12011 - Magnetic Heating of the Outer Atmospheres of Very Low Mass Dwarfs

Cycle: 17, Proposal Category: GO

(Availability Mode: AVAILABLE)

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	(2) LHS2065	COS/FUV	5	28-Jul-2010 11:23:10.0	yes
02	(1) LHS3003	COS/FUV	3	28-Jul-2010 11:23:12.0	yes
03	(3) LHS3003-UPDATE	COS/FUV	2	28-Jul-2010 11:23:15.0	yes
04	(4) LHS2065-UPDATE	COS/FUV	4	28-Jul-2010 11:23:17.0	yes

14 Total Orbits Used

ABSTRACT

The detections of FUV and X-ray emissions from very low mass stars and brown dwarfs have confirmed that stellar magnetic activity can survive even at these low stellar masses. The emissions are qualitatively similar to those from active stars, despite the dramatic differences between the characteristics of an ultracool (>M7) stellar atmosphere and those of earlier type cool stars. It is currently an open question how the structures and

magnetic heating which exists in these very low mass stars compare with those seen in higher mass active stars. We propose to take Chandra and HST/COS spectra of two nearby active very low mass stars in order to determine the effect that these large-scale fields have on transition region and coronal structures.

OBSERVING DESCRIPTION

We will observe two targets, both nearby late M dwarfs (LHS3003 and LHS 2065) which have shown evidence for chromospheric and coronal activity. Exposure time requests for COS G140L FUV spectra are based on existing STIS G140L spectra of VB8 and LHS 2065 which were reported in Hawley & Johns-Krull (2003). The STIS spectra were designed to obtain a detection of the C IV line flux in order to compare chromospheric-transition region scaling relations found in earlier type M stars. The measured Halpha flux for LHS 3003 is similar to that of VB8 (1.4e-14 erg/cm2/s for LHS 3003 vs. 2e-14 for VB8), and we expect that the extrapolation to C IV flux for LHS 3003 will also be similar to VB 8. The focus on the present proposal is to investigate the structures producing both transition region and coronal emission, and for this purpose we seek a deeper exposure of the FUV spectrum to explore the several diagnostics of transition region emission which exist -- N V, Si IV, and C IV. We seek a peak SNR of 10 and the C IV line, which will enable more significant detection of not just C IV but also N V and Si IV and other weak lines in this part of the spectrum. The preferred format for COS observations is TIME-TAG mode, so we will be sensitive to any flare-like variations. Because variability in both transition region and coronal plasmas is expected, we require that the Chandra and HST/COS observations overlap.

Visit

Proposal 12011, Visit 01, failed Wed Jul 28 15:23:19 GMT 2010

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 01) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 01) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	LHS2065	RA: 08 53 36.2000 (133.4008333d)	Proper Motion RA: -0.035564s/yr	V=18.4	Reference Frame: ICRS
		Dec: -03 29 32.10 (-3.49225d)	Proper Motion Dec: -0.211"/yr		
		Equinox: J2000	Parallax: 0.1173"		
			Epoch of Position: 2000		

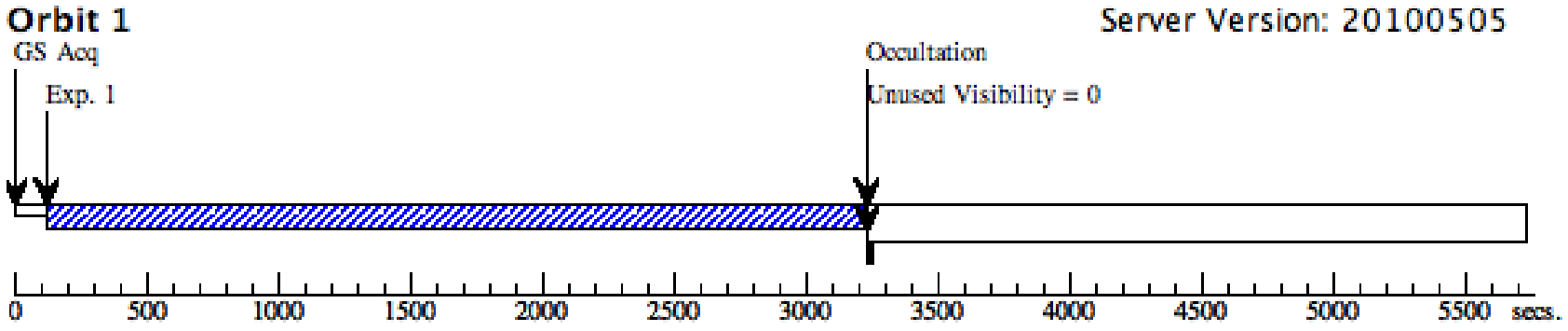
Comments: coordinates are from epoch 2000, ICRS reference frame, taken from SIMBAD. Proper motion is taken from Cruz et al. 2007 (AJ 133, 2258): -0.501 arcseconds per year in RA, -0.202 arcsec/year in DEC, and converted to the appropriate units here. Parallax is taken from Reid & Cruz 2002 (AJ 123, 2806).

