15116 - Very Massive Stars in the Local Universe

Cycle: 25, 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) SBS0335-052E (6) SBS0335-052E-OFFSET	STIS/CCD STIS/FUV-MAMA	4	14-Jun-2019 16:00:23.0	yes
02	(5) NGC4449 (7) NGC4449-OFFSET	STIS/CCD STIS/FUV-MAMA	4	14-Jun-2019 16:00:25.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(3) NGC1140 (8) NGC1140-OFFSET	STIS/CCD STIS/FUV-MAMA	2	14-Jun-2019 16:00:26.0	yes
51	(9) SBS0335-052E-OFFSET2 (10) SBS0335-052E-2	STIS/CCD STIS/FUV-MAMA	4	14-Jun-2019 16:00:28.0	yes

14 Total Orbits Used

ABSTRACT

The upper mass limit for stars is unknown. Recent UV observations of young (< 3 Myr), massive star clusters (>5 x10^4 M_sun) suggest that stars substantially more massive than 100 M_sun exist. These very massive stars (VMS) are not properly accounted for in current stellar population synthesis (SPS) codes, even though they will dominate the ionization and mechanical feedback in star-forming regions for the first few Myr. VMS have been detected as resolved stars in the nearby LMC cluster R136 and in the integrated light of two young super star clusters in two nearby starburst galaxies. Since JWST will obtain numerous UV rest-frame spectra of young high redshift galaxies, it is essential that we investigate whether VMS are common in local, low metallicity analogs, while we still have access to the UV domain.

We propose to obtain FUV STIS spectroscopy of young (< 3 Myr) super star clusters in 4 starbursting galaxies with the aim of establishing if VMS are commonly formed in dense star-forming events at low metallicity. The crucial spectral diagnostics for VMS are only available in the FUV, and we will use the spectroscopy together with new SPS models to constrain the upper mass limit to the initial mass function, and to test the importance of VMS for feedback. These spectra will form an important part of the UV legacy of HST and will provide an excellent local-universe analog to the rest-frame UV spectra of high-z galaxies to be obtained with JWST.

OBSERVING DESCRIPTION

HST images were used to locate GSC2 stars to use as offsets. The offset to each target was measured from the offset star coordinates on the HST image. The slit orientation was chosen to pass through as many clusters as possible. A 4 point dither along the slit was chosen with a 0.5 arcsec spacing.

The exposure times were determined using COS spectra of different regions in the galaxies and scaling using F140LP images.

Visit

Proposal 15116, SBS0335-052E (01), failed Fri Jun 14 20:00:29 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: ORIENT 90.0D TO 90.0 D; ORIENT 270.0D TO 270.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2), (3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.5	Center Pattern=false		
	Line Spacing=			

