15677 - Spectroscopy and Imaging of the Southern Crab Nebula

Cycle: 26, Proposal Category: GO/DD

(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) WRAY-16-147	WFC3/UVIS	3	14-Feb-2019 08:00:51.0	yes
02	(1) WRAY-16-147	WFC3/UVIS	3	14-Feb-2019 08:00:54.0	yes
21	(1) WRAY-16-147	STIS/CCD	3	14-Feb-2019 08:00:57.0	yes
22	(1) WRAY-16-147	STIS/CCD	4	14-Feb-2019 08:01:05.0	yes

13 Total Orbits Used

ABSTRACT

We will obtain WFC3 imaging of the Southern Crab Nebula (also known as WRAY-16-47 and Hen 2-104) with four narrowband filters to detect key nebular emission features. We will also obtain high-quality STIS spectra, which will cover the core of the nebula and one of the bright limbs of the ejecta.

OBSERVING DESCRIPTION

We will obtain high S/N images of the Southern Crab Nebula with 4 narrowband filters to detect key nebular emission features (F502N, F656N, F658N, F673N). This target has a bright central region, with much fainter extended structure, so there is some chance the central region may saturate in our long exposures. To mitigate this, we will also obtain some short exposures with these narrowband filters. This will ensure that we have unsaturated images of the central region, which should show nebular expansion relative to earlier WFPC2 images from 1999-2003. We will also obtain short exposures with two broadband filters (F475W, F606W) for continuum subtraction and star colors across the entire field. Each filter will consist of multiple dithered exposures which will be drizzle-combined to eliminate chip gaps, hot pixels, and cosmic rays. We specify a desirable WFC3 pointing with an orientation available in March 2019. We place the target on WFC3 chip 2 (UVIS2-FIX, with a slight offset applied) to avoid having window ghosts (internal reflections caused by other stars in the field) fall on the nebula. We use POS TARGs to merge this offset with dithers for the chip gap and improved sampling. The WFC3 went into safemode at the time of our Phase II program submission. So in an early version of this program we included alternate ACS imaging as ON HOLD visits to be used in case WFC3 is unavailable before our window closes at the end of March 2019. WFC3 later came out of safemode and these backup ACS visits have been removed, but could be swapped back in for the WFC3 visits if needed.

We will also obtain high-quality G430M and G750M spectra with STIS, which will cover the core of the nebula and one of the bright limbs of the ejecta. In order to maximize signal to noise in the spectrum, we will use a 0.5" slit (52x0.5). The velocities in the nebula are low enough that we do not expect using a smaller slit to reveal signicant structure in the 2-D spectrum, so we will sacrifice spectral resolution to maximize the number of photons from the extended source. The two gratings will allow us to construct a high quality spectrum spanning from H-beta to around 6700A. We estimate that 7 orbits should be sufficient to obtain high quality spectra in both G430M and G750M using the 0.5" slit. We will include CR-SPLITs for cosmic ray removal, and dithering for hot pixel filtering during data processing. There are limited observations of this target in the archive, but they are sufficient to enable detailed integration time calculations. A STIS spectrum taken with the G750M grating for HST program 9050 (PI Balick) at a short exposure of 280s shows prominent features include H-alpha and the [NII] doublet, as well as He I 6678 and the [SII] doublet at 6717A and 6731A to the right of He I 6678. Even in this short exposure, the diffuse emission from H-alpha and the [NII] doublet is visible, extending above and below the central star along the spatial direction. Flux measurements in each line are also available from ground based spectra (de Freitas Pacheco & Costa, 1996) which cover the range 3600-7000A. We specify a desirable orientation of the STIS slit (52x0.5) which is available before April 2019.

Visit

Proposal 15677, WFC3 F502N F656N F475W (01), implementation Thu Feb 14 13:01:07 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 330D TO 340 D; BEFORE 25-MAR-2019:00:00:00

Fixed Targets

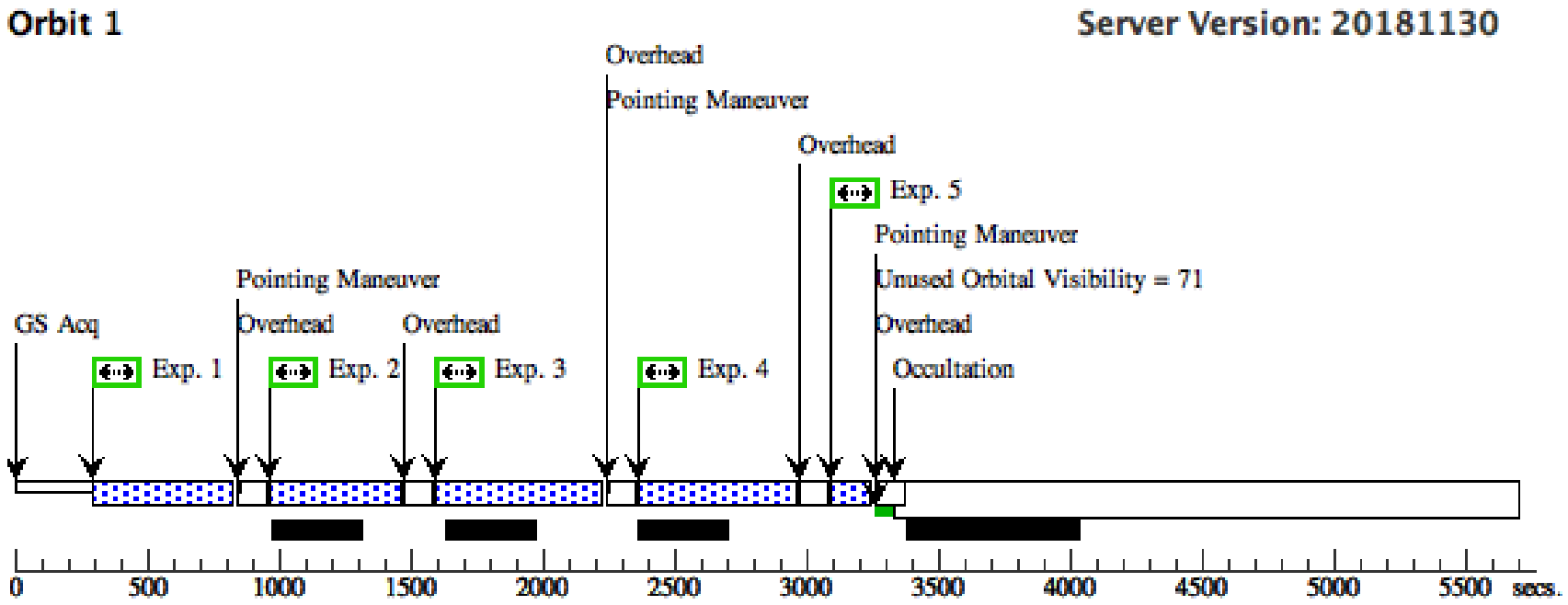
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WRAY-16-147	RA: 14 11 52.0467 (212.9668612d) Dec: -51 26 24.23 (-51.44006d) Equinox: J2000	Proper Motion RA: -9.312304956129221E-4 sec of time/yr Proper Motion Dec: -0.003019000064341526 arcsec/yr Epoch of Position: 2015.5	V=14.2	Reference Frame: ICRS

