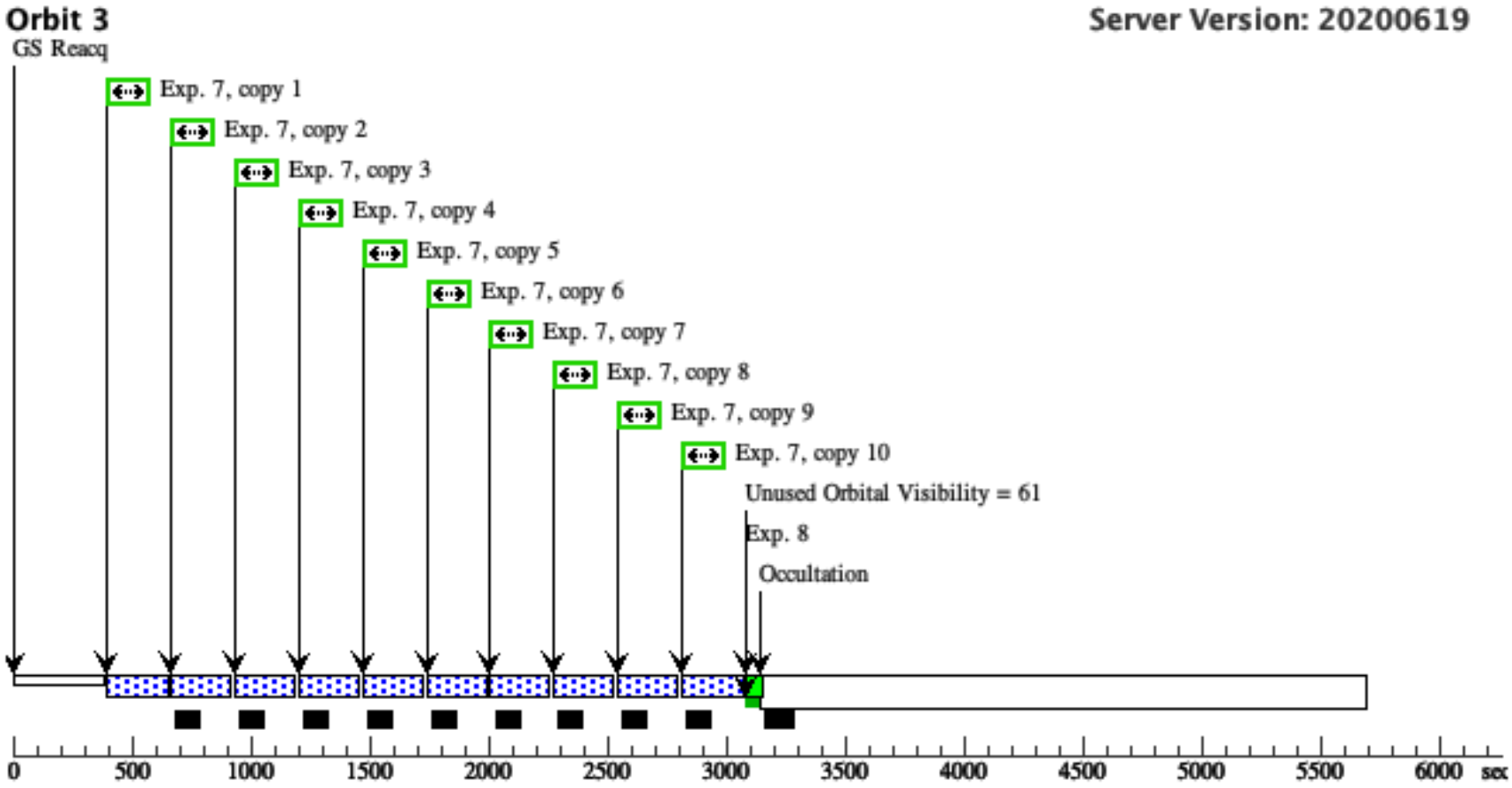
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Exp. 7, copy 5
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Exp. 7, copy 7
Exp. 7, copy 8
Exp. 7, copy 9
Exp. 7, copy 10
Unused Orbital Visibility = 61
Exp. 8
Occultation
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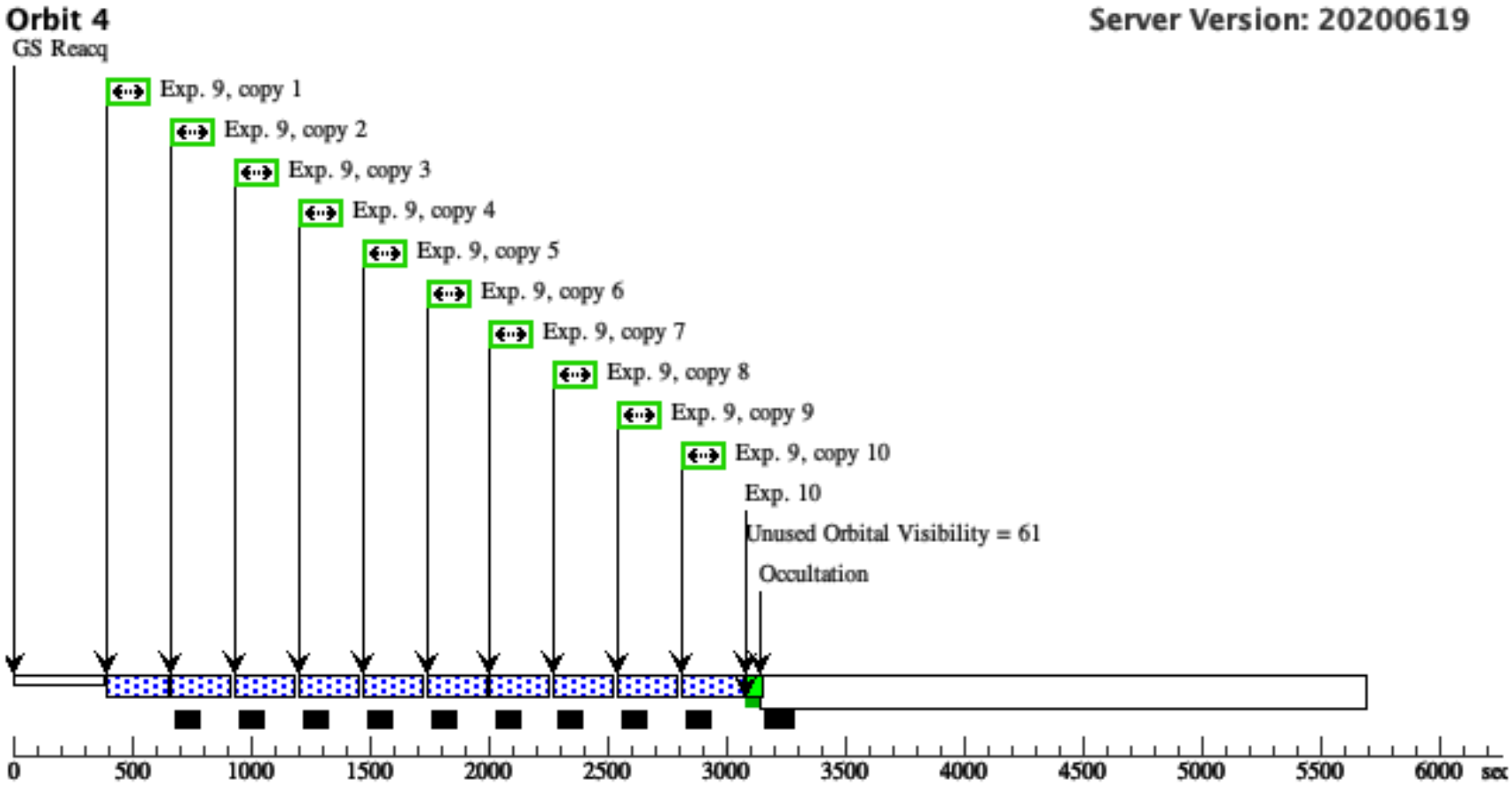
5000
5500
6000
sec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Exp. 9, copy 6
Exp. 9, copy 7
Exp. 9, copy 8
Exp. 9, copy 9
Exp. 9, copy 10
Exp. 10
Unused Orbital Visibility = 61