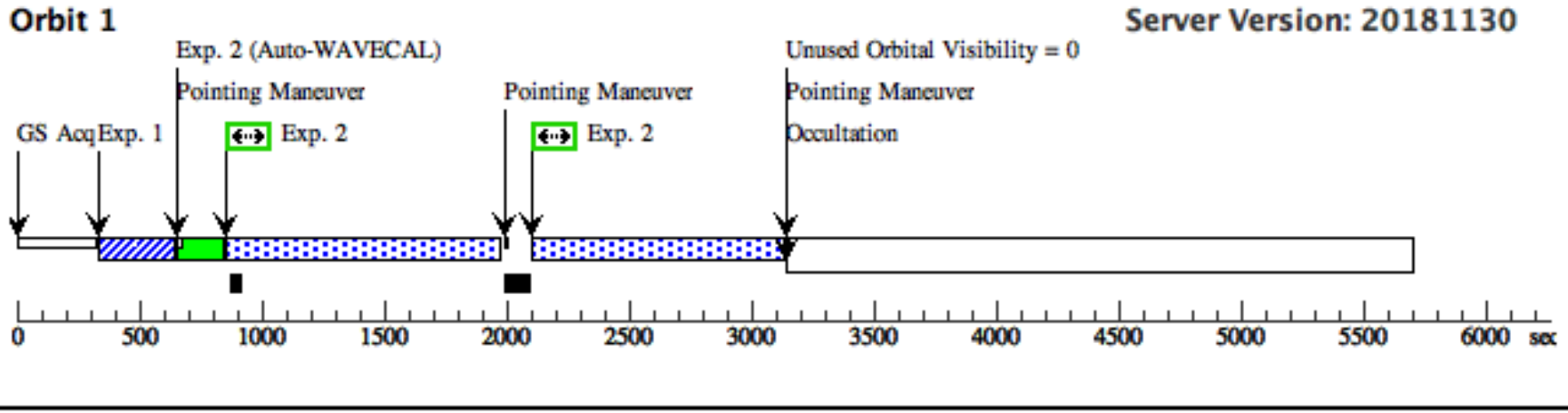
Fixed Targets

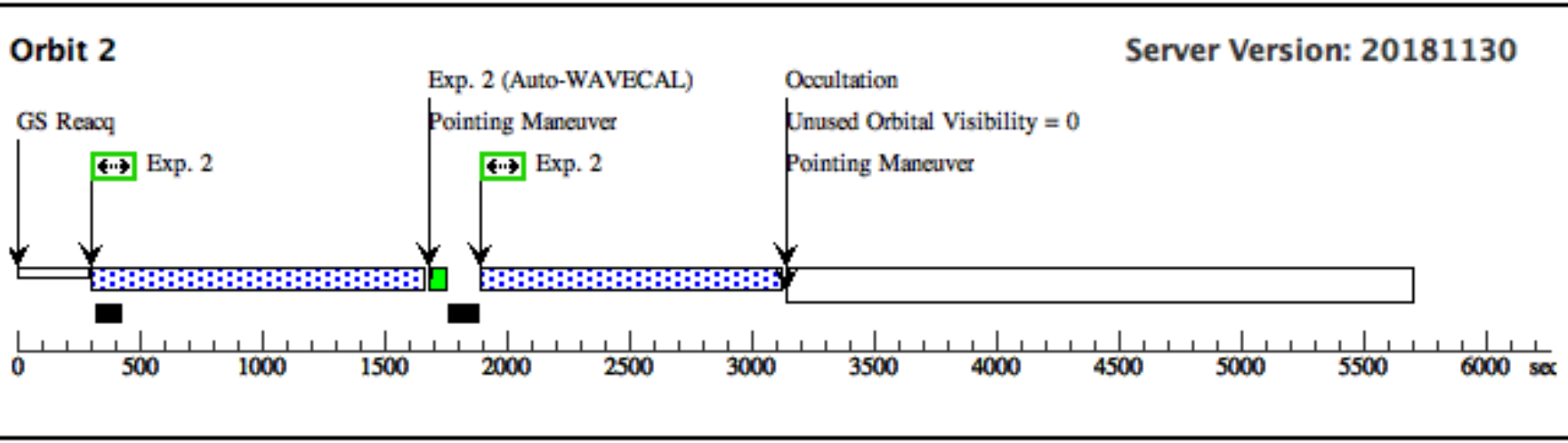
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SBS0335-052E	Offset from SBS0335-052E-OFFSET		V=19.0	Offset Position (SBS0335-052E)
		RA Offset: -1.22 Secs		F(1400)=3.0E-15	
		Dec Offset: 1.82 Arcsec			
Comments: *Category=GALAXY* *Description=[DWARF COMPACT, STARBURST]* *Extended=YES*					
(6)	SBS0335-052E-OFFSET	RA: 03 37 45.2510 (54.4385458d)		V=19.30	Reference Frame: ICRS
		Dec: -05 02 42.27 (-5.04507d)			
		Equinox: J2000			
Comments: *Category=STAR* *Description=[F0-F2]* *Extended=NO*					