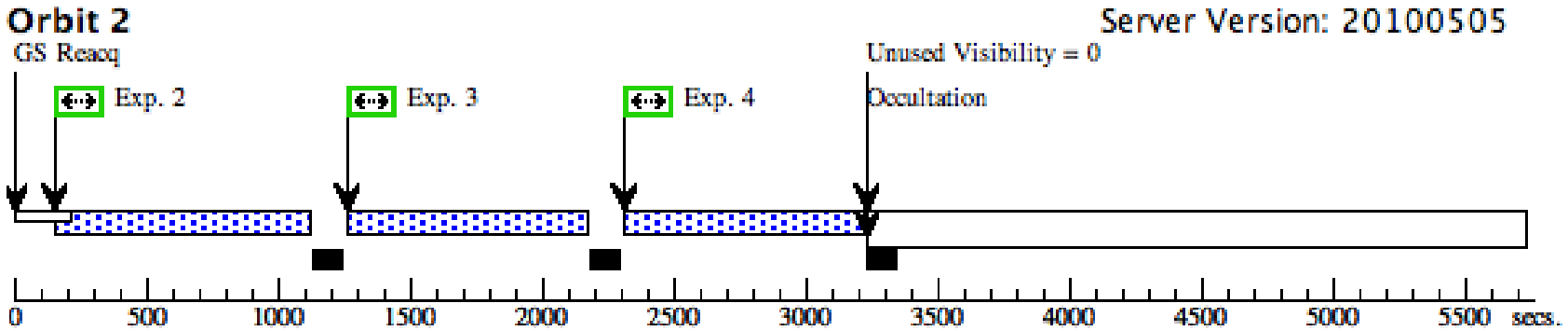
Exposures

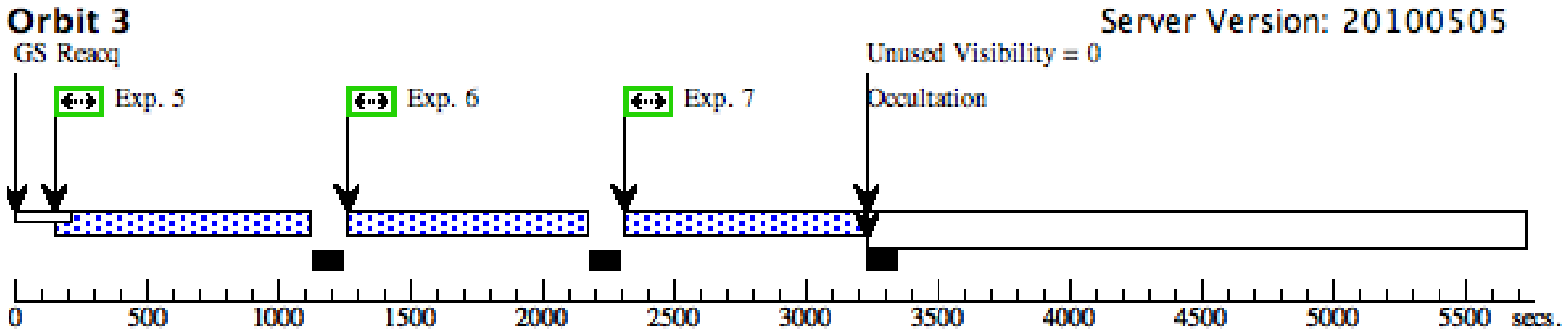
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ/SEARCH -- LHS 2065	(2) LHS2065	COS/FUV, ACQ/SEARCH, PSA	G140L 1230 A	STEP-SIZE=1.767; SCAN-SIZE=3; CENTER=BRIGHTEST			289.4 Secs *[==>]*	***[1]***
	Comments: Target acquisition uses a strategy of FUV dispersed light in an ACQ/SEARCH. The target is both nearby (d=8.5 pc) with a high proper motion, and faint (V=18.4). No NUV fluxes exist for us to check the validity of an NUV imaging target acquisition, so we use the detected FUV spectrum from a STIS G140L exposure (reported in Hawley & Johns-Krull 2003 ApJ 588, L109). The COS ETC gives a source count rate of 0.123 cps (COS188561), and we estimate that in 289.5 seconds, there should be about 36 source photons. The target acquisition strategy uses a 1.767" step size in a 3x3 spiral pattern, with centering on the brightest step. This uses up an entire orbit. *We have checked the target & field for BOP issues. The BOT returns 2 safe objects and no unknown/unsafe objects in the field. The target has been cleared using a STIS G140L 52x0.2 slit. We have also checked GALEX NUV and FUV intensity maps, and there are no bright sources within a 43" diameter macroaperture from the target. Note that Simbad lists this target as a flare star. Given its late spectral type (M9) and intrinsic faintness (V=18.5) any variability will not present a BOP concern.*								
2	FP1 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			853. Secs *[==>]*	***[2]***
3	FP2 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			853. Secs *[==>]*	***[2]***
4	FP3 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			852. Secs *[==>]*	***[2]***
5	FP1 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			853. Secs *[==>]*	***[3]***
6	FP2 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			853. Secs *[==>]*	***[3]***
7	FP3 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			852. Secs *[==>]*	***[3]***
8	FP1 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			853. Secs *[==>]*	***[4]***
9	FP2 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			853. Secs *[==>]*	***[4]***
10	FP3 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			852. Secs *[==>]*	***[4]***