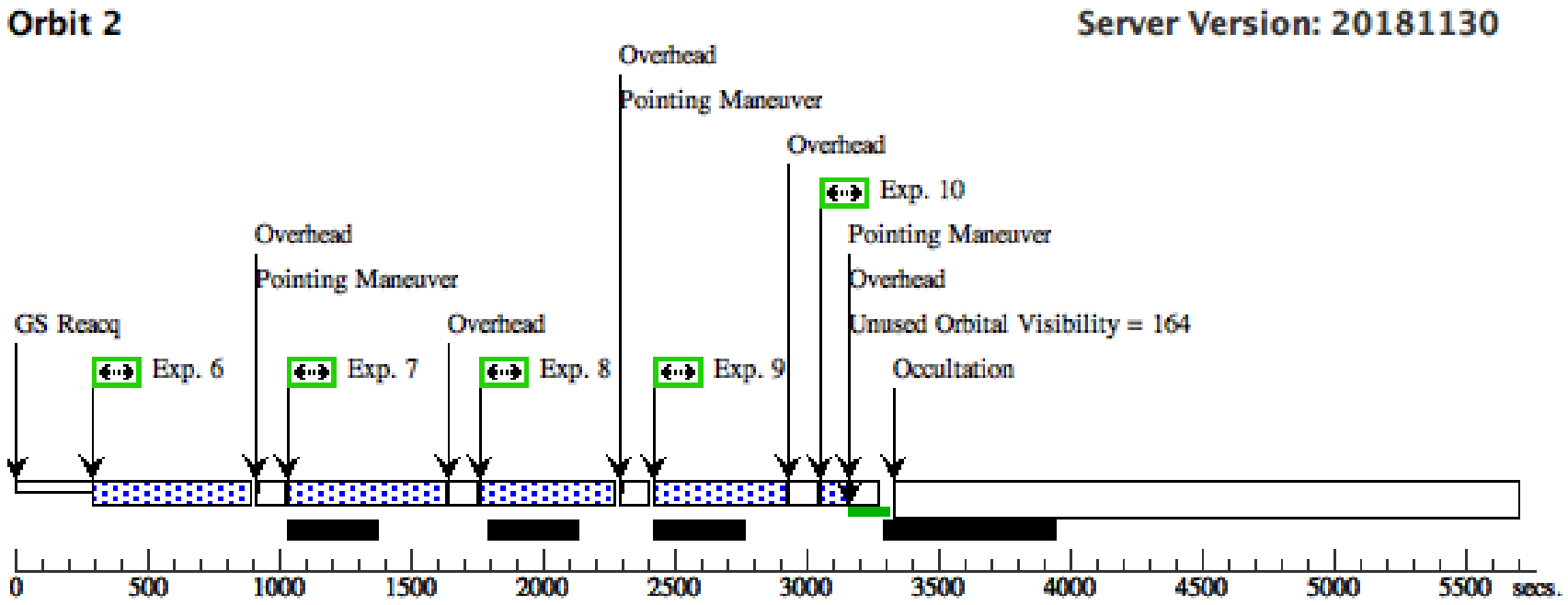
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CIRCUMSTELLAR MATTER, EMISSION LINE NEBULA, SYMBIOTIC STAR]
Extended=YES

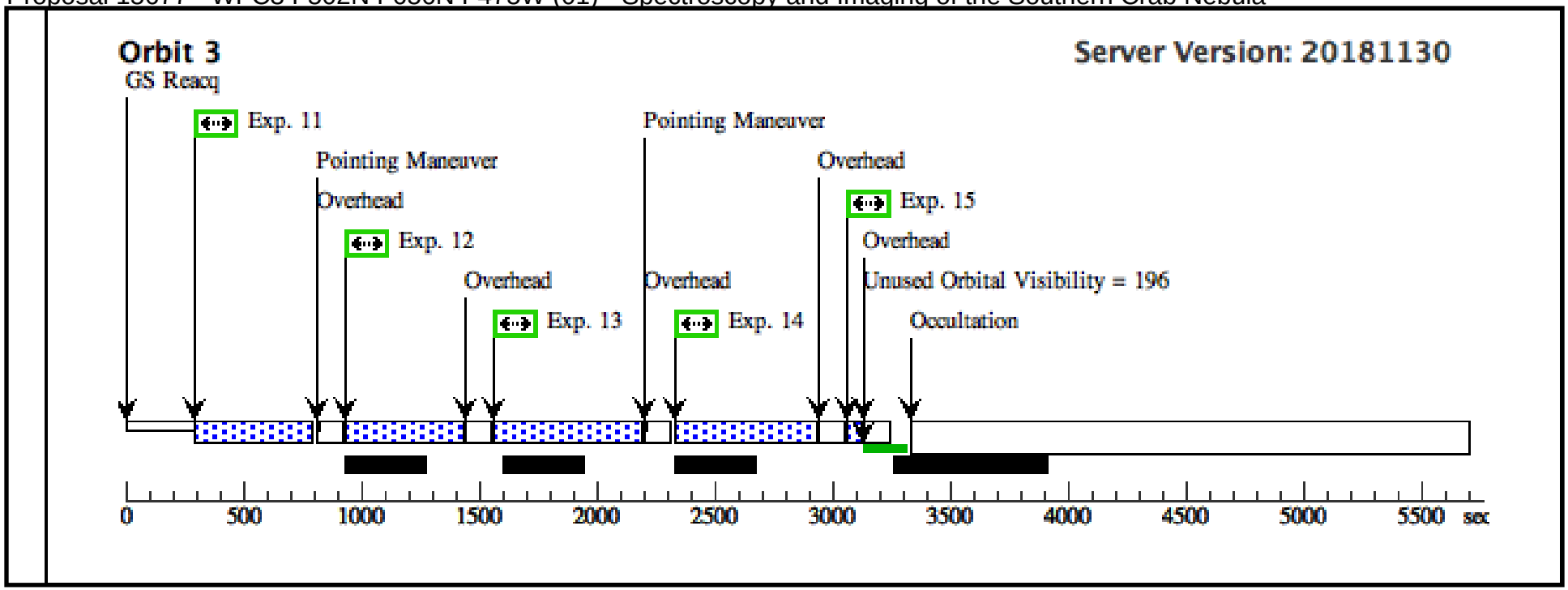
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		500 Secs (500 Secs) *[==>]*	*[1]*
2		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,15.4		500 Secs (500 Secs) *[==>]*	*[1]*
3		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,15.4		600 Secs (600 Secs) *[==>]*	*[1]*
4		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		600 Secs (600 Secs) *[==>]*	*[1]*
5		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		150 Secs (150 Secs) *[==>]*	*[1]*
6		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		600 Secs (600 Secs) *[==>]*	*[2]*
7		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,17.4		600 Secs (600 Secs) *[==>]*	*[2]*
8		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,17.4		500 Secs (500 Secs) *[==>]*	*[2]*
9		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		500 Secs (500 Secs) *[==>]*	*[2]*
10		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		100 Secs (100 Secs) *[==>]*	*[2]*
11		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		500 Secs (500 Secs) *[==>]*	*[3]*
12		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F656N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,19.4		500 Secs (500 Secs) *[==>]*	*[3]*
13		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,19.4		600 Secs (600 Secs) *[==>]*	*[3]*
14		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F502N	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		600 Secs (600 Secs) *[==>]*	*[3]*
15		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F475W	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		30 Secs (30 Secs) *[==>]*	*[3]*