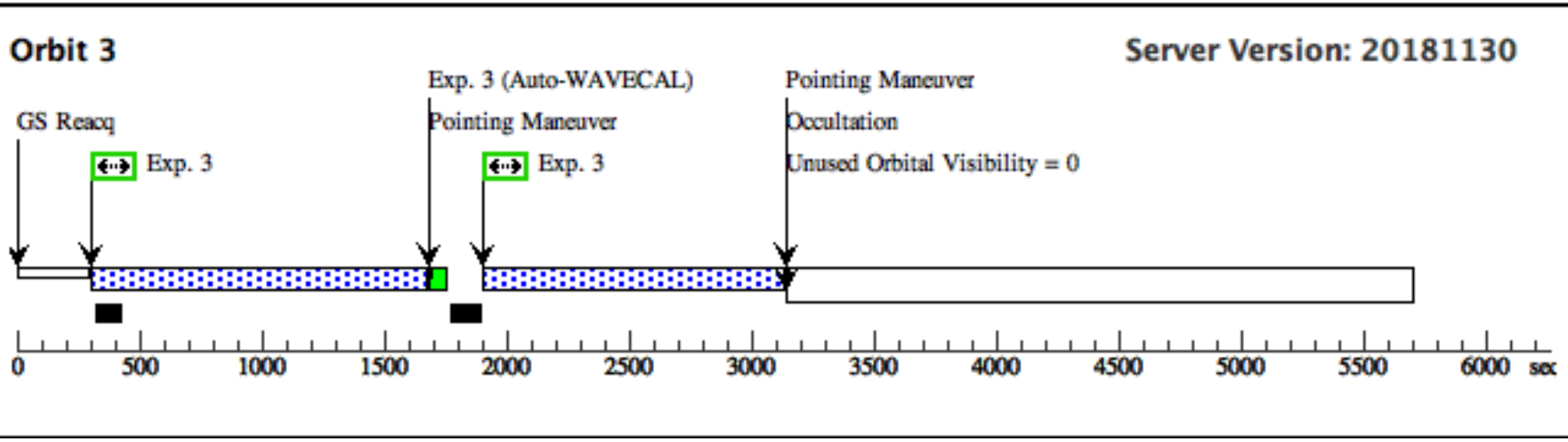
Exposures

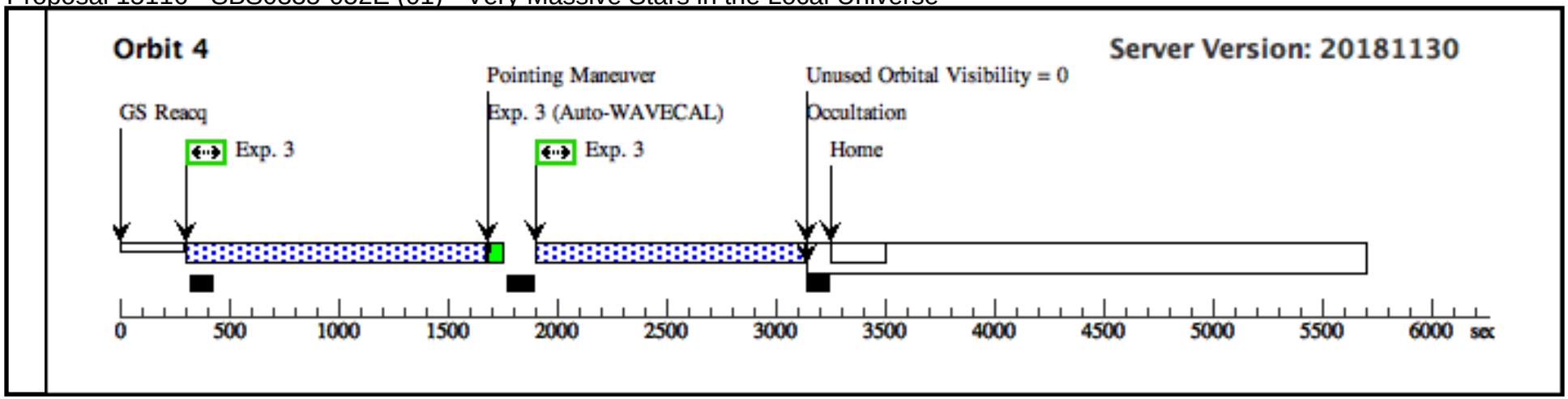
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition using offset star (STIS.ta.1012634)	(6) SBS0335-052E-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARIO BASE1B3		20 Secs (20 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1013825)	(1) SBS0335-052E	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 2-2 in SBS0335-052E (01) (1)	1000 Secs (4692 Secs)	
								[==>1109.0 Secs (Pattern 1)] *[==>1013 Secs (Pattern 2)]*	***[1]***
								[==>1351.0 Secs (Pattern 3)] *[==>1219.0 Secs (Pattern 4)]*	***[2]***
3	(STIS.sp.1013825)	(1) SBS0335-052E	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 3-3 in SBS0335-052E (01) (1)	1000 Secs (5140 Secs)	
								[==>1355 Secs (Pattern 1)] *[==>1215.0 Secs (Pattern 2)]*	***[3]***
								[==>1355 Secs (Pattern 3)] *[==>1215.0 Secs (Pattern 4)]*	***[4]***

Orbit Structure








Orbit 4
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GS Reacq
Exp. 3
Pointing Maneuver
Exp. 3 (Auto-WAVECAL)
Exp. 3
Unused Orbital Visibility = 0
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15116, NGC4449 (02), implementation Fri Jun 14 20:00:29 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2), (3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.5	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	NGC4449	Offset from NGC4449-OFFSET		V=17.5	Offset Position (NGC4449)
		RA Offset: 2.6264 Secs		F(1400)=1.7E-15	
		Dec Offset: -54.033 Arcsec			

Comments:
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]

(7)	NGC4449-OFFSET	RA: 12 28 11.3027 (187.0470946d)		V=15.7	Reference Frame: ICRS
		Dec: +44 08 4.83 (44.13468d)			
		Equinox: J2000			