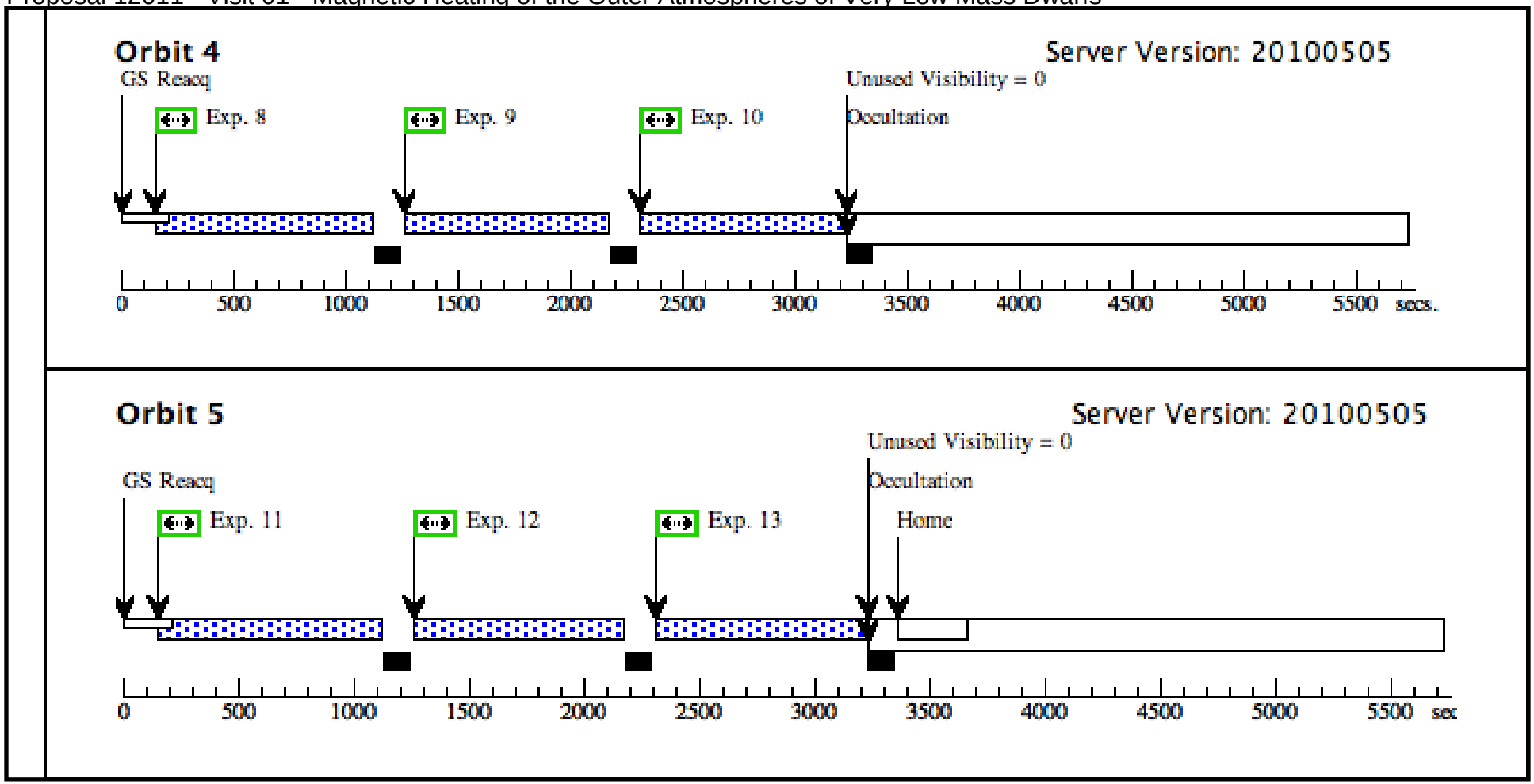
	11	FP1 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1	853. Secs *[==>]*	 ***[5]***
	12	FP2 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2	853. Secs *[==>]*	 ***[5]***
	13	FP3 -- LHS 2065	(2) LHS2065	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3	852. Secs *[==>]*	 ***[5]***