Orbit Structure




Orbit 2
Server Version: 20181130
Overhead
Pointing Maneuver
Overhead
Exp. 10
Pointing Maneuver
Overhead
Unused Orbital Visibility = 164
Occultation
Overhead
Pointing Maneuver
Overhead
GS Reacq
Exp. 6
Exp. 7
Exp. 8
Exp. 9
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20181130
GS Reacq
Exp. 11
Pointing Maneuver
Overhead
Exp. 12
Overhead
Exp. 13
Pointing Maneuver
Overhead
Exp. 14
Overhead
Exp. 15
Overhead
Unused Orbital Visibility = 196
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15677, WFC3 F658N F673N F606W (02), implementation Thu Feb 14 13:01:07 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 330D TO 340 D; BEFORE 25-MAR-2019:00:00:00

Fixed Targets

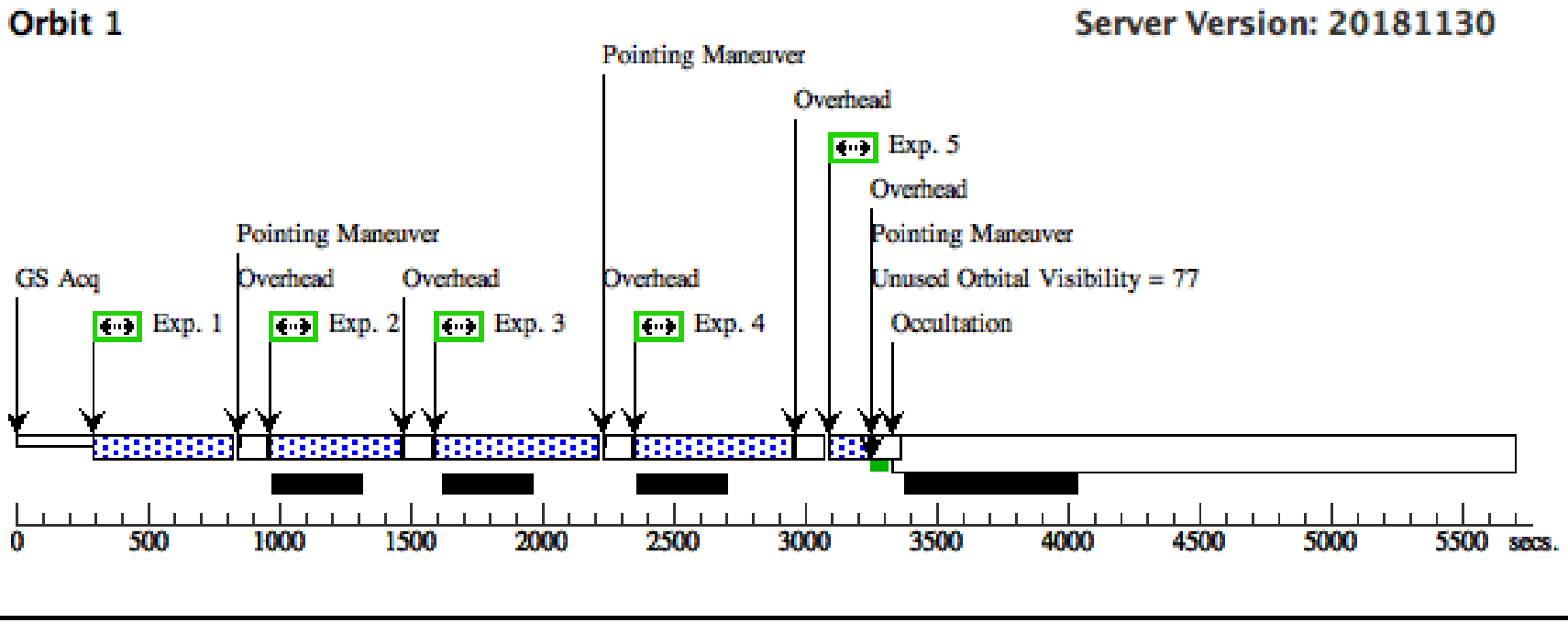
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WRAY-16-147	RA: 14 11 52.0467 (212.9668612d) Dec: -51 26 24.23 (-51.44006d) Equinox: J2000	Proper Motion RA: -9.312304956129221E-4 sec of time/yr Proper Motion Dec: -0.003019000064341526 arcsec/yr Epoch of Position: 2015.5	V=14.2	Reference Frame: ICRS

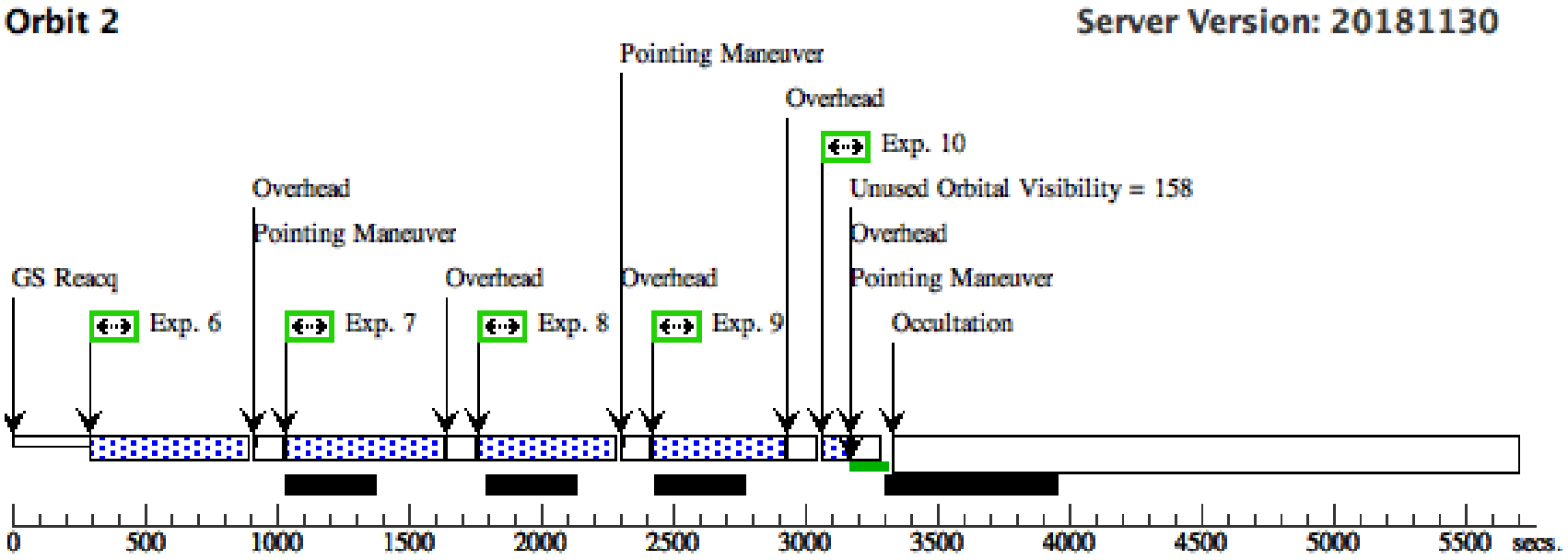
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CIRCUMSTELLAR MATTER, EMISSION LINE NEBULA, SYMBIOTIC STAR]
Extended=YES