Comments:
Category=STAR
Description=[F3-F9]
Extended=NO

Exposures

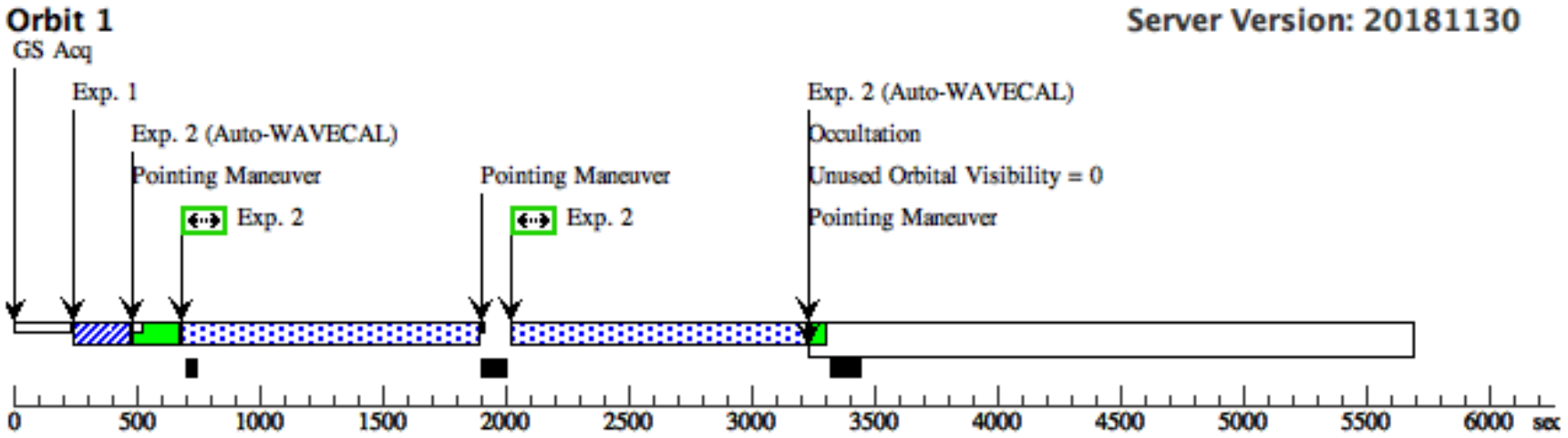
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition using offset star (STIS.ta.1357098)	(7) NGC4449-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARIO SINGLE		1 Secs (1 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1014160)	(5) NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 2-2 in NGC4449 (02) (1)	1000 Secs (5289 Secs)	
								[==>1193.0 Secs (Pattern 1)] *[==>1190.0 Secs (Pattern 2)]*	***[1]***
								[==>1401.0 Secs (Pattern 3)] *[==>1505.0 Secs (Pattern 4)]*	***[2]***

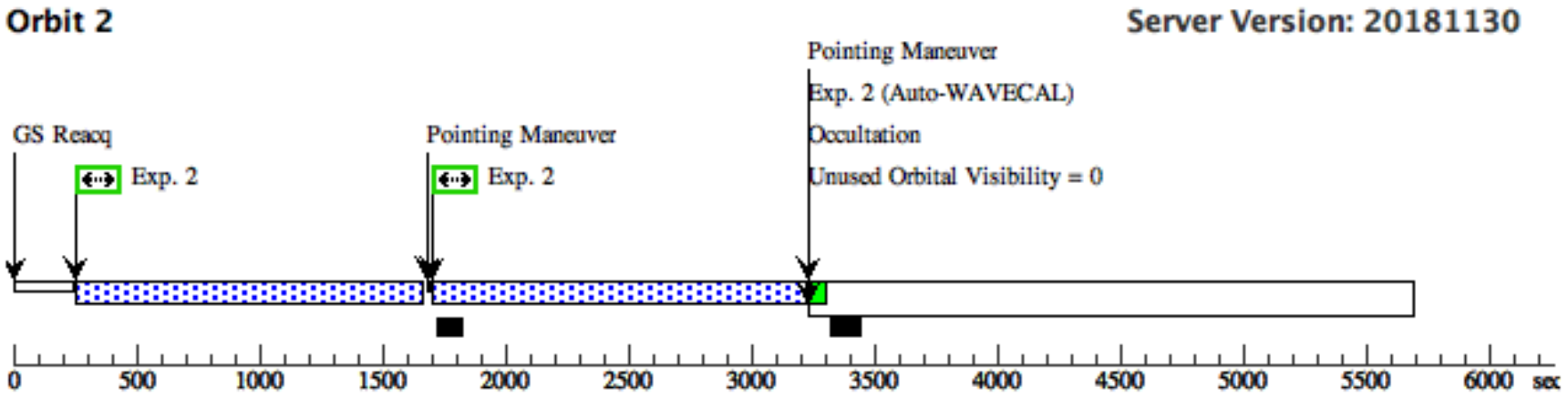
Comments: STIS.sp.1016820 - check on counts - BOP - no GALEX data

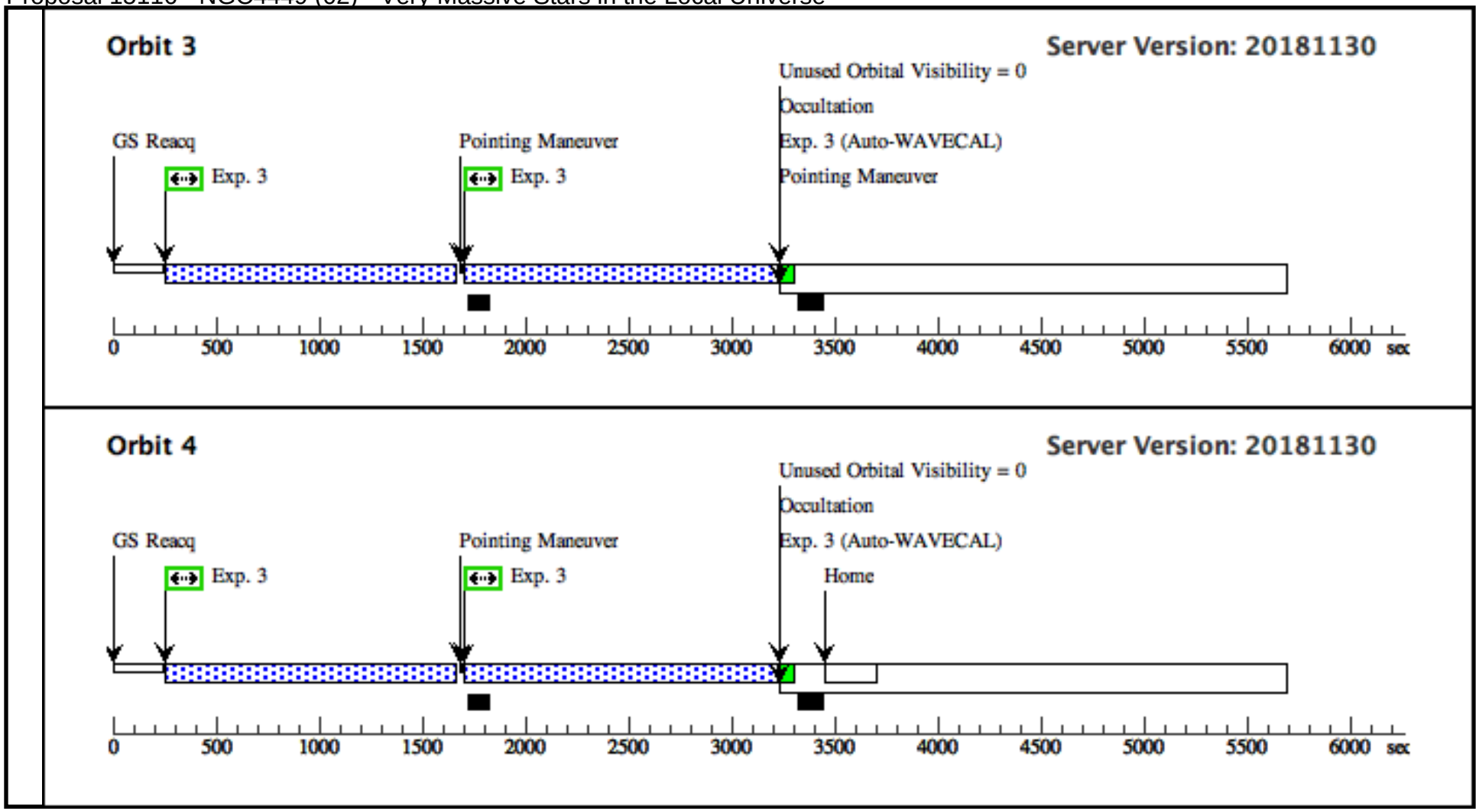
Reines et al. (2010, ApJ, 708, 26) give a flux density for the target S26 of 1.3 E-14 erg/s/cm^2/A with the F170W WFPC2 filter. This is the shortest wavelength observation. The region S26 is much larger than the 0.2 arcsec STIS slit so this is a strong upper limit. Using the STIS ETC, the above flux at 1821 A (central wavelength of F170W), assuming an O3 V spectral type and no reddening, gives the number of counts as 0.65 c/s so the target is safe.

3	(STIS.sp.1014160)	(5) NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 3-3 in NGC4449 (02) (1)	1000 Secs (5812 Secs)	
								[==>1401 Secs (Pattern 1)] *[==>1505.0 Secs (Pattern 2)]*	***[3]***
								[==>1401 Secs (Pattern 3)] *[==>1505.0 Secs (Pattern 4)]*	***[4]***

Orbit Structure



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Pointing Maneuver
GS Reacq
Exp. 3
Pointing Maneuver
Exp. 3
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1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec
Orbit 4
Server Version: 20181130
Unused Orbital Visibility = 0
Occultation
Exp. 3 (Auto-WAVECAL)
Home
GS Reacq
Exp. 3
Pointing Maneuver
Exp. 3
0
500
1000
1500
2000
2500
3000
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4000
4500
5000
5500
6000
sec

Visit

Proposal 15116, NGC1140 (03), completed Fri Jun 14 20:00:29 GMT 2019

Diagnostic Status: Warning

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

Special Requirements: ORIENT 48D TO 48 D; ORIENT 228D TO 228 D

Diagnostics

(NGC1140 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(NGC1140 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.5	Center Pattern=false		
	Line Spacing=			

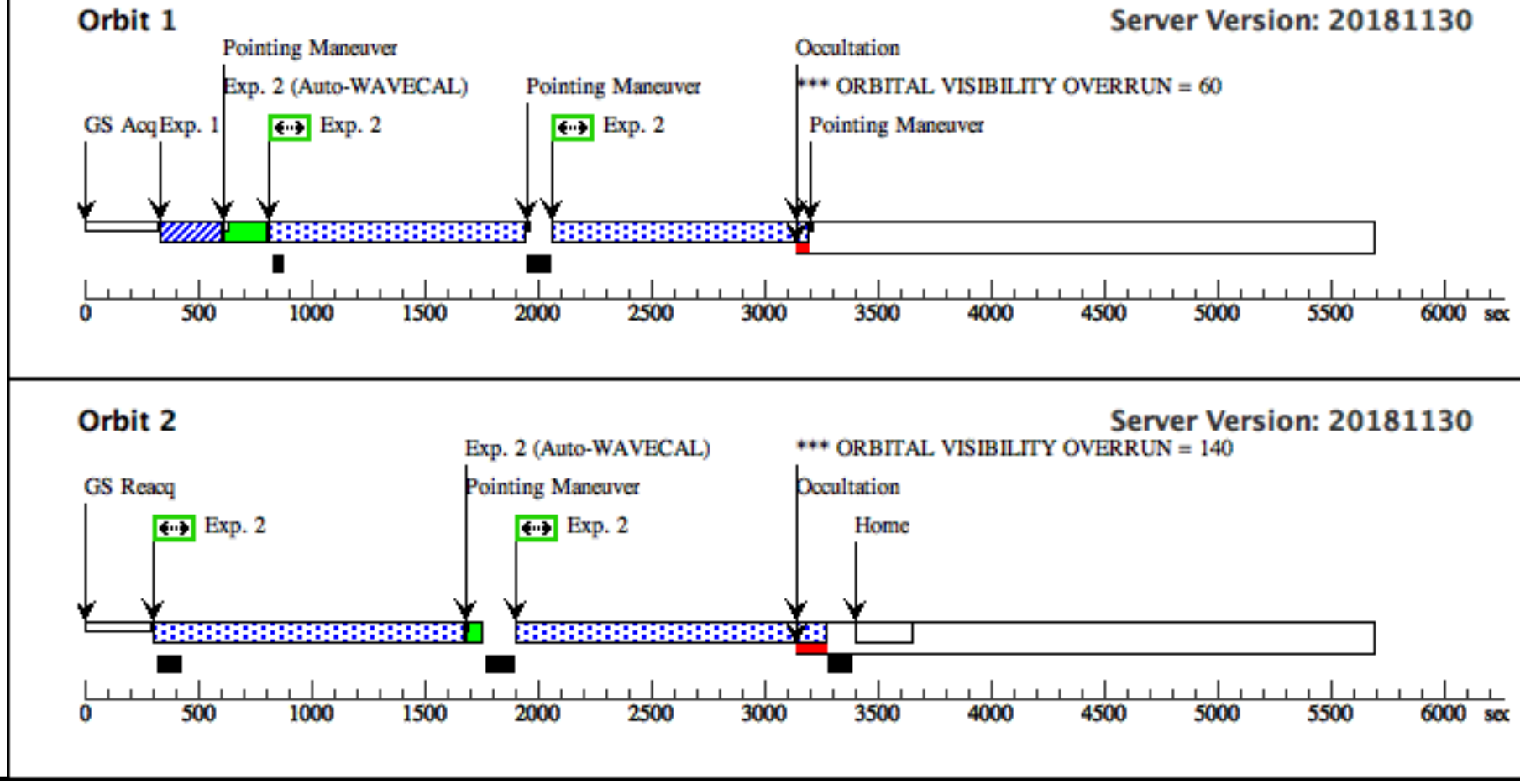
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC1140	Offset from NGC1140-OFFSET		V=18.0	Offset Position (NGC1140)
		RA Offset: -1.708 Secs		F(1400) =2.0E-15	
		Dec Offset: -3.51 Arcsec			
Comments: *Category=GALAXY* *Description=[DWARF COMPACT, STARBURST]*					
(8)	NGC1140-OFFSET	RA: 02 54 35.2290 (43.6467875d)		V=19.05	Reference Frame: ICRS
		Dec: -10 01 36.56 (-10.02682d)			
		Equinox: J2000			
Comments: *Category=STAR* *Description=[F0-F2]* *Extended=NO*					

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition using offset star (STIS.ta.1014167)	(8) NGC1140-OFFSET	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARIO BASE1B3		10 Secs (10 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1014168)	(3) NGC1140	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 2-2 in NGC1140 (03) (1)	1000 Secs (4940 Secs)	
								[==>1113.0 Secs (Pattern 1)] *[==>1113.0 Secs (Pattern 2)]*	***[1]***
								[==>1357.0 Secs (Pattern 3)] *[==>1357.0 Secs (Pattern 4)]*	***[2]***

Orbit Structure



Visit

Proposal 15116, SBS0335-052E (51), implementation Fri Jun 14 20:00:29 GMT 2019

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2), (3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.5	Center Pattern=false		
	Line Spacing=			

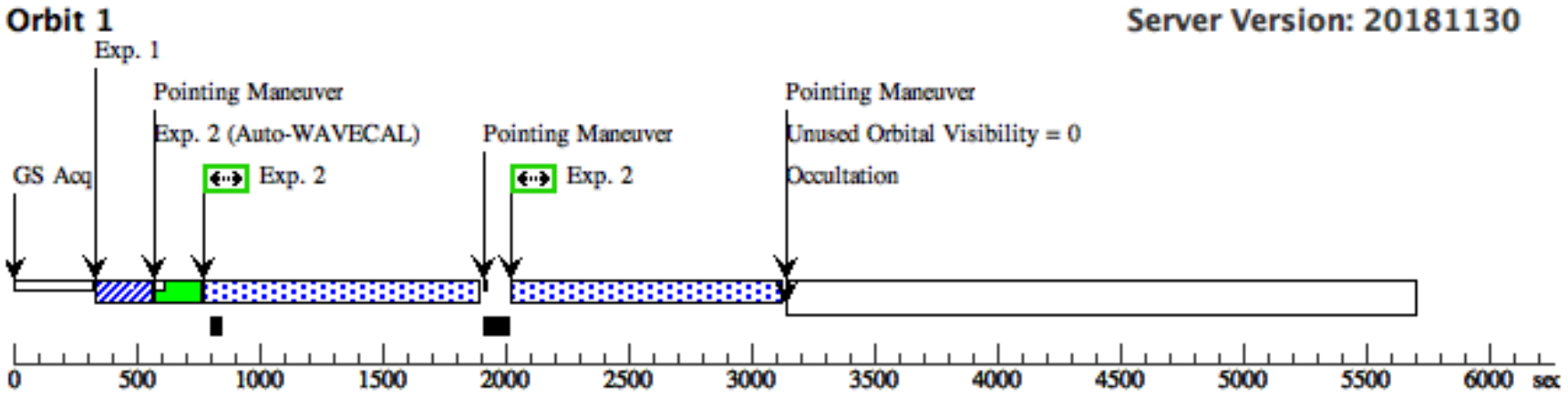
Fixed Targets

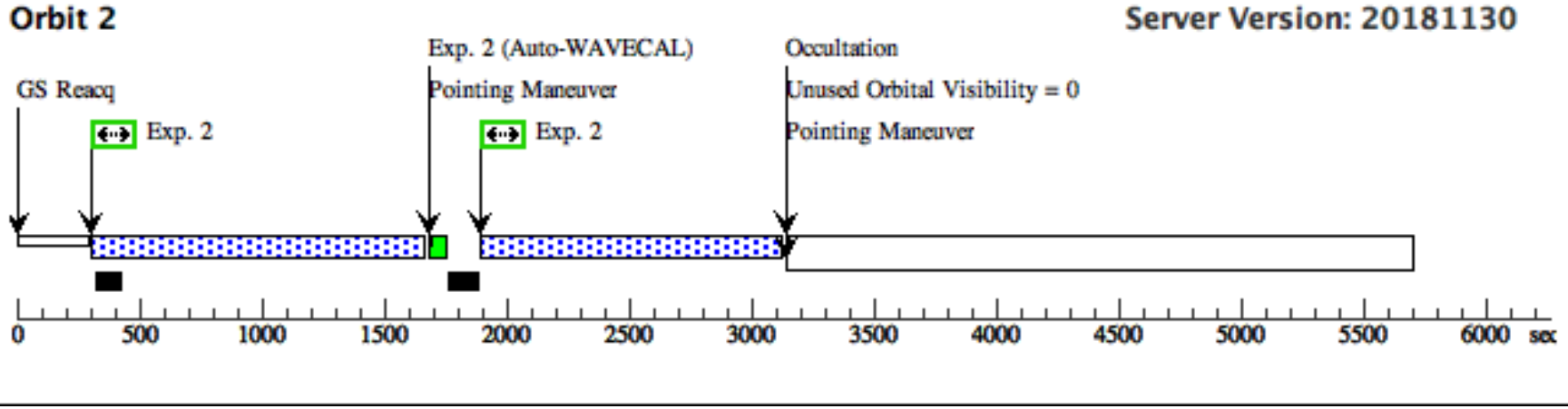
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(9)	SBS0335-052E-OFFSET2	RA: 03 37 48.0762 (54.4503175d) Dec: -05 02 9.94 (-5.03609d) Equinox: J2000		V=15.4	Reference Frame: ICRS
Comments: *Category=STAR* *Description=[F0-F2]*					
(10)	SBS0335-052E-2	Offset from SBS0335-052E-OFFSET2 RA Offset: -4.0234 Secs Dec Offset: -30.474 Arcsec		V=19.0	Offset Position (SBS0335-052E-2)
Comments: *Category=GALAXY* *Description=[DWARF COMPACT, STARBURST]* *Extended=YES*					