Orbit Structure





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secs.
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Occultation
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Exp. 12
Exp. 13
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5500
sec

Visit

Proposal 12011, Visit 02, failed Wed Jul 28 15:23:19 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	LHS3003	RA: 14 56 38.3000 (224.1595833d)	Proper Motion RA: -0.034144s/yr	V=17.05	Reference Frame: ICRS
	Alt Name1: GJ3877	Dec: -28 09 47.40 (-28.16317d)	Proper Motion Dec: -0.814"/yr		
	Alt Name2: NLTT38829	Equinox: J2000	Parallax: 0.1578"		
			Epoch of Position: 2000		

Comments: coordinates are from epoch 2000, ICRS reference frame, taken from SIMBAD. Proper motion is taken from Cruz et al. 2007 (AJ 133, 2258): -0.509 arcseconds per year in RA, -0.814 arcsec/year in DEC, and converted to the appropriate units here. Parallax is taken from Reid & Cruz 2002 (AJ 123, 2806).

Exposures

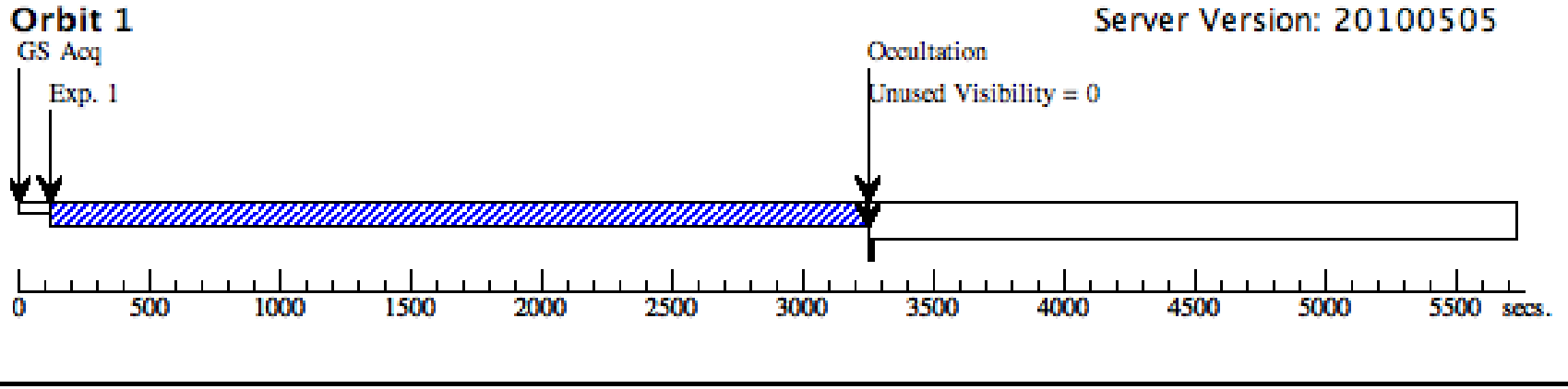
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ/SEARCH -- LHS3003	(1) LHS3003	COS/FUV, ACQ/SEARCH, PSA	G140L 1230 A	STEP-SIZE=1.767; SCAN-SIZE=3; CENTER=BRIGHTEST			292. Secs *[==>]*	*[1]*

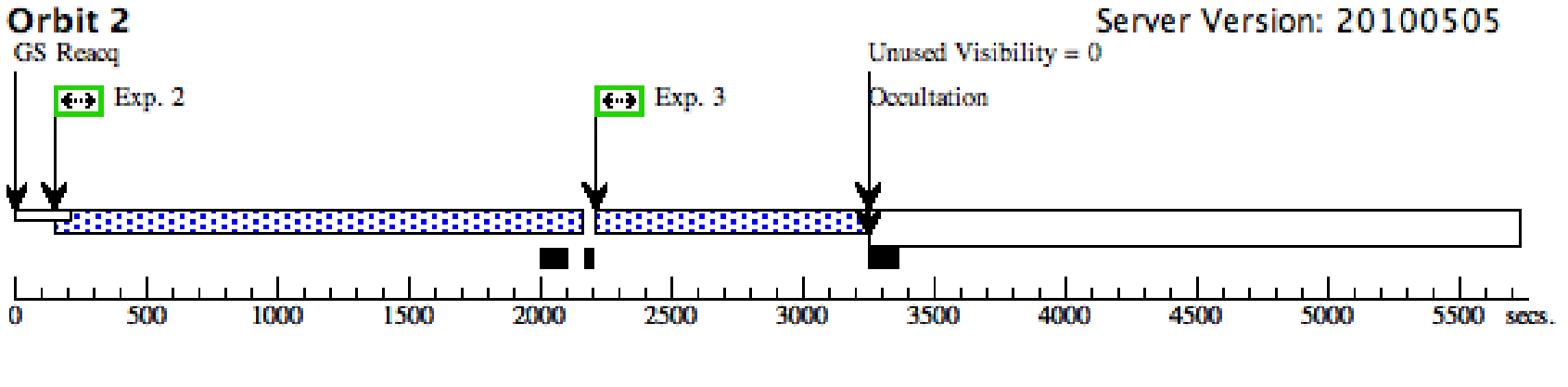
Comments: Our target acquisition strategy for this target utilizes dispersed light FUV spectra. The target is both nearby (d=6.7pc), with a large proper motion, and faint (V=17.05). There are no FUV extant FUV spectra of this object, but we expect its behavior to be similar to that of VB8, for which an FUV/STIS/G140L spectrum exists (reported in Hawley & Johns-Krull 2003 ApJ 588, L109), and we use that to estimate exposure times for the target acquisition. The COS ETC gives a SNR=5.2 for an exposure time of 293 seconds, using a dispersed light acqusition (COS.A225999). The target acquisition strategy uses a 1.767" step size in a 3x3 spiral pattern, with centering on the brightest step. This uses up an entire orbit.