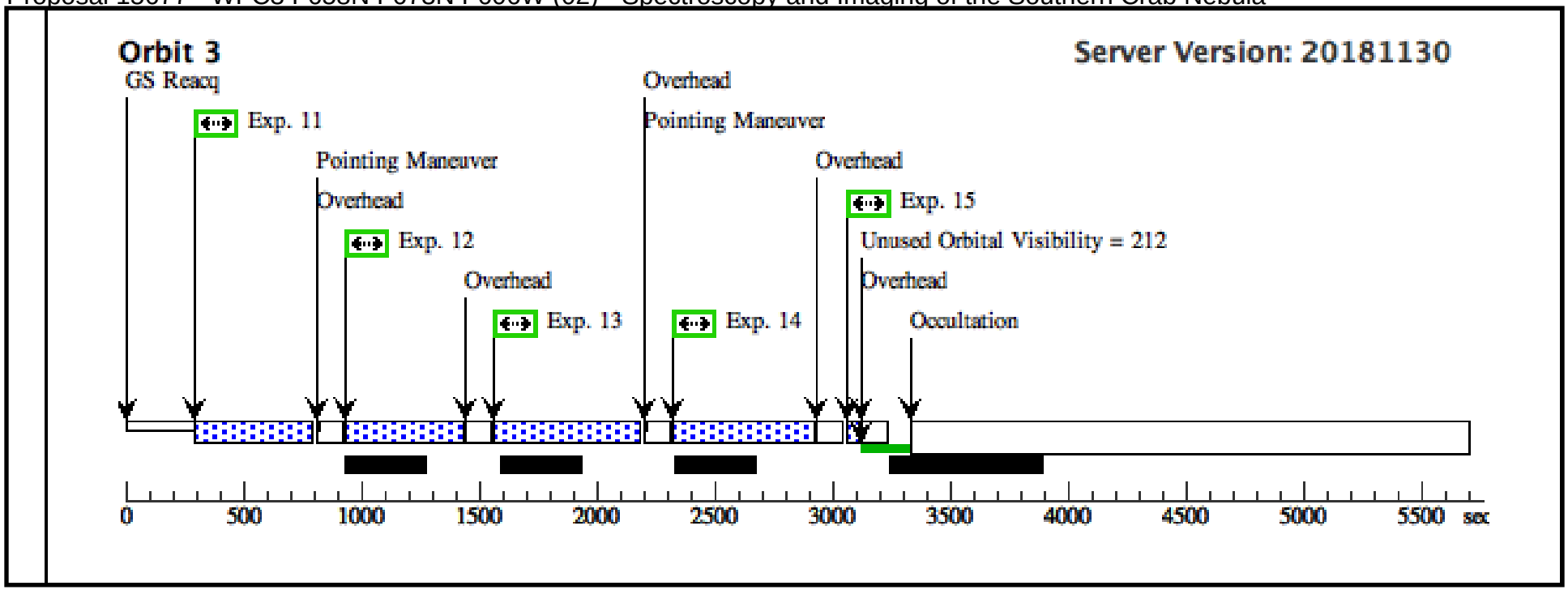
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		500 Secs (500 Secs) *[==>]*	*[1]*
2		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,15.4		500 Secs (500 Secs) *[==>]*	*[1]*
3		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,15.4		600 Secs (600 Secs) *[==>]*	*[1]*
4		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		600 Secs (600 Secs) *[==>]*	*[1]*
5		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0,15		150 Secs (150 Secs) *[==>]*	*[1]*
6		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		600 Secs (600 Secs) *[==>]*	*[2]*
7		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,17.4		600 Secs (600 Secs) *[==>]*	*[2]*
8		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,17.4		500 Secs (500 Secs) *[==>]*	*[2]*
9		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		500 Secs (500 Secs) *[==>]*	*[2]*
10		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0,17		100 Secs (100 Secs) *[==>]*	*[2]*
11		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		500 Secs (500 Secs) *[==>]*	*[3]*
12		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F658N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,19.4		500 Secs (500 Secs) *[==>]*	*[3]*
13		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0.4,19.4		600 Secs (600 Secs) *[==>]*	*[3]*
14		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F673N	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		600 Secs (600 Secs) *[==>]*	*[3]*
15		(1) WRAY-16-147	WFC3/UVIS, ACCUM, UVIS2-FIX	F606W	CR-SPLIT=NO; FLASH=12	POS TARG 0,19		20 Secs (20 Secs) *[==>]*	*[3]*

Orbit Structure






Orbit 3
Server Version: 20181130
GS Reacq
Exp. 11
Pointing Maneuver
Overhead
Exp. 12
Overhead
Exp. 13
Overhead
Pointing Maneuver
Exp. 14
Overhead
Exp. 15
Unused Orbital Visibility = 212
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15677, STIS G430M (21), implementation Thu Feb 14 13:01:07 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 280D TO 300 D; BEFORE 25-MAR-2019:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2-5)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.761655	Center Pattern=true		
	Line Spacing=			

Fixed Targets

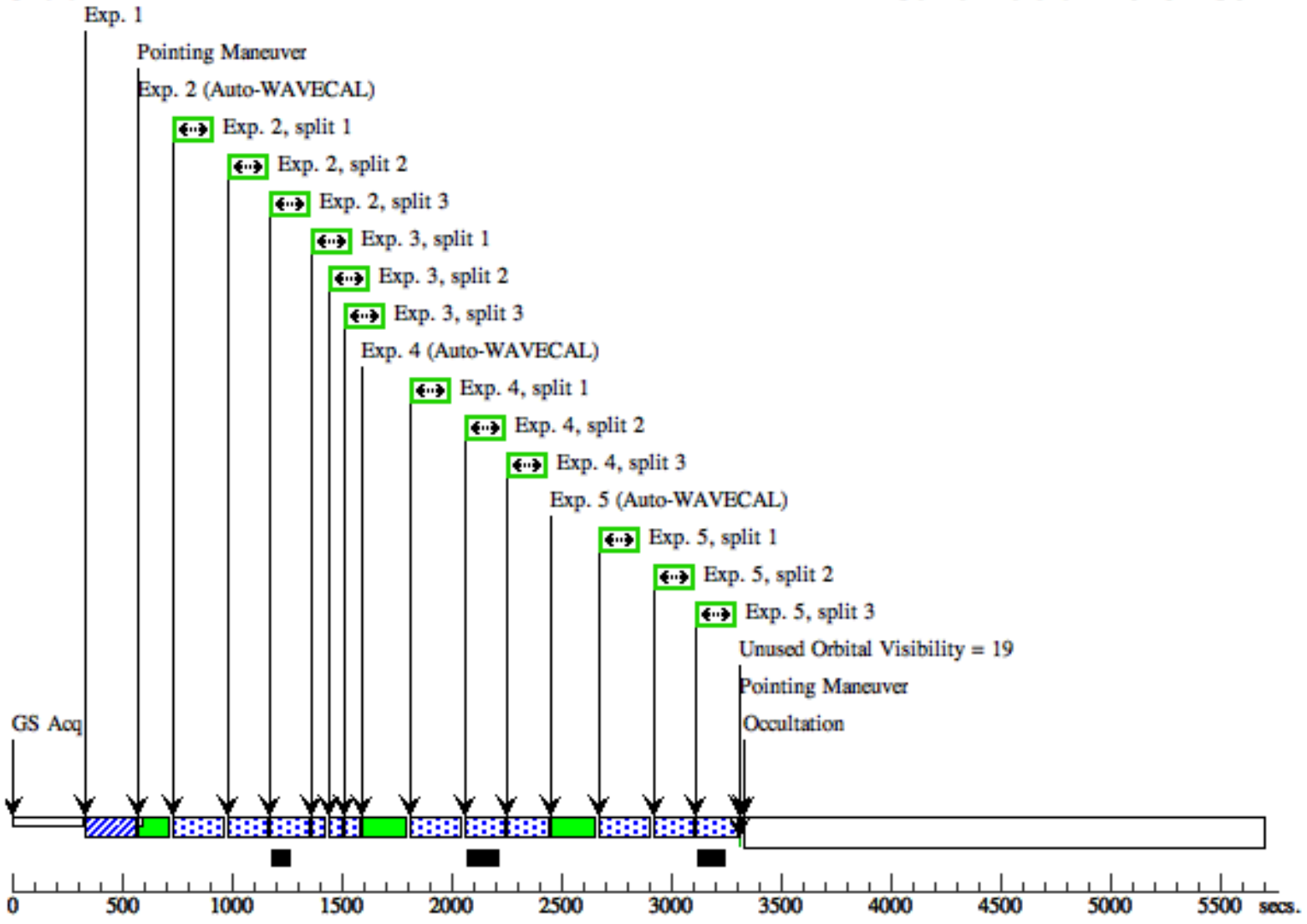
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WRAY-16-147	RA: 14 11 52.0467 (212.9668612d) Dec: -51 26 24.23 (-51.44006d) Equinox: J2000	Proper Motion RA: -9.312304956129221E-4 sec of time/yr Proper Motion Dec: -0.003019000064341526 arcsec/yr Epoch of Position: 2015.5	V=14.2	Reference Frame: ICRS