Occultation
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1500
2000
2500
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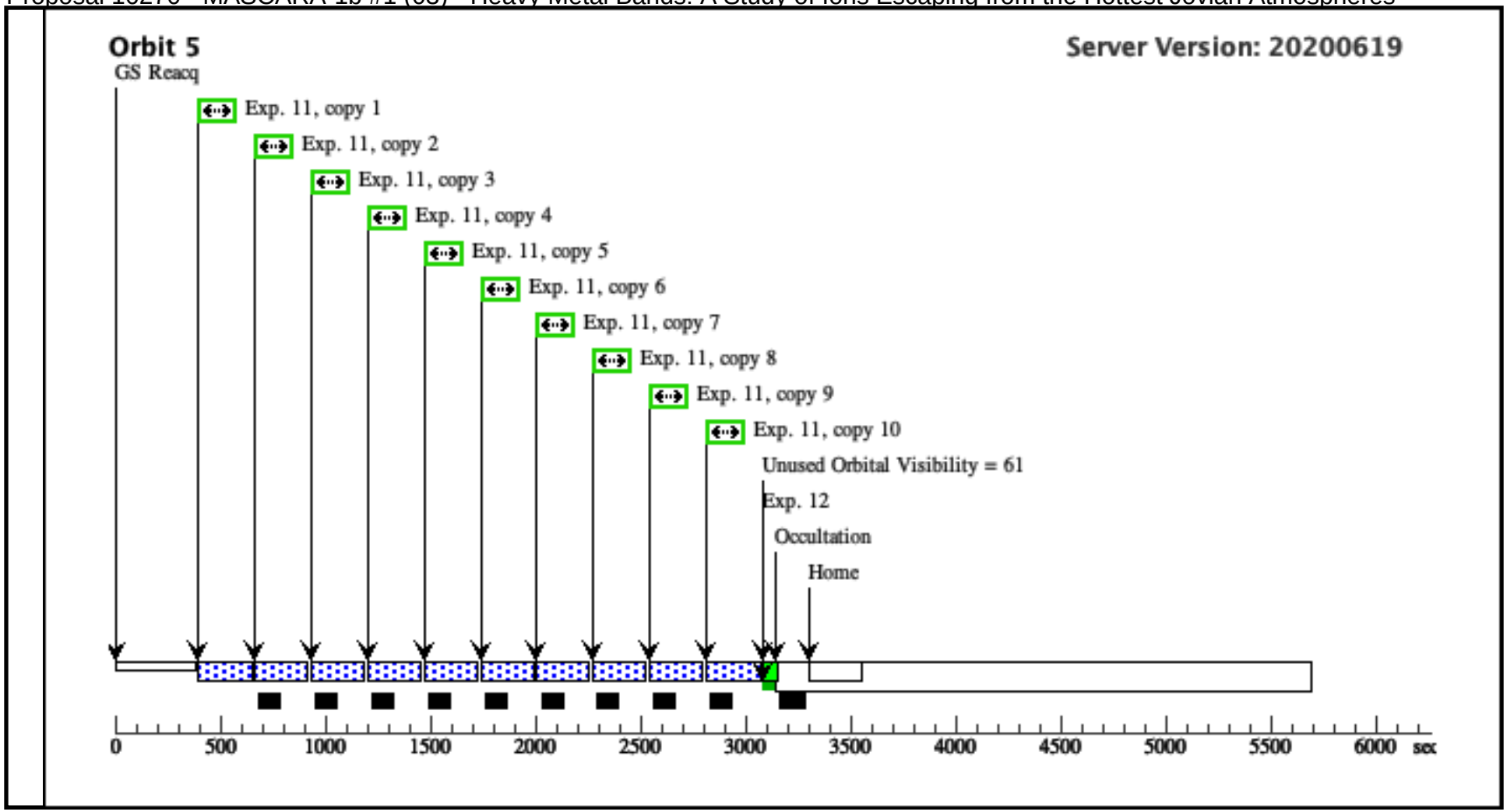
3500
4000
4500
5000
5500
6000
sec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Exp. 11, copy 8
Exp. 11, copy 9
Exp. 11, copy 10
Unused Orbital Visibility = 61
Exp. 12
Occultation
Home
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500
1000
1500
2000
2500
3000
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4000
4500
5000
5500
6000
sec