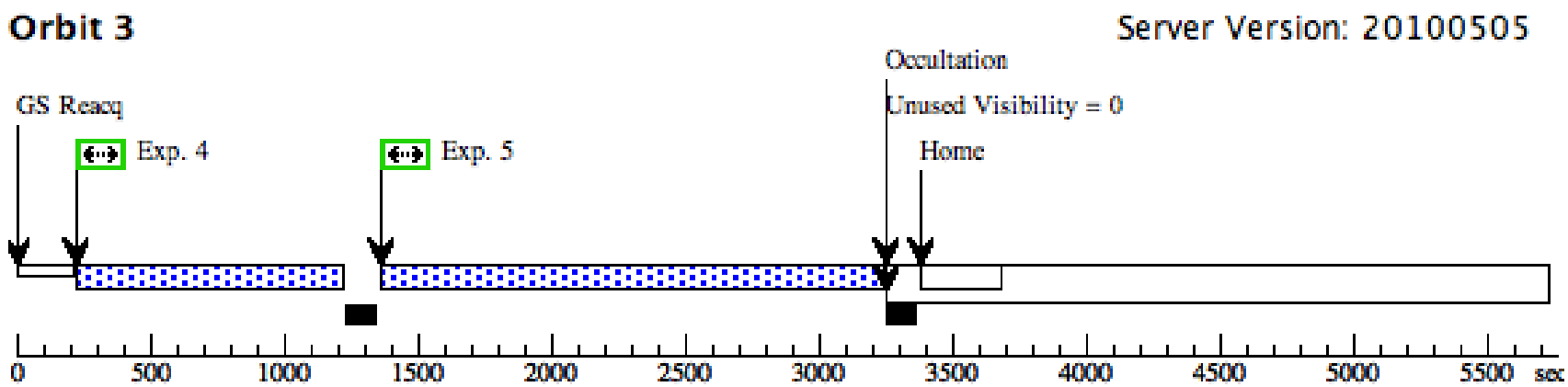
We have checked the target & field for BOP issues. The BOT returns 7 safe objects and no unsafe objects in the field. The target has been cleared using low dispersion large aperture IUE fluxes (LWP 31205 and SWP 55370). Note that Simbad lists this target as a flare star. We can find no published references to flaring activity on this star, and given its late spectral type (M7) and intrinsic faintness (V=17.05) any variability will not present a BOP concern.

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2	FP1--LHS3003	(1) LHS3003	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=1750.; FP-POS=1; FLASH=YES			1886. Secs *[==>]*	*[2]*
3	FP2--LHS3003	(1) LHS3003	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=950.; FP-POS=2; FLASH=YES			976. Secs *[==>]*	*[2]*
4	FP2--LHS3003	(1) LHS3003	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=930.; FP-POS=2; FLASH=YES			953. Secs *[==>]*	*[3]*
5	FP3--LHS3003	(1) LHS3003	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=1800.; FP-POS=3; FLASH=YES			1823. Secs *[==>]*	*[3]*

Orbit Structure







Visit

Proposal 12011, Visit 03 Wed Jul 28 15:23:19 GMT 2010

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 03) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 03) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