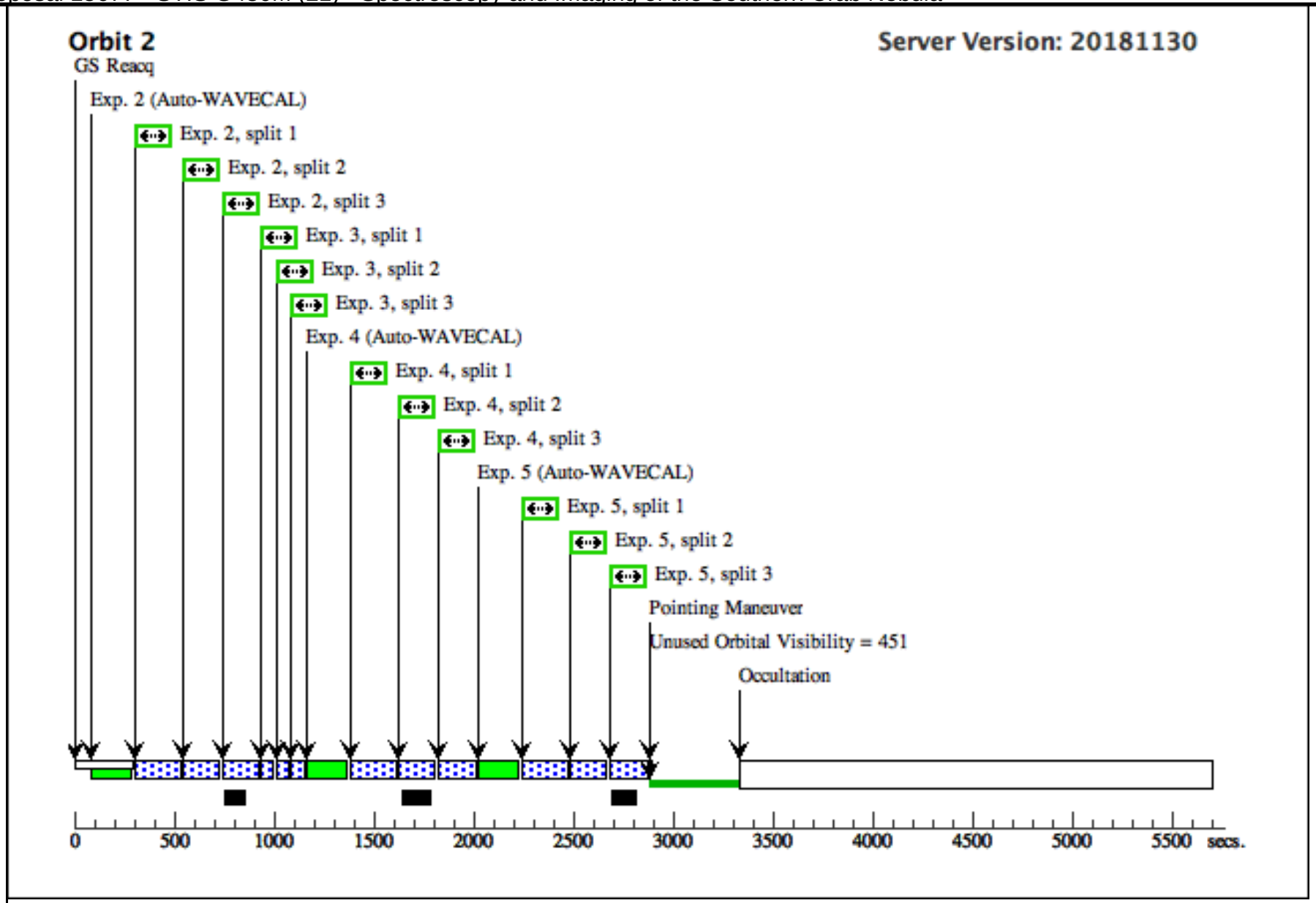
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CIRCUMSTELLAR MATTER, EMISSION LINE NEBULA, SYMBIOTIC STAR]
Extended=YES