Visit

Proposal 16270, MASCARA-1b #2 (04), completed Tue Jan 05 21:00:43 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: Period 2.148780 D AND ZERO-PHASE HJD2457097.278

Comments: It is essential that all 5 orbits be scheduled in a continuous block. We have chosen WAVECAL=NO to avoid autowavecals at non-optimal times in the orbit and have scheduled wavecals manually, at the beginning of the visit and at the end of each orbit.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD-201585	RA: 21 10 12.3723 (317.5515512d)	Proper Motion RA: -5.719 mas/yr	V=8.27	Reference Frame: ICRS
		Dec: +10 44 19.94 (10.73887d)	Proper Motion Dec: 5.379 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments: Position and Proper motion from GAIA DR2.
Category=STAR
Description=[A4-A9 V-IV, EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM]
Extended=NO

Exposures

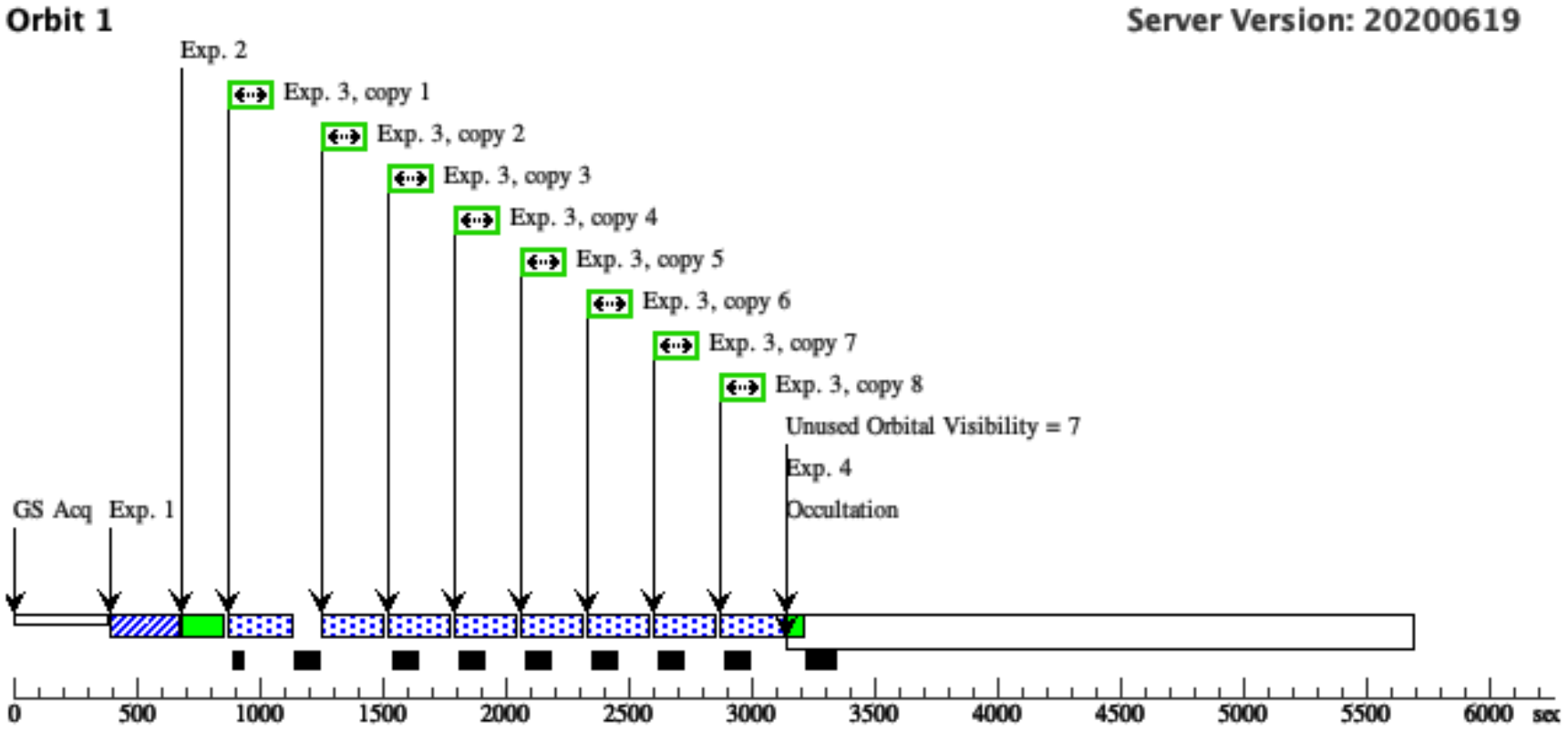
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ, phase constrained (STIS.ta.1448825)	(2) HD-201585	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.9345 TO 0.941	Sequence 1-4 Non-Int in MASCARA-1b # 2 (04)	6.0 Secs (6 Secs) *[==>]*	***[1]***
	Comments: Target is too bright for F28X50LP (saturation < minimum exposure time), so we use F28X50OII with a 6.0 second exposure to get SNR>300. We use STIS/CCD for this, though STIS/CCD was not explicitly requested in Phase I.								
2	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in MASCARA-1b # 2 (04)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
3	Orbit #1 (STIS.sp.1448828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 1-4 Non-Int in MASCARA-1b # 2 (04)	245 Secs X 8 (1960 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
4	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in MASCARA-1b # 2 (04)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
5	Orbit #2 (STIS.sp.1448828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 5-6 Non-Int in MASCARA-1b # 2 (04)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[2]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
6	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 5-6 Non-Int in MASCARA-1b # 2 (04)	*[==>]*	***[2]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

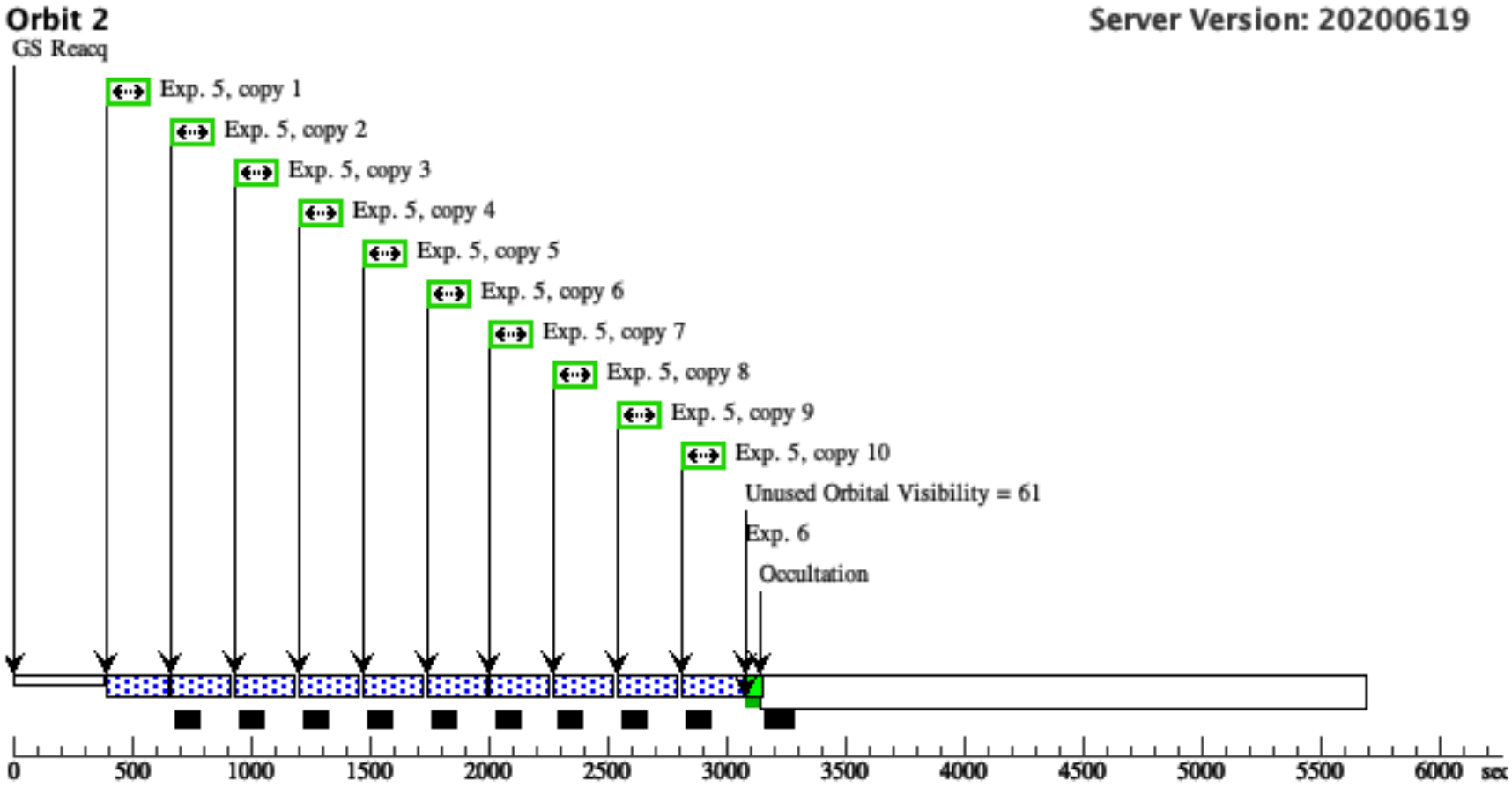
7	Orbit #3 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 7-8 Non-Int in MASCARA-1b #2 (04)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[3]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
8	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 7-8 Non-Int in MASCARA-1b #2 (04)	*[==>]*	***[3]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
9	Orbit #4 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 9-10 Non-Int in MASCARA-1b #2 (04)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[4]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								
10	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 9-10 Non-Int in MASCARA-1b #2 (04)	*[==>]*	***[4]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
11	Orbit #5 (STIS.sp.14 48828)	(2) HD-201585	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 11-12 Non-Int in MASCARA-1b #2 (04)	245 Secs X 10 (2450 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[5]***
Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~23.6 per frame at 2707 angstrom.								

	12 WAVECAL WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	Sequence 11-12 Non -Int in MASCARA-1 b #2 (04)	*[==>]*	***[5]***

Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.

Orbit Structure

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Exp. 5, copy 9
Exp. 5, copy 10
Unused Orbital Visibility = 61
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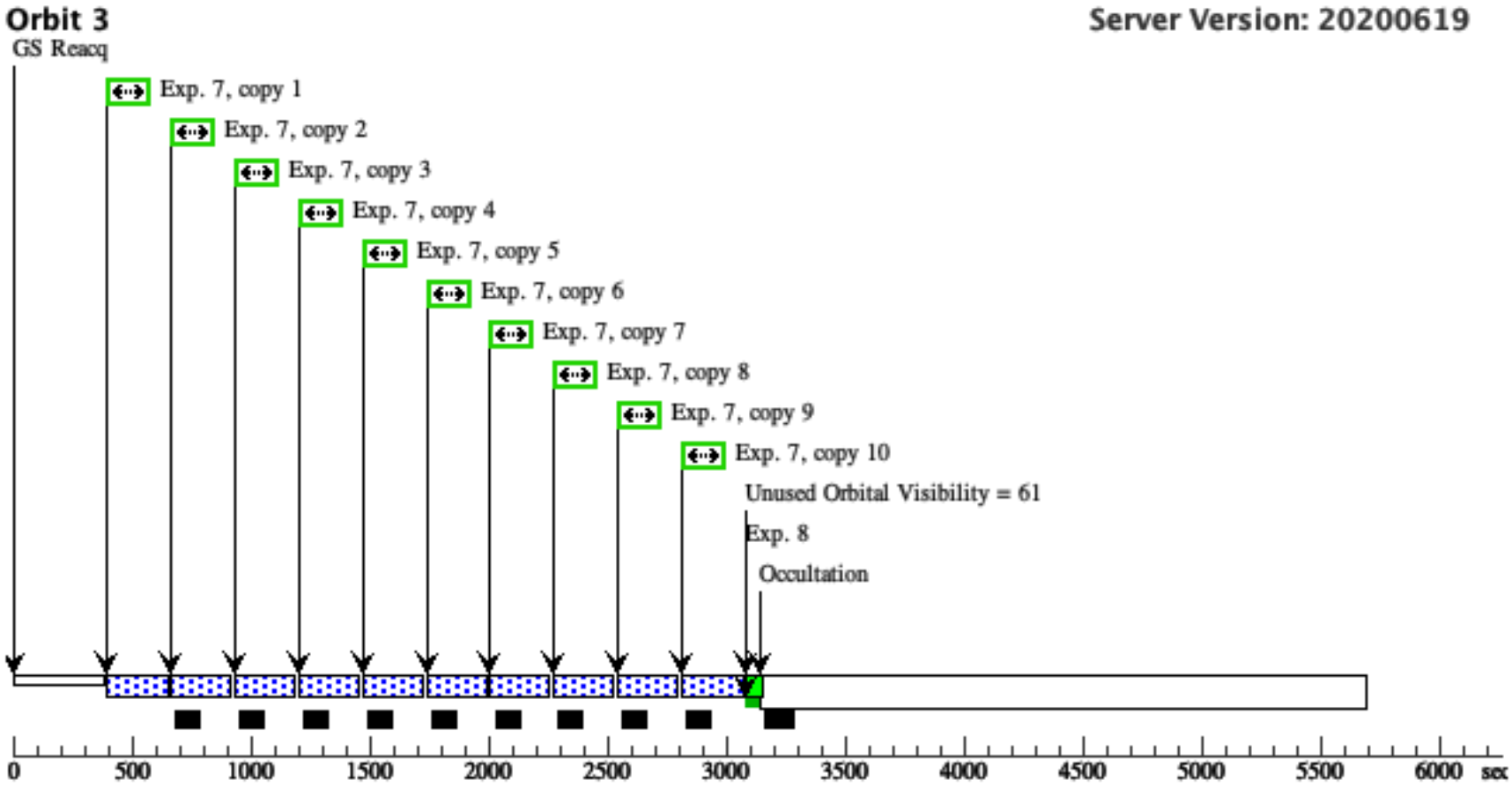
6000
sec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Exp. 7, copy 10
Unused Orbital Visibility = 61
Exp. 8
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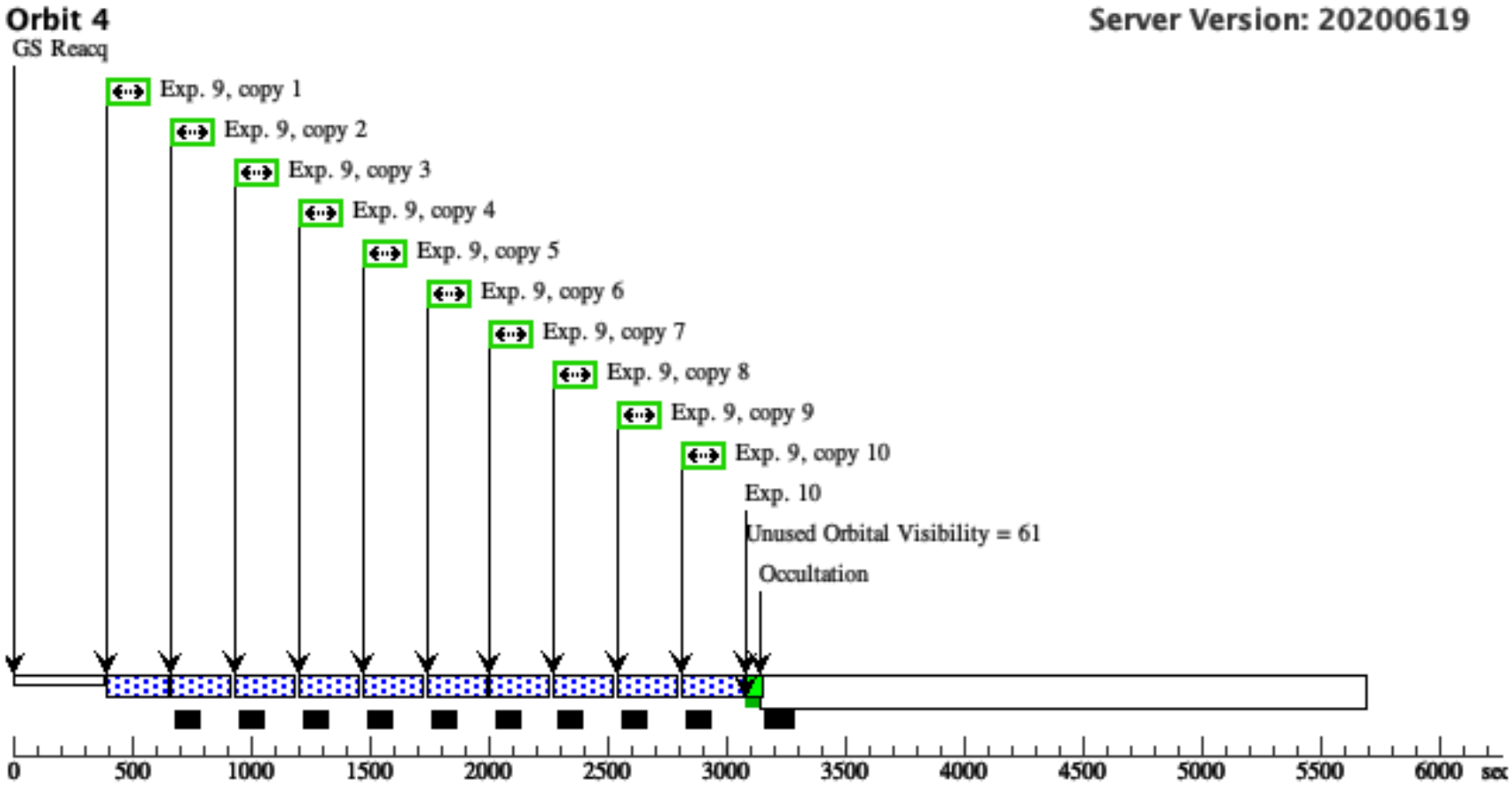
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Exp. 10
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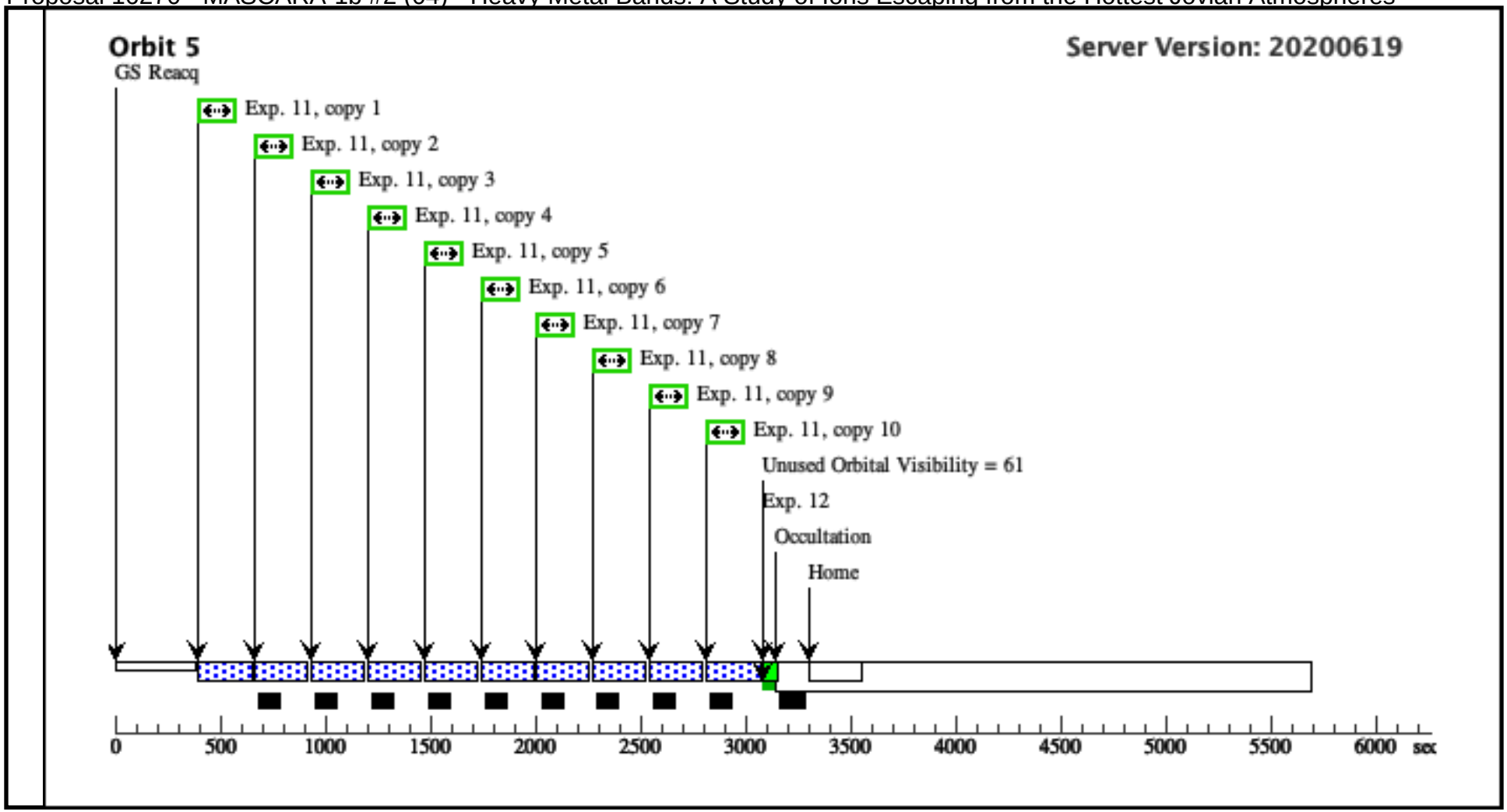
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Exp. 11, copy 10
Unused Orbital Visibility = 61
Exp. 12
Occultation
Home
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1000
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sec

Visit

Proposal 16270, KELT-9b #2 HOPR (Z2) Tue Jan 05 21:00:43 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: Period 1.4811235 D AND ZERO-PHASE HJD2457095.68572

Comments: It is essential that all 5 orbits be scheduled in a continuous block. We have chosen WAVECAL=NO to avoid autowavecals at non-optimal times in the orbit and have scheduled wavecals manually, at the beginning of the visit and at the end of each orbit.

HOPR

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-195689	RA: 20 31 26.3534 (307.8598058d)	Proper Motion RA: 16.728 mas/yr	V=7.56	Reference Frame: ICRS
		Dec: +39 56 19.77 (39.93882d)	Proper Motion Dec: 21.478 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Position and Proper motion from GAIA DR2.
Category=STAR
Description=[A0-A3 V-IV, EXTRA-SOLAR PLANET, EXTRA-SOLAR PLANETARY SYSTEM]
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, phase constrained (STIS.ta.1448464)	(1) HD-195689	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.905 TO 0.915	Sequence 1-4 Non-Int in KELT-9b #2 HOPR (Z2)	2.5 Secs (2.5 Secs) *[==>]*	***[1]***
	Comments: Target is too bright for F28X50LP (saturation < minimum exposure time), so we use F28X50OII with a 2.5 second exposure to get SNR~300. We use STIS/CCD for this, though STIS/CCD was not explicitly requested in Phase I.								
2	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
3	Orbit #1 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 1-4 Non-Int in KELT-9b #2 HOPR (Z2)	254 Secs X 8 (2032 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom.								
4	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 1-4 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[1]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
5	Orbit #2 (STIS.sp.1448460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO		Sequence 5-6 Non-Int in KELT-9b #2 HOPR (Z2)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[2]***
	Comments: Exposure time calculated to get 10 frames per orbit (except the first orbit because of target acq) to obtain enough time fidelity to model the systemics and transit time series'. This results in an SNR of ~45.5 per frame at 2707 angstrom.								
6	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A			Sequence 5-6 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[2]***
	Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

7	Orbit #3 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 7-8 Non-Int in KELT-9b #2 HOPR (Z2)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[3]***
8	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 7-8 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[3]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
9	Orbit #4 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 9-10 Non-Int in KELT-9b #2 HOPR (Z2)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[4]***
10	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 9-10 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[4]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								
11	Orbit #5 (STIS.sp.14 48460)	(1) HD-195689	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A	WAVECAL=NO	Sequence 11-12 Non-Int in KELT-9b #2 HOPR (Z2)	254 Secs X 10 (2540 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]*	***[5]***
12	WAVECAL	WAVE	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		Sequence 11-12 Non-Int in KELT-9b #2 HOPR (Z2)	*[==>]*	***[5]***
Comments: Auto-wavecal=NO, but we manually request wavecals at the beginning of the visit and then at the end of each orbit.								

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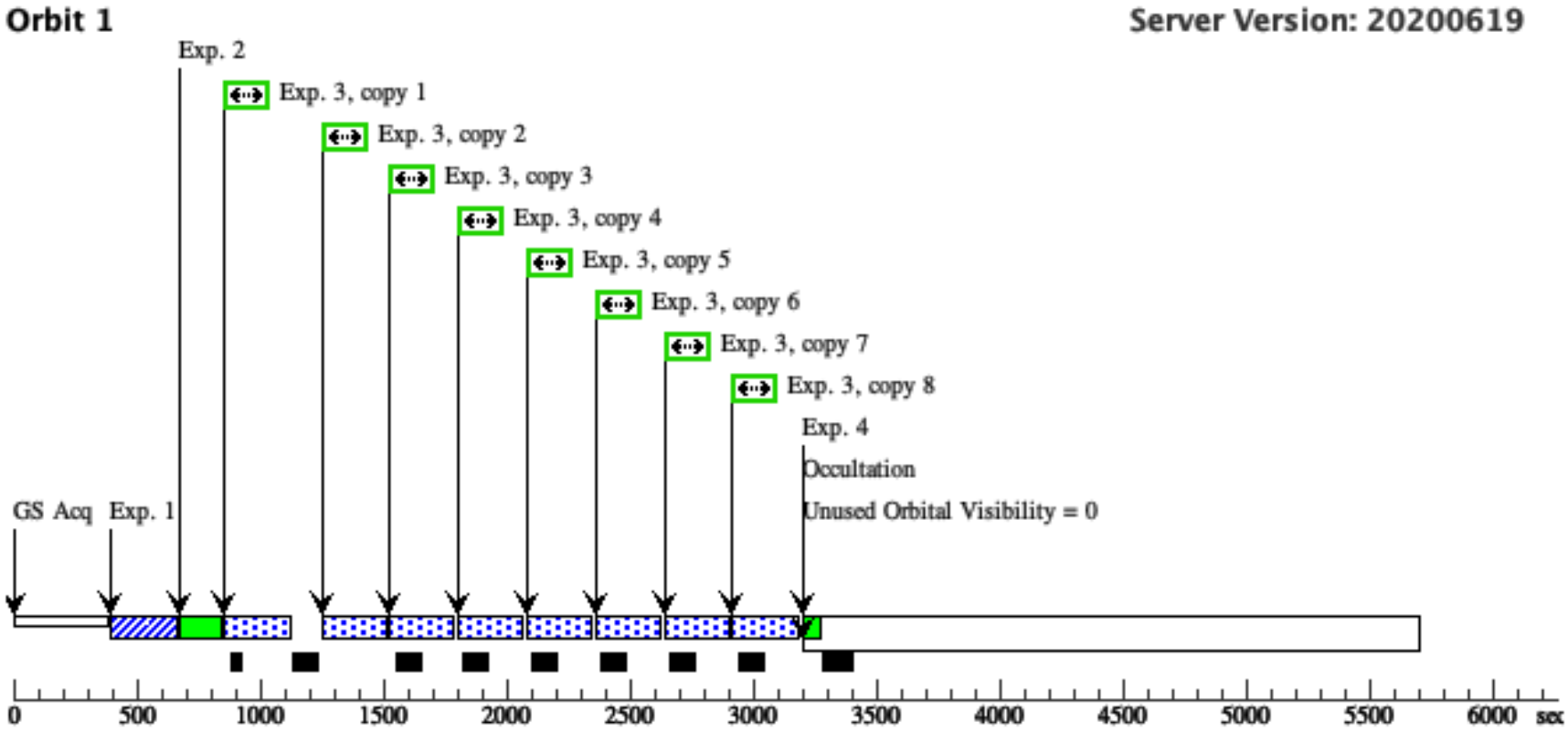