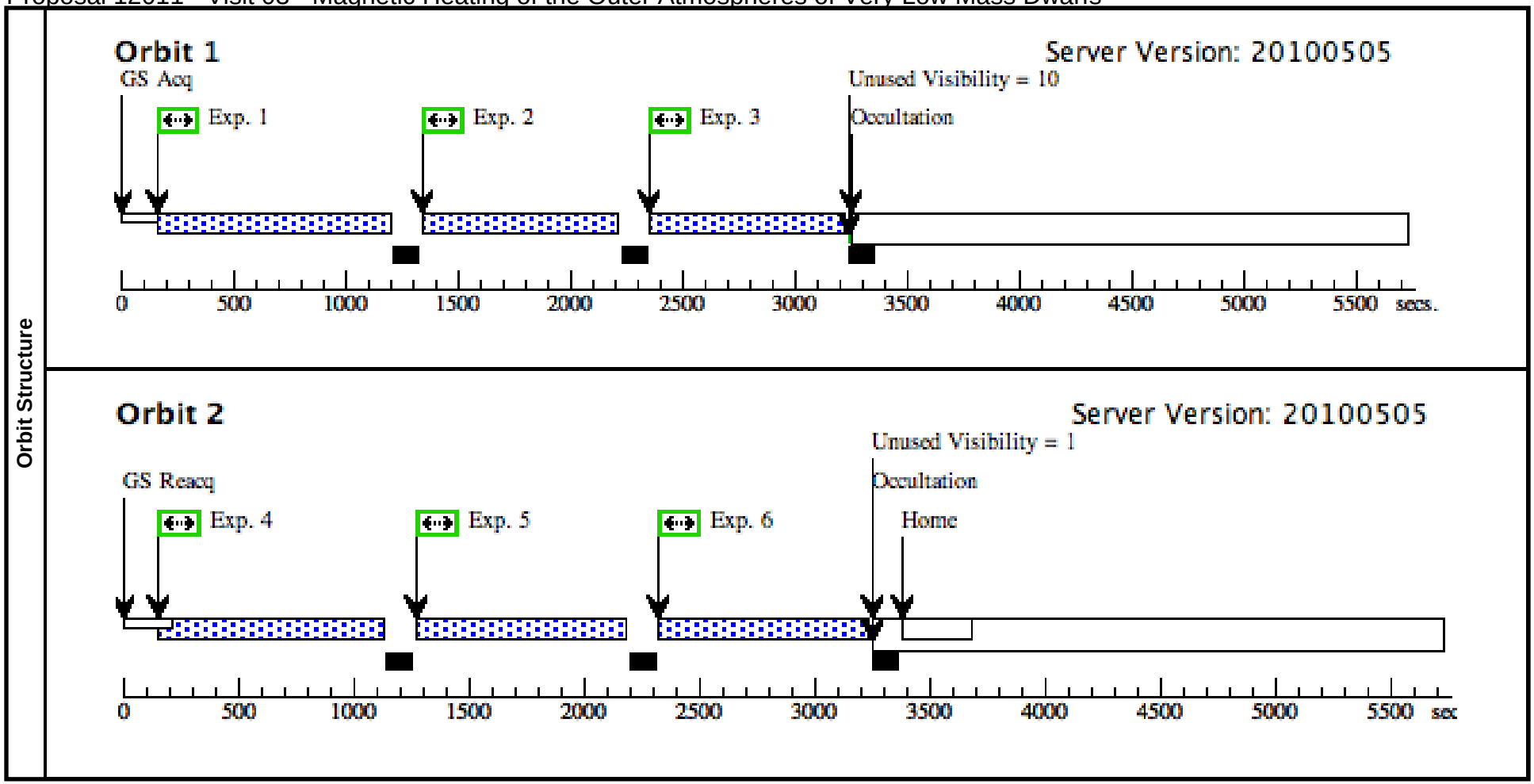
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	LHS3003-UPDATE Alt Name1: GJ3877 Alt Name2: NLTT38829	RA: 14 56 38.3100 (224.1596250d) Dec: -28 09 47.40 (-28.16317d) Equinox: J2000	Proper Motion RA: -0.03758288132314259s/yr Proper Motion Dec: -0.827"/yr Parallax: 0.1578" Epoch of Position: 1998.487	V=17.05	Reference Frame: ICRS

Comments: epoch of 2MASS coordinates are from the 2MASS point source catalog and are 06/27/1998, or 1998.487. Proper motion is taken from Salim & Gould (2003 ApJ 582, 1011): -0.497 arcseconds per year in RA, -0.827 arcsec/year in DEC. Parallax is taken from Reid & Cruz 2002 (AJ 123, 2806).

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=1			820. Secs *[==>]*	***[1]***
2		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=2			820. Secs *[==>]*	***[1]***
3		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=3			820. Secs *[==>]*	***[1]***
4		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=1			860. Secs *[==>]*	***[2]***
5		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=2			860. Secs *[==>]*	***[2]***
6		(3) LHS3003-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=3			860. Secs *[==>]*	***[2]***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secs.
Orbit 2
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Occultation
Exp. 4
Exp. 5
Exp. 6
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sec

Visit

Proposal 12011, Visit 04 Wed Jul 28 15:23:20 GMT 2010

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: (none)

Diagnostics

(Visit 04) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 04) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(Visit 04) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 04) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