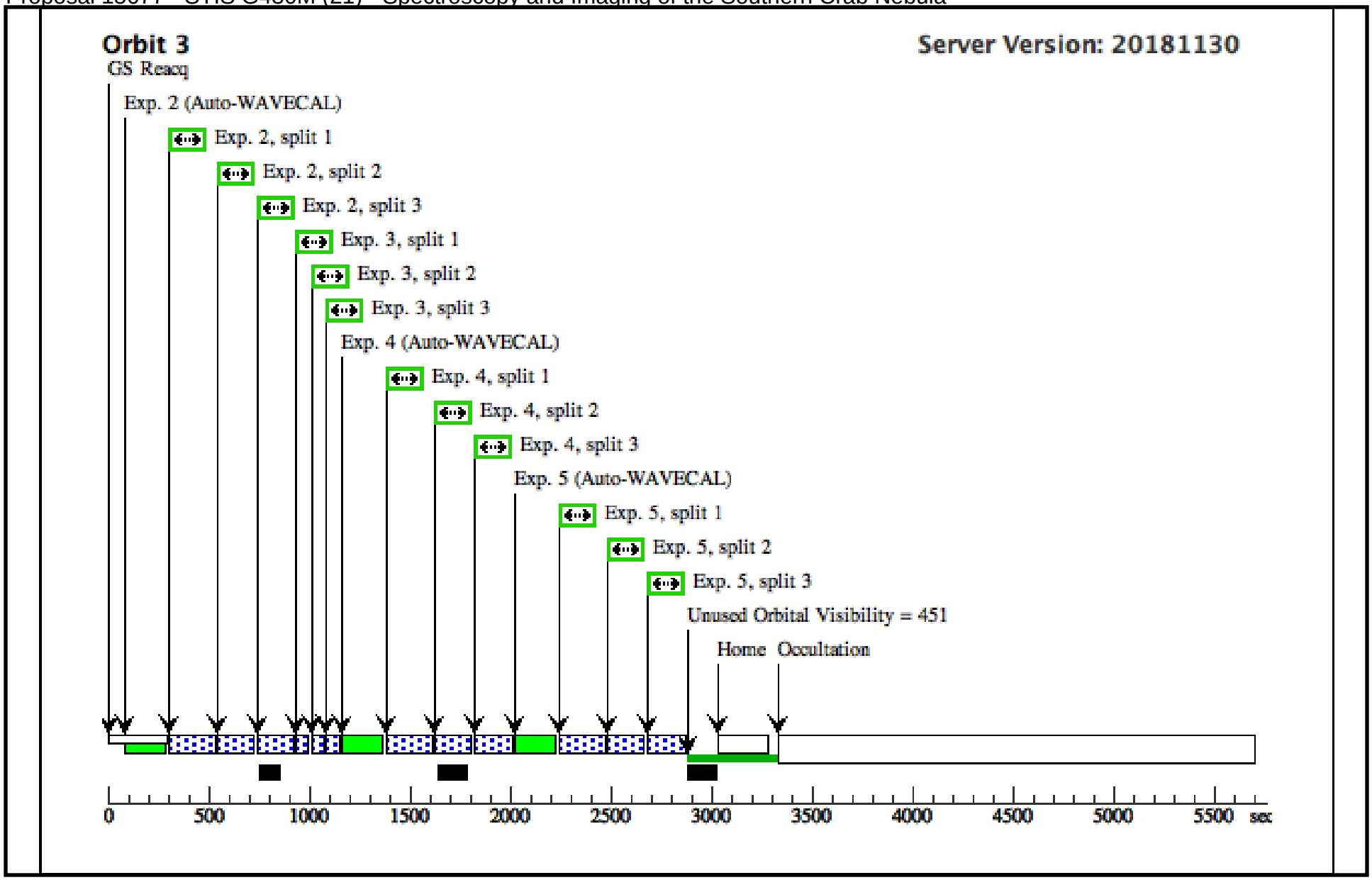
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1314347)	(1) WRAY-16-147	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs (1 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1314353)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G430M 4961 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-5 in STIS G430M (21) (3)	450 Secs (1350 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	
3	(STIS.sp.1314354)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G430M 4961 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-5 in STIS G430M (21) (3)	90 Secs (270 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	
4	(STIS.sp.1314355)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G430M 5216 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-5 in STIS G430M (21) (3)	450 Secs (1350 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	
5	(STIS.sp.1314356)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G430M 5471 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-5 in STIS G430M (21) (3)	450 Secs (1350 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	

Orbit Structure




Orbit 2
Server Version: 20181130
GS Reacq
Exp. 2 (Auto-WAVECAL)
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 3, split 1
Exp. 3, split 2
Exp. 3, split 3
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 5 (Auto-WAVECAL)
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Pointing Maneuver
Unused Orbital Visibility = 451
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20181130
GS Reacq
Exp. 2 (Auto-WAVECAL)
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 3, split 1
Exp. 3, split 2
Exp. 3, split 3
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 5 (Auto-WAVECAL)
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Unused Orbital Visibility = 451
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15677, STIS G750M (22), implementation Thu Feb 14 13:01:08 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SAME ORIENT AS 21; BEFORE 25-MAR-2019:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2-8)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.761655	Center Pattern=true		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WRAY-16-147	RA: 14 11 52.0467 (212.9668612d) Dec: -51 26 24.23 (-51.44006d) Equinox: J2000	Proper Motion RA: -9.312304956129221E-4 sec of time/yr Proper Motion Dec: -0.003019000064341526 arcsec/yr Epoch of Position: 2015.5	V=14.2	Reference Frame: ICRS

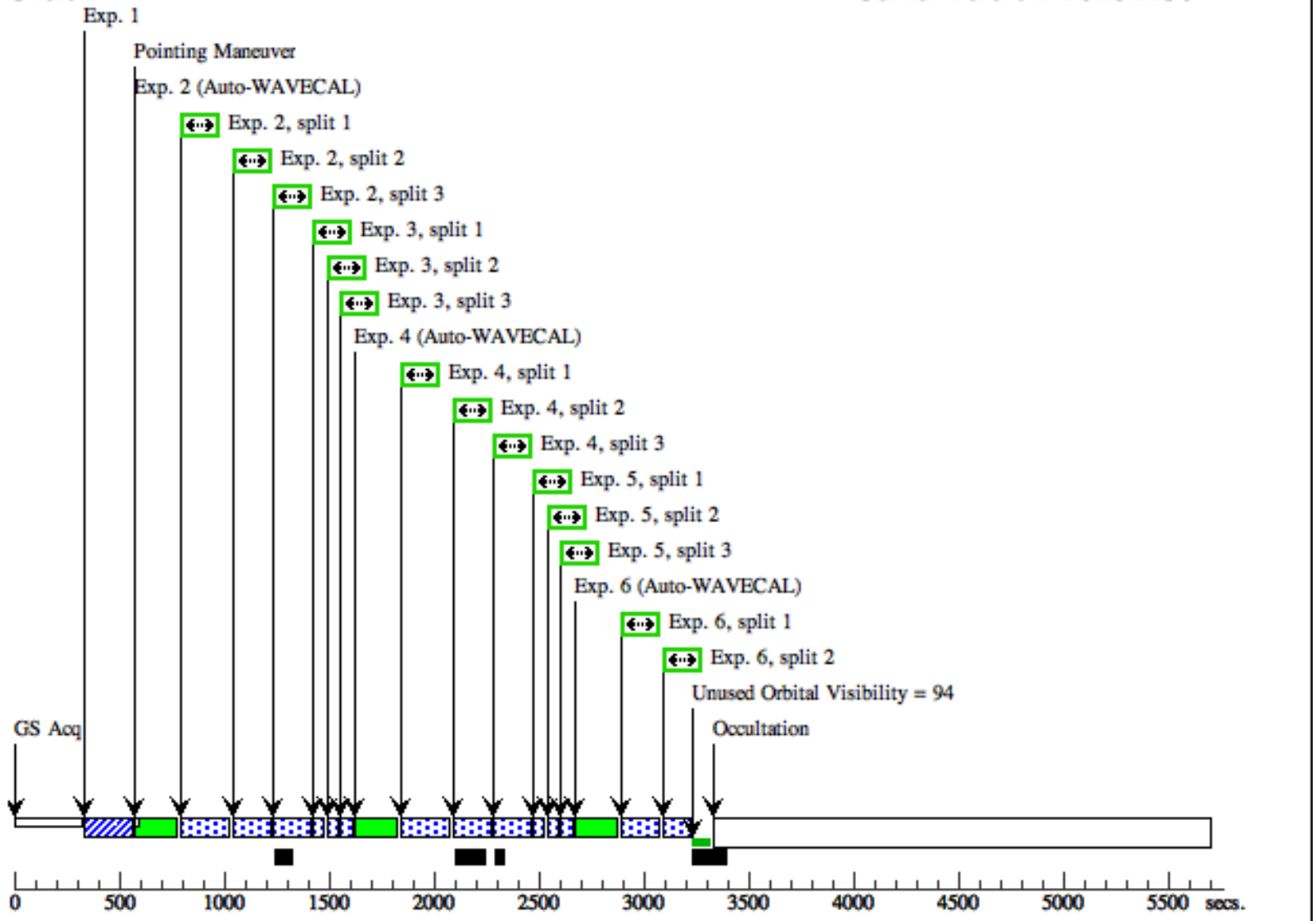
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CIRCUMSTELLAR MATTER, EMISSION LINE NEBULA, SYMBIOTIC STAR]
Extended=YES