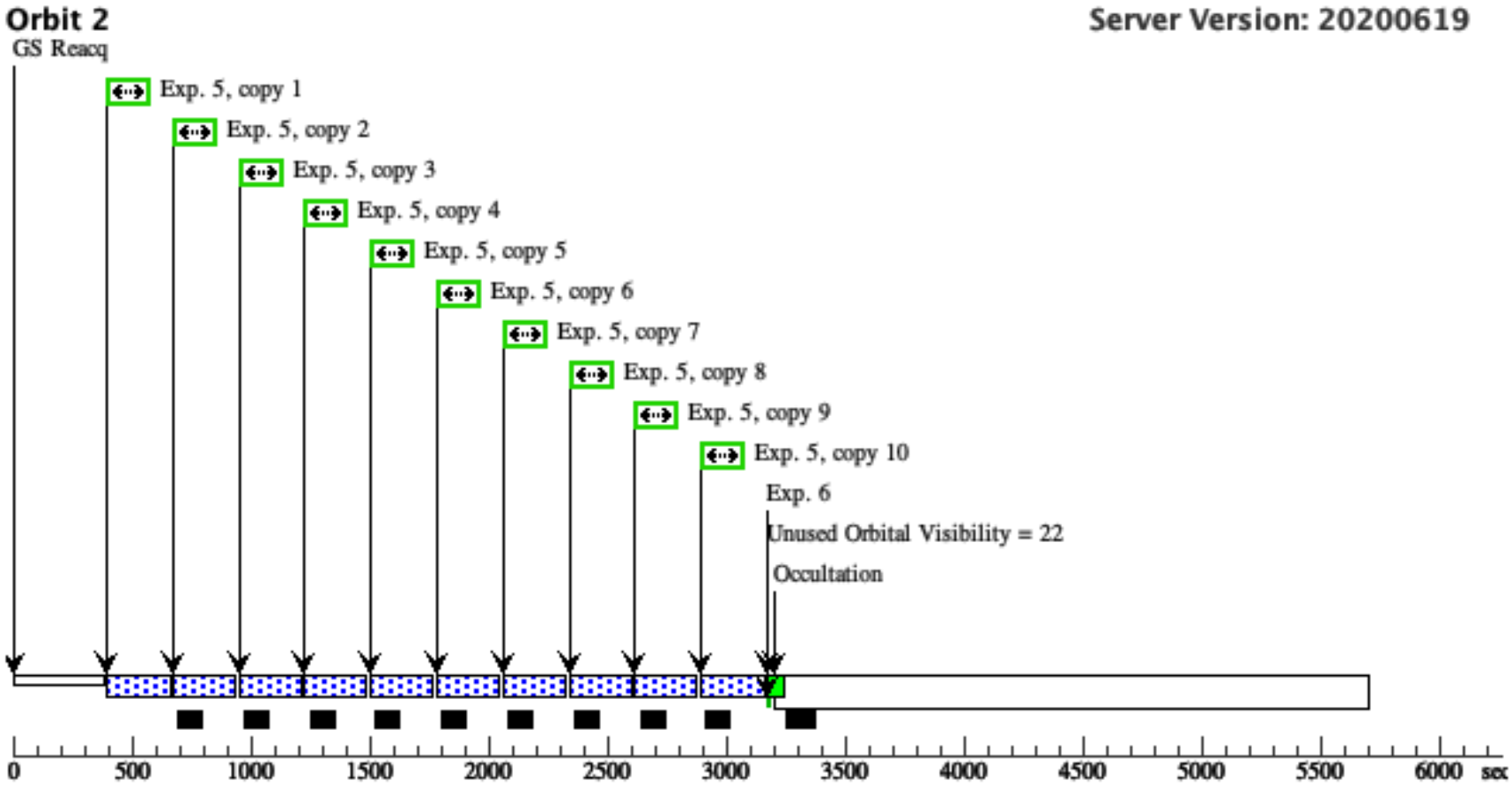
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Exp. 6
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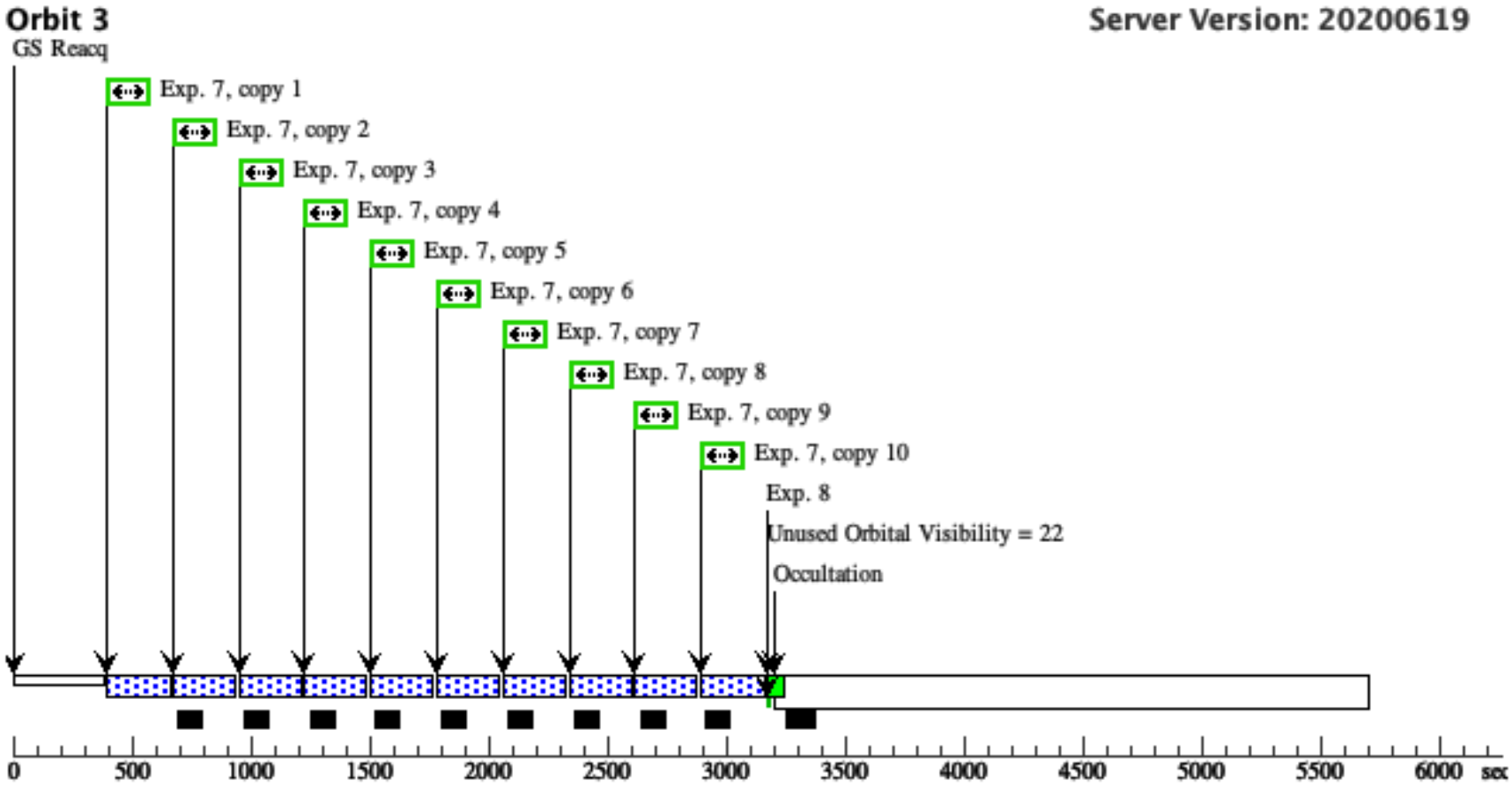
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Exp. 8
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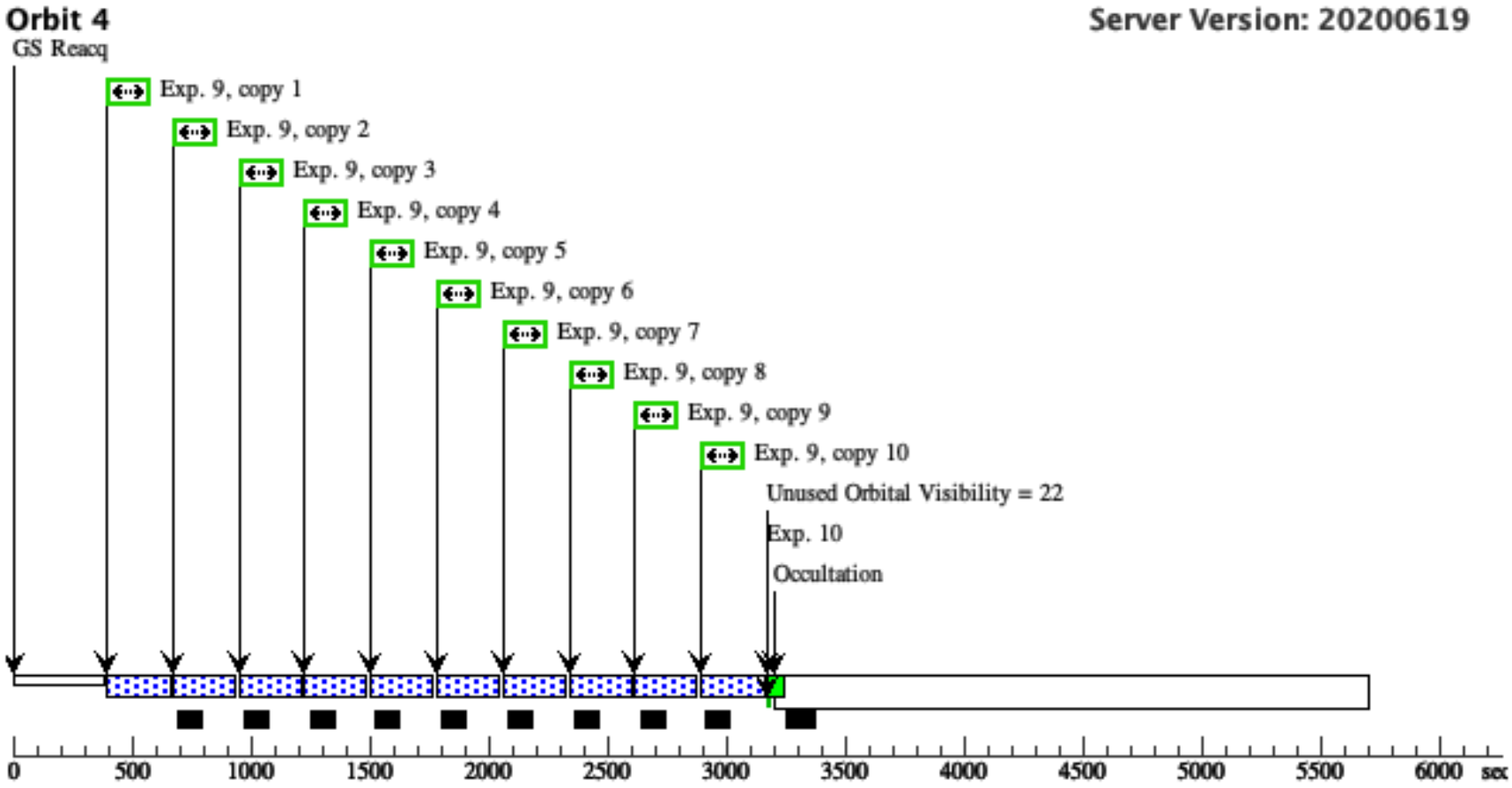
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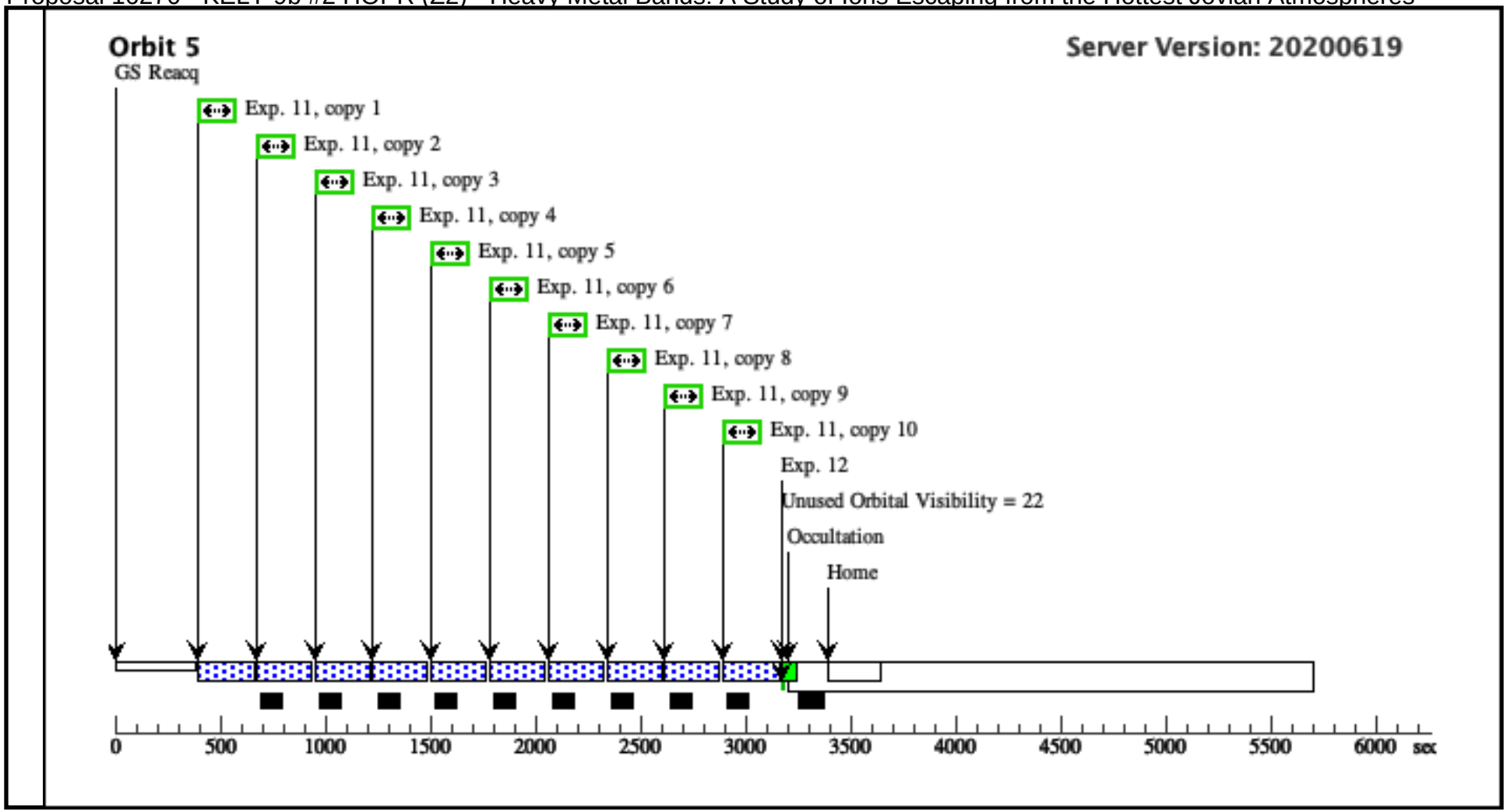
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