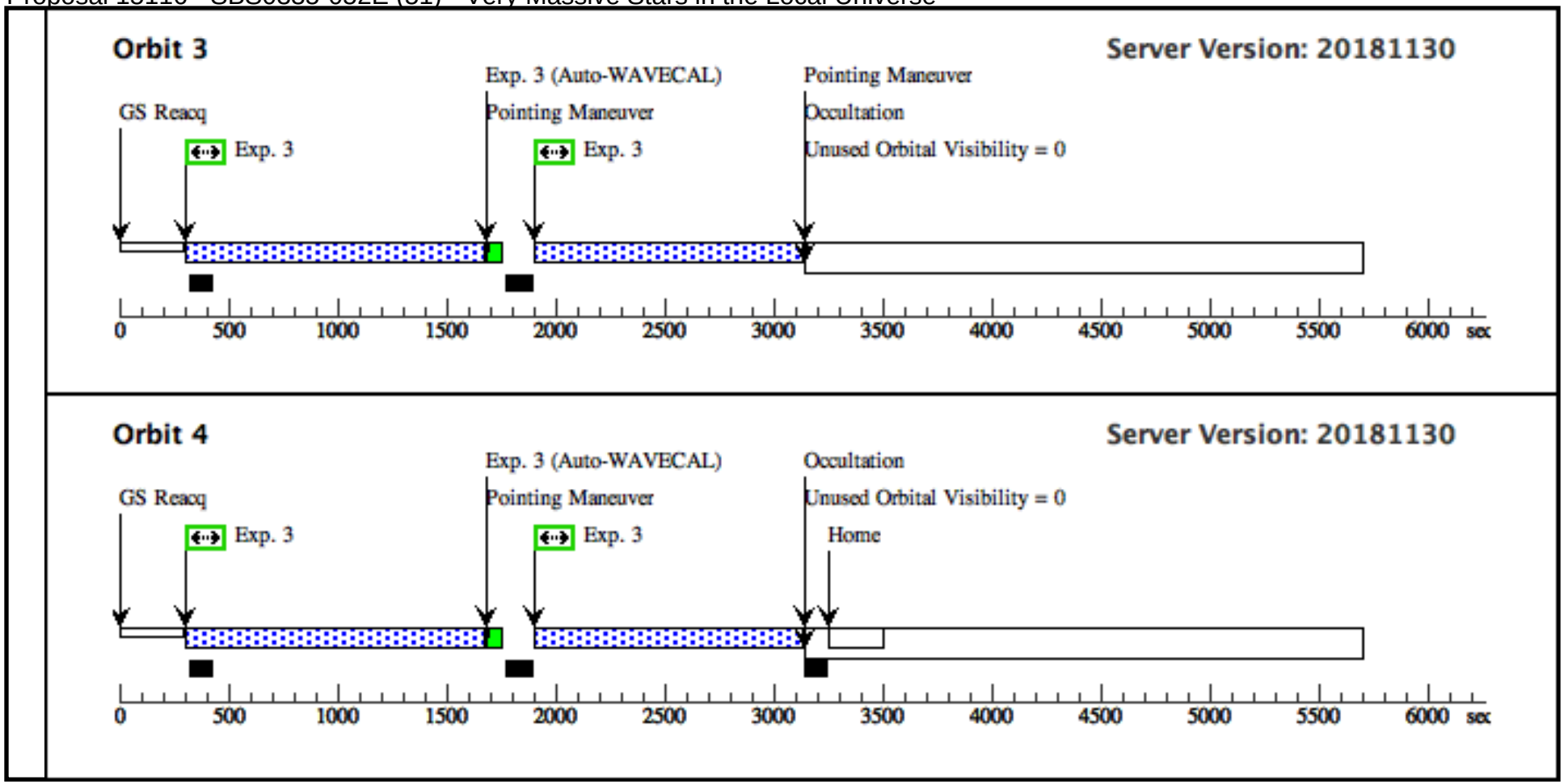
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition using offset star (STIS.ta.1356855)	(9) SBS0335-052E-OFFSET2	STIS/CCD, ACQ, F28X50LP	MIRROR		GS ACQ SCENARIO BASE1B3		1 Secs (1 Secs)	
								[==>]	***[1]***
2	(STIS.sp.1013825)	(10) SBS0335-052E-2	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 2-2 in SBS0335-052E (51) (1)	1000 Secs (4768 Secs)	
								[==>1109.0 Secs (Pattern 1)] *[==>1089.0 Secs (Pattern 2)]*	***[1]***
								[==>1351.0 Secs (Pattern 3)] *[==>1219.0 Secs (Pattern 4)]*	***[2]***
3	(STIS.sp.1013825)	(10) SBS0335-052E-2	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 1, Exps 3-3 in SBS0335-052E (51) (1)	1000 Secs (5140 Secs)	
								[==>1355 Secs (Pattern 1)] *[==>1215.0 Secs (Pattern 2)]*	***[3]***
								[==>1355 Secs (Pattern 3)] *[==>1215.0 Secs (Pattern 4)]*	***[4]***

Orbit Structure



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GS Reacq
Exp. 3
Exp. 3 (Auto-WAVECAL)
Pointing Maneuver
Exp. 3
Pointing Maneuver
Occultation
Unused Orbital Visibility = 0
0
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4500
5000
5500
6000
sec
Orbit 4
Server Version: 20181130
GS Reacq
Exp. 3
Exp. 3 (Auto-WAVECAL)
Pointing Maneuver
Exp. 3
Occultation
Unused Orbital Visibility = 0
Home
0
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1000
1500
2000
2500
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3500
4000
4500
5000
5500
6000
sec