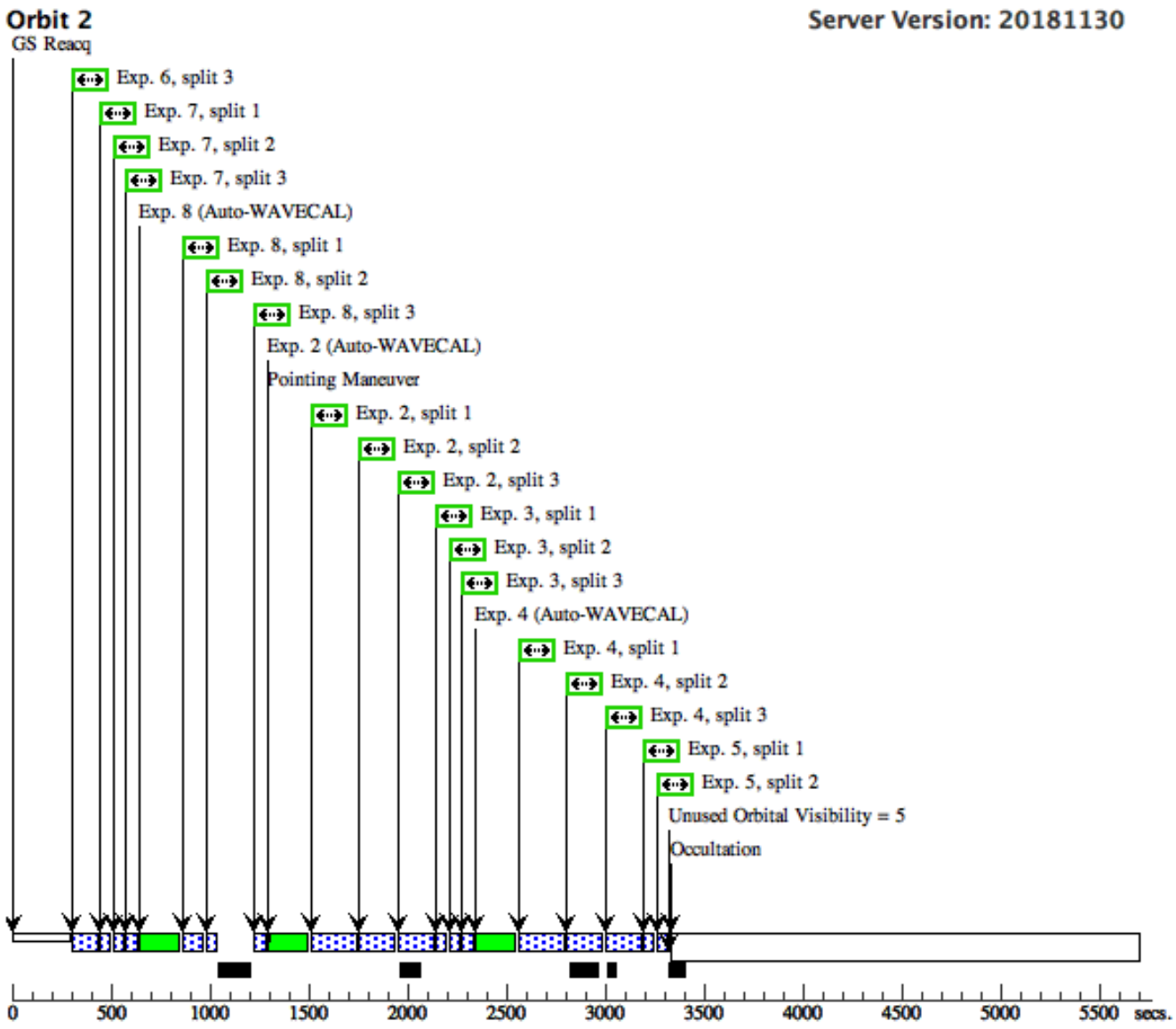
Exposures

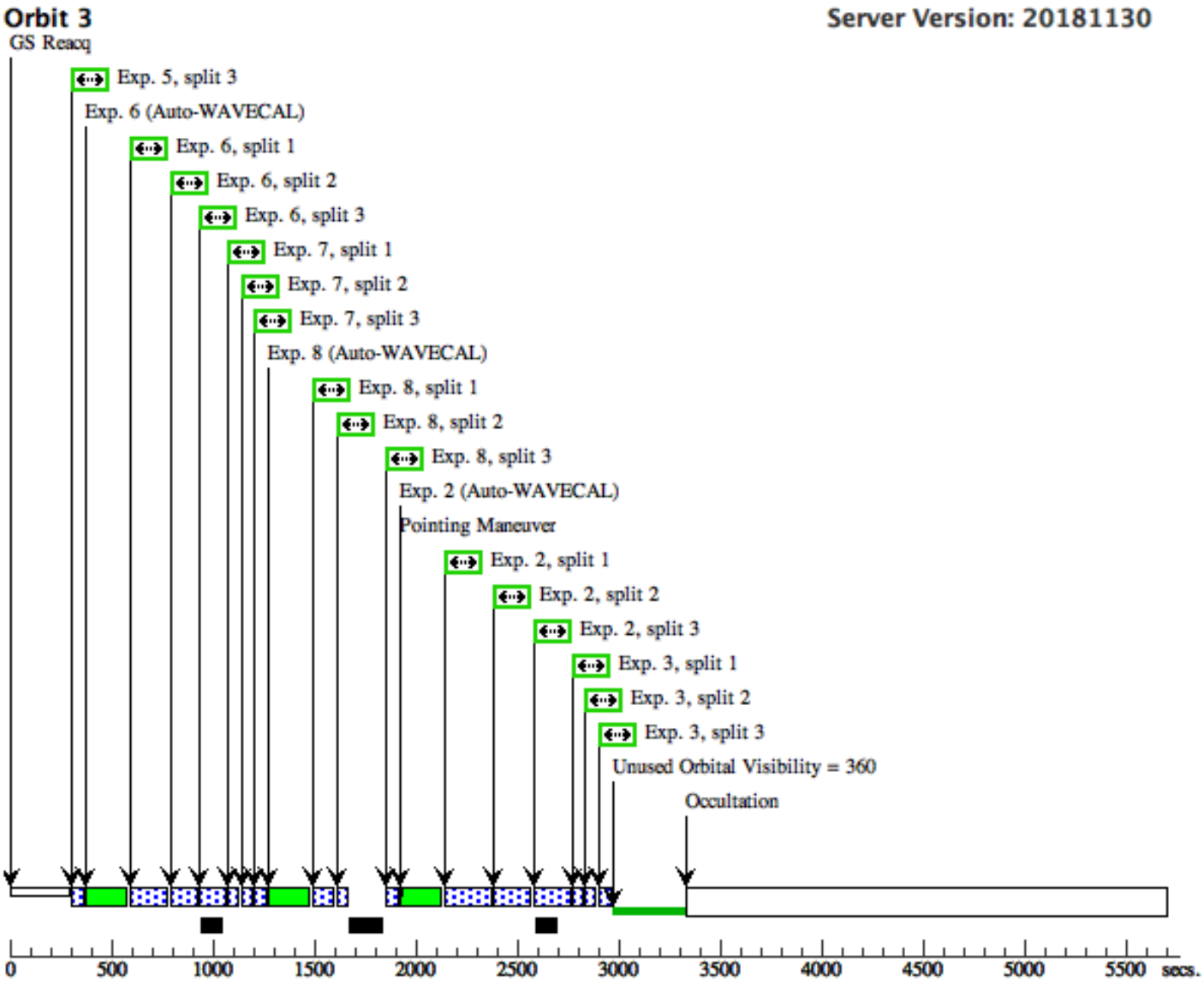
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (STIS.ta.1314347)	(1) WRAY-16-147	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs (1 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1314360)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 5734 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-8 in STIS G750M (22) (3)	450 Secs (1350 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	
3		(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 5734 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-8 in STIS G750M (22) (3)	60 Secs (180 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[3]***
								[==>(Pattern 3, Split 3)]	
4	(STIS.sp.1314361)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 6252 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-8 in STIS G750M (22) (3)	450 Secs (1350 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[2]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
5		(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 6252 A	CR-SPLIT=3; GAIN=4		Pattern 3, Exps 2-8 in STIS G750M (22) (3)	60 Secs (180 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[1]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	***[2]***
								[==>(Pattern 2, Split 2)]	
								[==>(Pattern 2, Split 3)]	***[3]***
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	