Fixed Targets

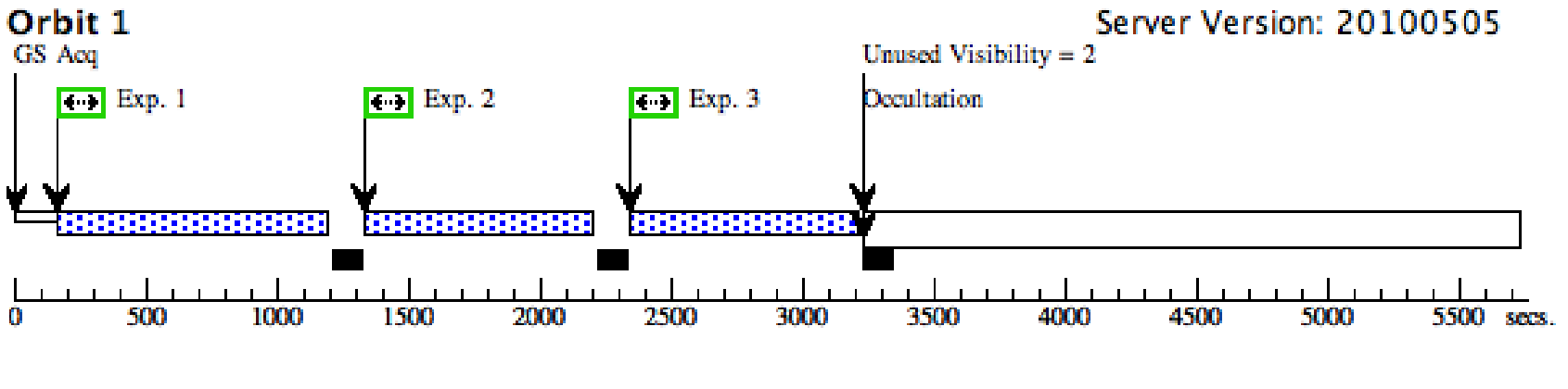
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	LHS2065-UPDATE Alt Name1: NLTT20475	RA: 08 53 36.2000 (133.4008333d) Dec: -03 29 32.11 (-3.49225d) Equinox: J2000	Proper Motion RA: -0.03352892841322303s/yr Proper Motion Dec: -0.211"/yr Parallax: 0.1173" Epoch of Position: 1998.986	V=18.4	Reference Frame: ICRS

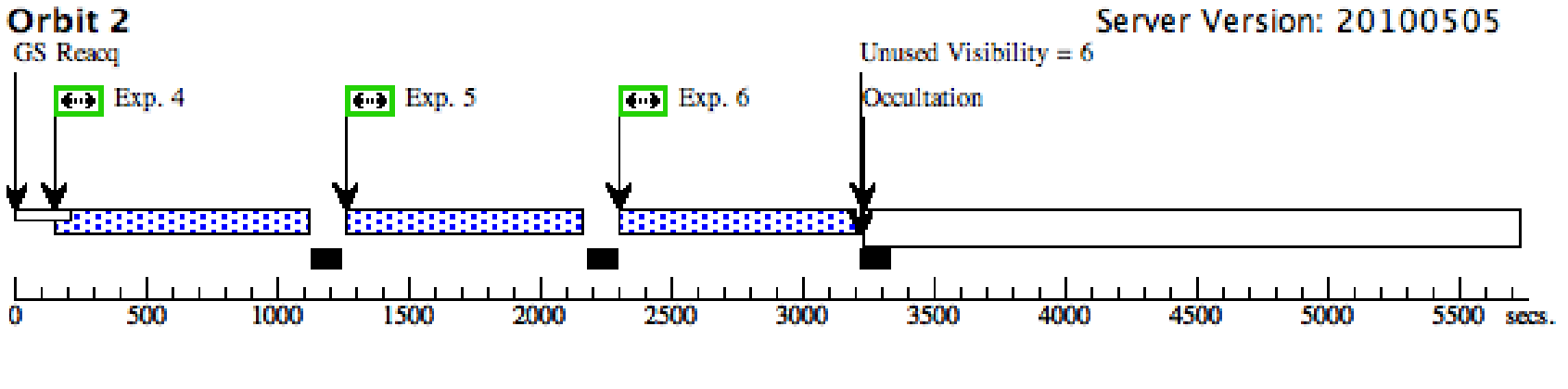
Comments: Epoch of 2MASS coordinates are from the 2MASS point source catalog and are 12/26/1998, or 1998.986. Proper motion is taken from Salim & Gould (2003 ApJ 582, 1011):-0.502 arcseconds per year in RA, -0.202 arcsec/year in DEC. Parallax is taken from Reid & Cruz 2002 (AJ 123, 2806).

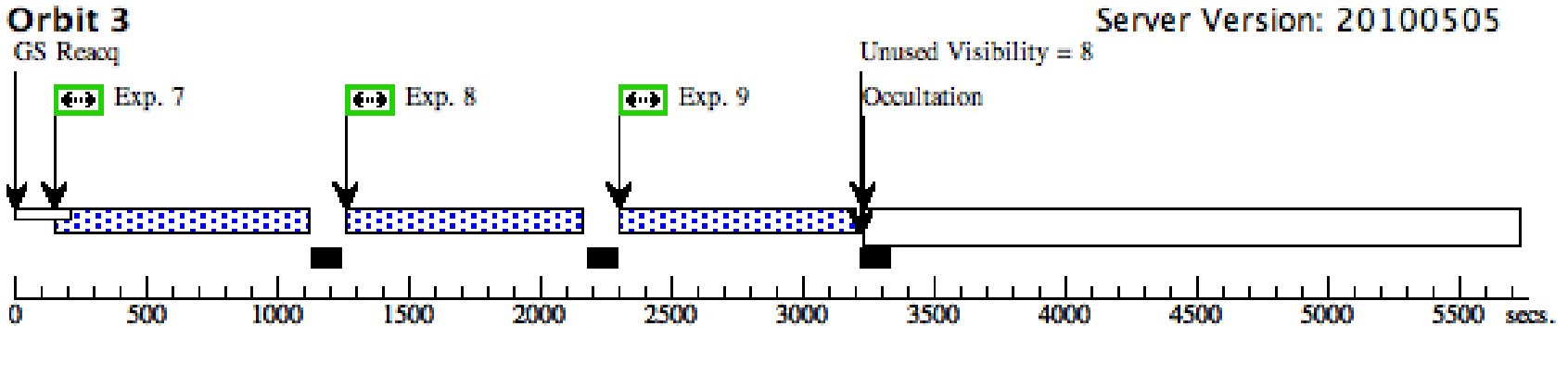
Exposures

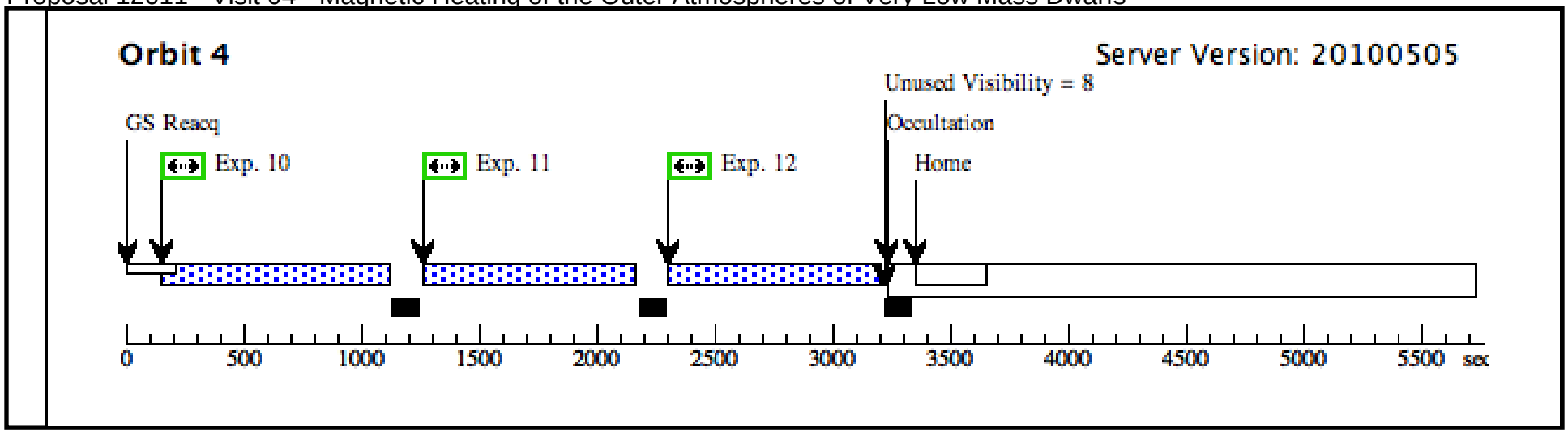
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=1			815. Secs *[==>]*	*[1]*
2		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=2			815. Secs *[==>]*	*[1]*
3		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=799.; FLASH=YES; FP-POS=3			815. Secs *[==>]*	*[1]*
4		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			852. Secs *[==>]*	*[2]*
5		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			850. Secs *[==>]*	*[2]*
6		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			850. Secs *[==>]*	*[2]*
7		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			850. Secs *[==>]*	*[3]*
8		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			850. Secs *[==>]*	*[3]*
9		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			850. Secs *[==>]*	*[3]*
10		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=1			850. Secs *[==>]*	*[4]*
11		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=2			850. Secs *[==>]*	*[4]*
12		(4) LHS2065-UPDATE	COS/FUV, TIME-TAG, PSA	G140L 1230 A	BUFFER-TIME=840.; FLASH=YES; FP-POS=3			850. Secs *[==>]*	*[4]*

Orbit Structure





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