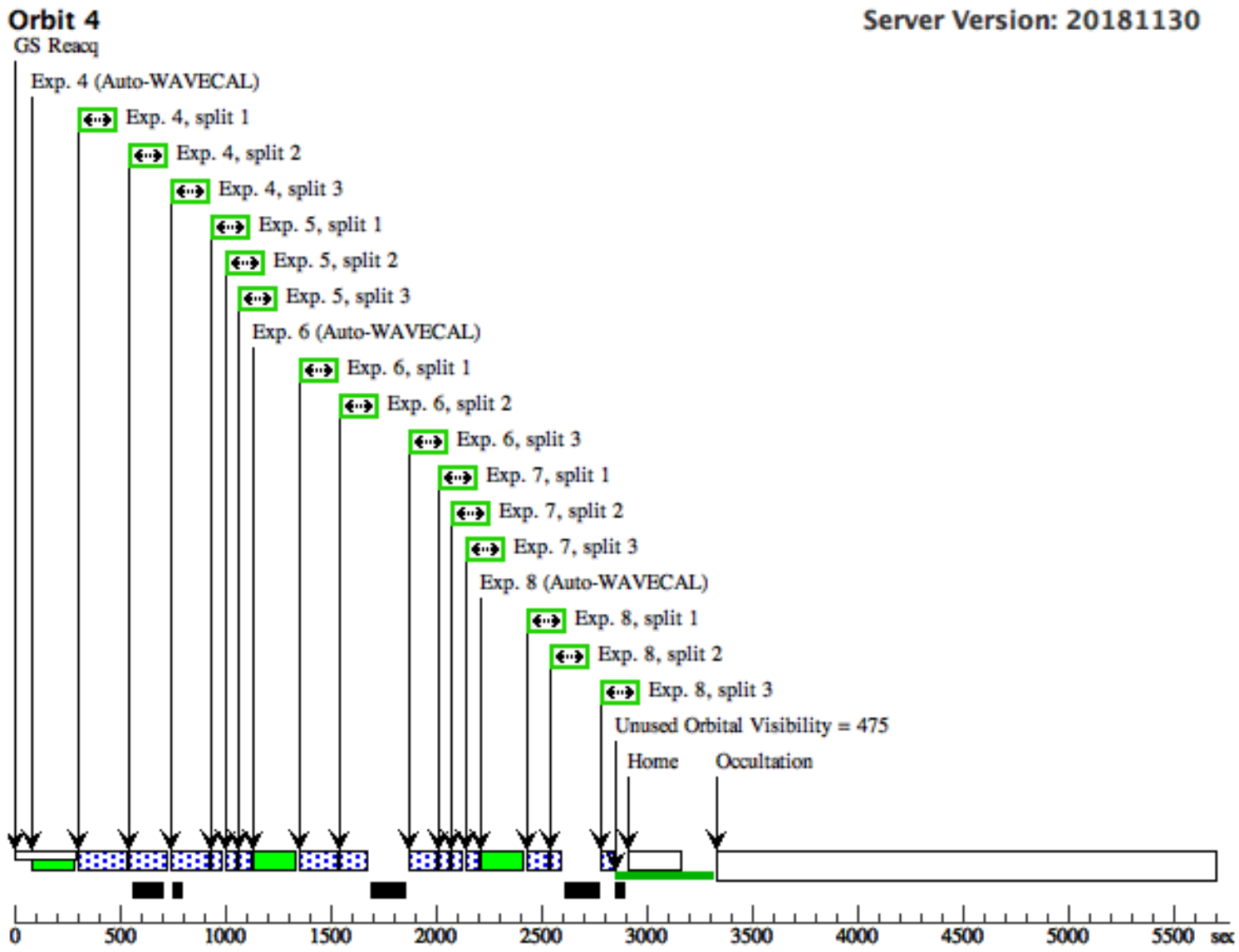
	6	(STIS.sp.13 14362)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 6768 A	CR-SPLIT=3; GAIN=4	Pattern 3, Exps 2-8 in STIS G750M (22) (3)	300 Secs (900 Secs)	
								[==>(Pattern 1, Split 1)]	***[1]***
								[==>(Pattern 1, Split 2)]	
								[==>(Pattern 1, Split 3)]	***[2]***
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
	Comments: Halpha will saturate								
	7	(STIS.sp.13 14363)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 6768 A	CR-SPLIT=3; GAIN=4	Pattern 3, Exps 2-8 in STIS G750M (22) (3)	60 Secs (180 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[2]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
	Comments: Shallow exposure for Halpha to not saturate								
	8	(STIS.sp.13 14364)	(1) WRAY-16-147	STIS/CCD, ACCUM, 52X0.5E1	G750M 6581 A	CR-SPLIT=3; GAIN=4	Pattern 3, Exps 2-8 in STIS G750M (22) (3)	60 Secs (180 Secs)	
								[==>(Pattern 1, Split 1)]	
								[==>(Pattern 1, Split 2)]	***[2]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	

Orbit Structure




Orbit 2
Server Version: 20181130
GS Reacq
Exp. 6, split 3
Exp. 7, split 1
Exp. 7, split 2
Exp. 7, split 3
Exp. 8 (Auto-WAVECAL)
Exp. 8, split 1
Exp. 8, split 2
Exp. 8, split 3
Exp. 2 (Auto-WAVECAL)
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 3, split 1
Exp. 3, split 2
Exp. 3, split 3
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 5, split 1
Exp. 5, split 2
Unused Orbital Visibility = 5
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20181130
GS Reacq
Exp. 5, split 3
Exp. 6 (Auto-WAVECAL)
Exp. 6, split 1
Exp. 6, split 2
Exp. 6, split 3
Exp. 7, split 1
Exp. 7, split 2
Exp. 7, split 3
Exp. 8 (Auto-WAVECAL)
Exp. 8, split 1
Exp. 8, split 2
Exp. 8, split 3
Exp. 2 (Auto-WAVECAL)
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 3, split 1
Exp. 3, split 2
Exp. 3, split 3
Unused Orbital Visibility = 360
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20181130
GS Reacq
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 6 (Auto-WAVECAL)
Exp. 6, split 1
Exp. 6, split 2
Exp. 6, split 3
Exp. 7, split 1
Exp. 7, split 2
Exp. 7, split 3
Exp. 8 (Auto-WAVECAL)
Exp. 8, split 1
Exp. 8, split 2
Exp. 8, split 3
Unused Orbital Visibility = 475
Home
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec