



# 14683 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: AVAILABLE)

## INVESTIGATORS

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## VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) AAOMEGA-30DOR-333	COS/FUV	1	10-Aug-2017 14:00:16.0	yes
51	(1) AAOMEGA-30DOR-333	COS/FUV	1	10-Aug-2017 14:00:19.0	yes
02	(2) AAOMEGA-30DOR-368	COS/FUV	1	10-Aug-2017 14:00:21.0	yes
03	(3) AAOMEGA-30DOR-187	COS/FUV	1	10-Aug-2017 14:00:23.0	yes
04	(4) AAOMEGA-30DOR-142	STIS/CCD STIS/FUV-MAMA	3	10-Aug-2017 14:00:24.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
05	(5) ELS2006-N11-020	STIS/CCD STIS/FUV-MAMA	2	10-Aug-2017 14:00:25.0	yes
06	(6) ST2-53	STIS/CCD STIS/FUV-MAMA	1	10-Aug-2017 14:00:26.0	yes
07	(7) FARINA82	STIS/CCD STIS/FUV-MAMA	3	10-Aug-2017 14:00:27.0	yes
08	(8) 2DFL-51-50	STIS/CCD STIS/FUV-MAMA	2	10-Aug-2017 14:00:28.0	yes

15 Total Orbits Used

## **ABSTRACT**

Rapidly rotating, evolved massive stars are thought to be the progenitors of long gamma-ray bursts (LGRBs). Their rapid rotation may be the result of (a) reduced angular-momentum loss by a single star due to reduced mass loss at low metallicity; or (b) spin-up via mass and angular momentum transfer from a companion or a stellar merger. Independent of their formation mechanism, the properties of their stellar winds are strongly affected by their rapid rotation. We have recently obtained optical spectroscopy to study the properties of a sample of ten fast rotating, evolved massive stars in the Large Magellanic Cloud. Here, we propose to use HST FUV spectroscopy to determine the wind properties of these objects. The information needed to characterize the stellar winds of massive stars is encoded in FUV spectra. Establishing the properties of these rotating outflows is a critical issue, since the present uncertainties restrict our understanding of the evolution of the angular momentum, the initial-to-final mass relation, and the ultimate fate of a massive star.

By fitting line profiles from sophisticated model atmospheres to the FUV spectra, we will measure photospheric CNO abundances, probe the rotation law of the stellar wind, and study the influence of rapid rotation on the profiles of wind lines, and hence on the determination of mass-loss rates. We will investigate how rapid rotation affects the onset of clumping, the presence of which reduces estimates of mass-loss rates. This program will enable decisive steps toward determining the nature of rapidly rotating, evolved, massive stars, as required to evaluate their suitability as progenitors of LGRBs.

## **OBSERVING DESCRIPTION**

Here, we propose to use HST FUV spectroscopy to determine the wind properties of rapidly rotating, evolved massive stars in the Large Magellanic Cloud. The information needed to characterize the stellar winds of massive stars is encoded in FUV spectra. Wind terminal velocities will be measured from the blue edge of absorption component of P Cygni profiles. Mass-loss rates will be derived from P Cygni profiles from resonance doublets of N v 1238-1242, Si iv 1393-1402, and C iv 1548-1550. Excited state wind lines are also available, and provide different sensitivities to density and the radiation field from resonance transitions (e.g. He ii 1640). Clumping parameters can be derived from O v 1371 and N iv 1718 but also He ii 1640 which is very sensitive to clumping for stars with strong winds.

For five of the selected targets, we choose to use STIS in the E140M setting, because it provides spectra over the entire wavelength range (1150-1700 Å) in a single exposure, with low overheads. ACCUM mode was selected because we don't need/want high time resolution. These stars are bright and/or have low E(B-V). Our nominal target signal-to-noise ratio (SNR) is ~ 15-20 per resolution element, sufficient to measure the weakest CNO lines used for abundance analyses for instance. Exposure times were determined with the STIS ETC by scaling early to mid-O star Kurucz templates to the observed V magnitude. We used the LMC diffuse extinction curve and E(B-V) computed from the photometry and intrinsic colors to redden the spectrum. For targets in the LMC, the visibility is 60 min per orbit. Allowing for guide-star and target acquisitions (6mn for first exposure, 4mn for reacquisition) and instrument overhead (2-4 min), we should typically have about 50-55 min of spectroscopic exposure. Using this input, we find that a single non-CVZ orbit will give a SNR ~15-20 per resolution element at 1600 Å in one orbit for 1 target. For two stars, 2 orbits are needed to reach this SNR, and two other stars require 3 orbits.

For three stars, we shall take advantage of the higher FUV sensitivity, in the G130M (settings 1291, 1327) and G160M (1577, 1623) gratings, for the maximum, uninterrupted wavelength coverage of 1134-1798 Å. The resolving power of these settings ( $R \sim 20,000$ ) is optimal for wind and photospheric parameters characterization (e.g. surface abundances). Exposure times were determined with the COS ETC with the same template as for STIS (above). The required SNR (~20) can be achieved in a single orbit for these stars, using 2 FP-POS for each central wavelength. It will be further improved by co-adding overlapping segments. For targets in the MCs, the visibility is 60 min per orbit. Guide star acquisition consumes 6 min and COS imaging target acquisition (supported by our accurate coordinates and elimination of excessively crowded targets) another 3 min. COS overheads for the required 4-setting sequence are  $5+2+3+2=12$  min, so that total overheads amount to 21 min, leaving 39 min of spectroscopic exposure time. For a typical 1:2 ratio between the two gratings, that reduces to 13 min (780 sec) for G130M and 26 min (1560 sec) for G160M.

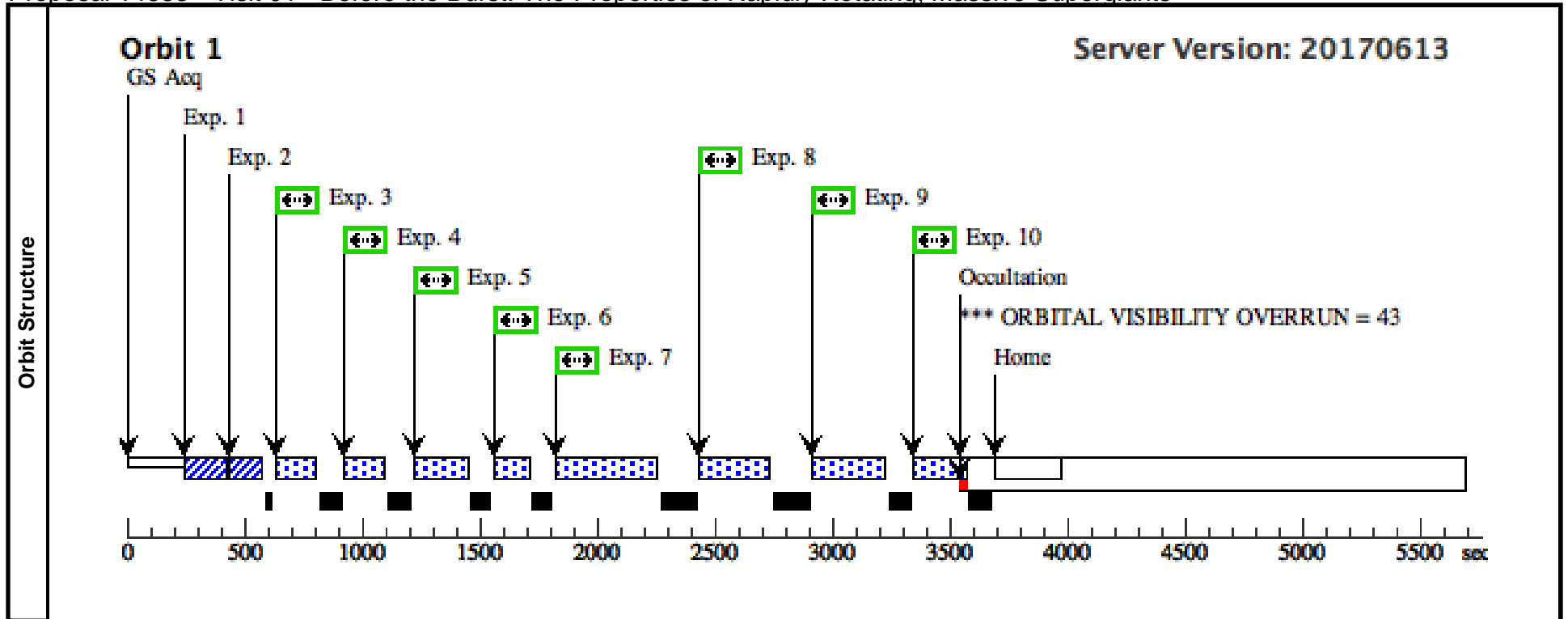
Proposal 14683 - Visit 01 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:29 GMT 2017

<b>Visit</b>	<p><b>Proposal 14683, Visit 01, failed</b></p> <p><b>Diagnostic Status: Error</b></p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: (none)</p>					
<b>Diagnostics</b>	<p>(ACQ/PEAKXD (01.001)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(ACQ/PEAKD (01.002)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (01.003)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (01.004)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (01.005)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (01.006)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(Visit 01) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.</p> <p>(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p> <p>(G130M/1327 (01.005)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p> <p>(G130M/1327 (01.006)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p>					
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>
	(1)	AAOMEGA-30DOR-333	RA: 05 39 11.6100 (84.7983750d) Dec: -69 30 37.27 (-69.51035d) Equinox: J2000		V=12.27 B-V= 0.10, O2 - 3(n)f*p	Reference Frame: ICRS
	<i>Comments: Extended=NO</i>					

Proposal 14683 - Visit 01 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ/PEAK XD (COS.sa.841 348)	(1) AAOMEGA-30D OR-333	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				0.2 Secs (0.2 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.841 348)	(1) AAOMEGA-30D OR-333	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; CENTER=FLUX-W T-FLR; NUM-POS=5; SEGMENT=BOTH			0.2 Secs (0.2 Secs) [==>]	[1]
	3	G130M/129 1 (COS.sp.824 861)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=13 8; FLASH=YES			120 Secs (122 Secs) [==>122.0 Secs ]	[1]
	4	G130M/129 1 (COS.sp.824 861)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=13 8; FLASH=YES			120 Secs (122 Secs) [==>122.0 Secs ]	[1]
	5	G130M/132 7 (COS.sp.824 862)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=3; BUFFER-TIME=12 8; FLASH=YES			95 Secs (97 Secs) [==>97.0 Secs ]	[1]
	6	G130M/132 7 (COS.sp.824 862)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=4; BUFFER-TIME=12 8; FLASH=YES			95 Secs (97 Secs) [==>97.0 Secs ]	[1]
	7	G160M/157 7 (COS.sp.824 864)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=3; BUFFER-TIME=17 4; FLASH=YES			250 Secs (252 Secs) [==>252.0 Secs ]	[1]
	8	G160M/157 7 (COS.sp.824 864)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=4; BUFFER-TIME=17 4; FLASH=YES			250 Secs (252 Secs) [==>252.0 Secs ]	[1]
	9	G160M/162 3 (COS.sp.824 865)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=3; BUFFER-TIME=20 2; FLASH=YES			175 Secs (177 Secs) [==>177.0 Secs ]	[1]
10	G160M/162 3 (COS.sp.824 865)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=4; BUFFER-TIME=20 2; FLASH=YES			175 Secs (177 Secs) [==>177.0 Secs ]	[1]	



# Proposal 14683 - Visit 51 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:29 GMT 2017

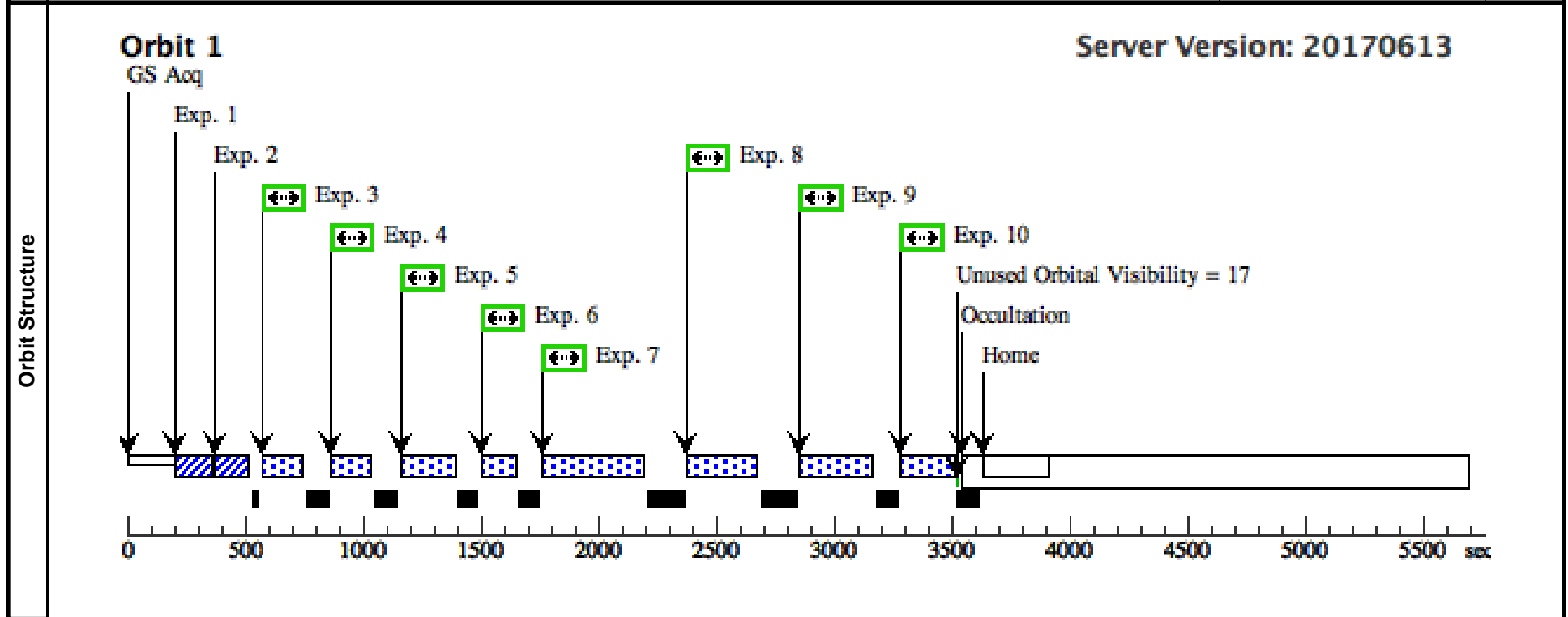
<b>Visit</b>	<b>Proposal 14683, Visit 51, implementation</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: (none)																
<b>Diagnostics</b>	(Visit 51) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.																
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>AAOMEGA-30DOR-333</td> <td>RA: 05 39 11.6100 (84.7983750d) Dec: -69 30 37.27 (-69.51035d) Equinox: J2000</td> <td></td> <td>V=12.27 B-V= 0.10, O2 - 3(n)f*p</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <p><i>Comments: Extended=NO</i></p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	AAOMEGA-30DOR-333	RA: 05 39 11.6100 (84.7983750d) Dec: -69 30 37.27 (-69.51035d) Equinox: J2000		V=12.27 B-V= 0.10, O2 - 3(n)f*p	Reference Frame: ICRS				
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous												
(1)	AAOMEGA-30DOR-333	RA: 05 39 11.6100 (84.7983750d) Dec: -69 30 37.27 (-69.51035d) Equinox: J2000		V=12.27 B-V= 0.10, O2 - 3(n)f*p	Reference Frame: ICRS												

Proposal 14683 - Visit 51 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	ACQ/PEAK XD (COS.sa.841 348)	(1) AAOMEGA-30D OR-333	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	NUM-POS=1; LIFETIME-POS=L P3		0.2 Secs (0.2 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.841 348)	(1) AAOMEGA-30D OR-333	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; CENTER=FLUX-W T-FLR; NUM-POS=5; SEGMENT=BOTH; LIFETIME-POS=L P3		0.2 Secs (0.2 Secs) [==>]	[1]
	3	G130M/129 1 (COS.sp.824 861)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=13 8; FLASH=YES; LIFETIME-POS=L P3		120 Secs (122 Secs) [==>122.0 Secs ]	[1]
	4	G130M/129 1 (COS.sp.824 861)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=13 8; FLASH=YES; LIFETIME-POS=L P3		120 Secs (122 Secs) [==>122.0 Secs ]	[1]
	5	G130M/132 7 (COS.sp.824 862)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=3; BUFFER-TIME=12 8; FLASH=YES; LIFETIME-POS=L P3		95 Secs (97 Secs) [==>97.0 Secs ]	[1]
	6	G130M/132 7 (COS.sp.824 862)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=4; BUFFER-TIME=12 8; FLASH=YES; LIFETIME-POS=L P3		95 Secs (97 Secs) [==>97.0 Secs ]	[1]
	7	G160M/157 7 (COS.sp.824 864)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=3; BUFFER-TIME=17 4; FLASH=YES		250 Secs (252 Secs) [==>252.0 Secs ]	[1]
	8	G160M/157 7 (COS.sp.824 864)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=4; BUFFER-TIME=17 4; FLASH=YES		250 Secs (252 Secs) [==>252.0 Secs ]	[1]
	9	G160M/162 3 (COS.sp.824 865)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=3; BUFFER-TIME=20 2; FLASH=YES		175 Secs (177 Secs) [==>177.0 Secs ]	[1]

Proposal 14683 - Visit 51 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

10	G160M/162 3 (COS.sp.824 865)	(1) AAOMEGA-30D OR-333	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=4; BUFFER-TIME=20 2; FLASH=YES	175 Secs (177 Secs)	[1]
						[=>177.0 Secs ]	



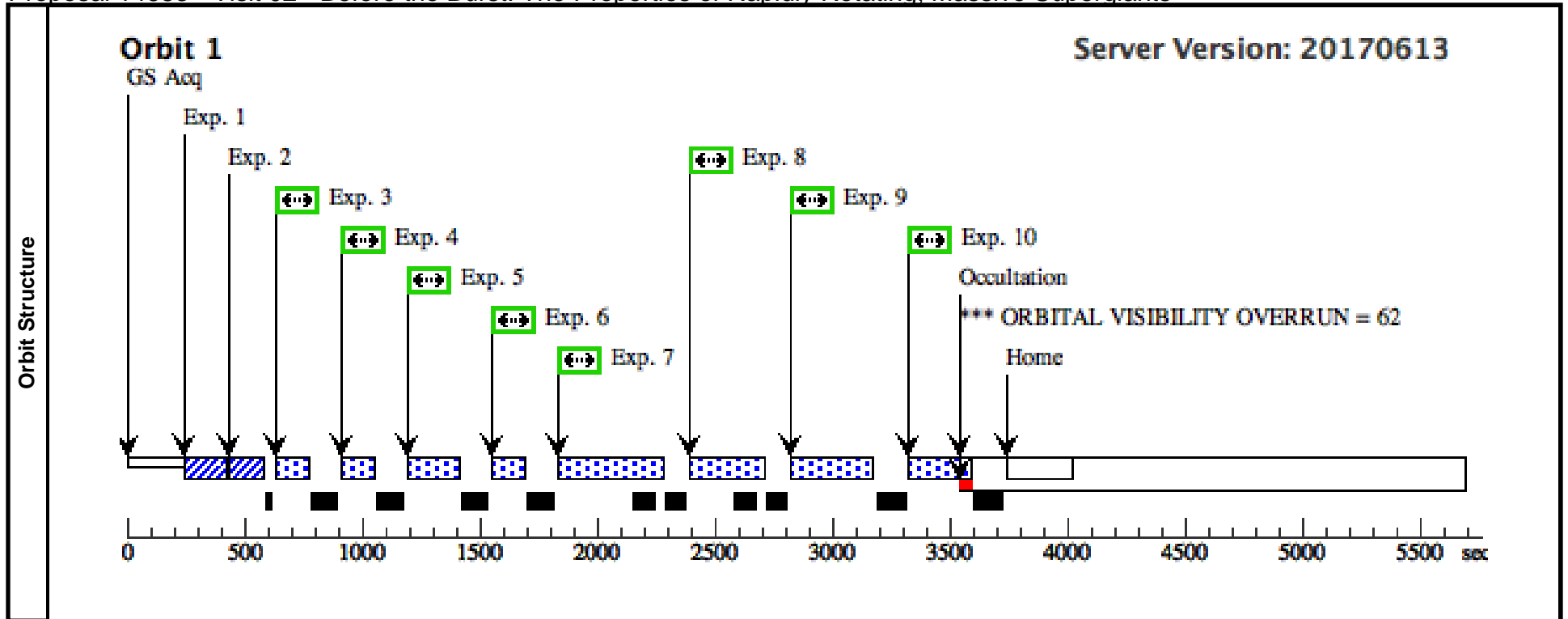
Proposal 14683 - Visit 02 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	<p><b>Proposal 14683, Visit 02, completed</b></p> <p><b>Diagnostic Status: Error</b></p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: (none)</p>						
	<b>Diagnostics</b>	<p>(ACQ/PEAKXD (02.001)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(ACQ/PEAKD (02.002)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (02.003)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (02.004)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (02.005)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (02.006)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(Visit 02) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.</p> <p>(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p> <p>(G130M/1327 (02.005)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p> <p>(G130M/1327 (02.006)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p>					
<b>Fixed Targets</b>		<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>
		(2)	AAOMEGA-30DOR-368	RA: 05 40 13.6450 (85.0568542d) Dec: -69 25 35.01 (-69.42639d) Equinox: J2000		V=13.30 B-V=-0.12, O7.5n(fp)	Reference Frame: ICRS
		<p><i>Comments: Extended=NO</i></p>					

Proposal 14683 - Visit 02 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.841 349)	(2) AAOMEGA-30D OR-368	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					0.3 Secs (0.3 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.841 349)	(2) AAOMEGA-30D OR-368	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; NUM-POS=5; STEP-SIZE=0.9; SEGMENT=BOTH				0.3 Secs (0.3 Secs) [==>]	[1]
	3	G130M/129 1 (COS.sp.824 867)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=80 ; FLASH=YES				80 Secs (88 Secs) [==>88.0 Secs ]	[1]
	4	G130M/129 1 (COS.sp.824 867)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=80 ; FLASH=YES				80 Secs (88 Secs) [==>88.0 Secs ]	[1]
	5	G130M/132 7 (COS.sp.824 828)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=3; BUFFER-TIME=80 ; FLASH=YES				80 Secs (88 Secs) [==>88.0 Secs ]	[1]
	6	G130M/132 7 (COS.sp.824 828)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=4; BUFFER-TIME=80 ; FLASH=YES				80 Secs (88 Secs) [==>88.0 Secs ]	[1]
	7	G160M/157 7 (COS.sp.824 871)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=3; BUFFER-TIME=15 4; FLASH=YES				260 Secs (268 Secs) [==>268.0 Secs ]	[1]
	8	G160M/157 7 (COS.sp.824 871)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=4; BUFFER-TIME=15 4; FLASH=YES				260 Secs (268 Secs) [==>268.0 Secs ]	[1]
	9	G160M/162 3 (COS.sp.824 874)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=3; BUFFER-TIME=18 6; FLASH=YES				210 Secs (218 Secs) [==>218.0 Secs ]	[1]
10	G160M/162 3 (COS.sp.824 874)	(2) AAOMEGA-30D OR-368	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=4; BUFFER-TIME=18 6; FLASH=YES				210 Secs (218 Secs) [==>218.0 Secs ]	[1]	



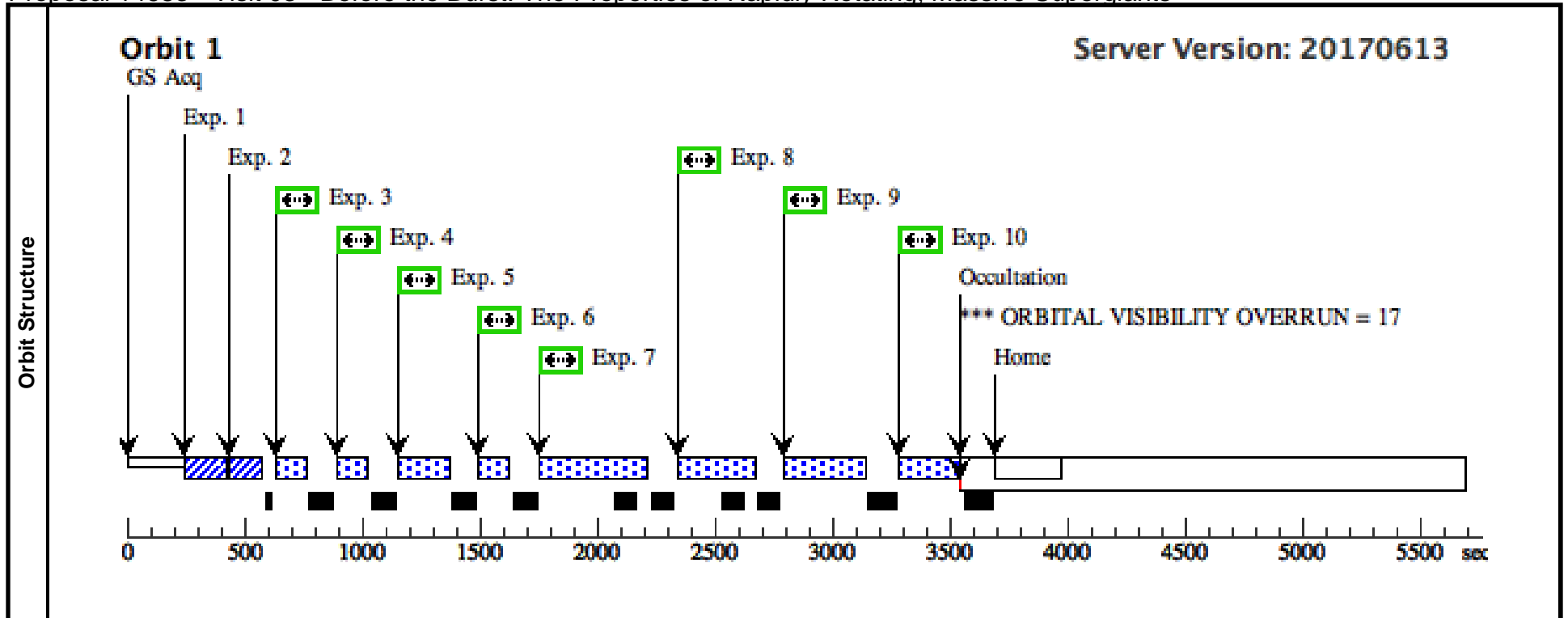
Proposal 14683 - Visit 03 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	<p><b>Proposal 14683, Visit 03, completed</b></p> <p><b>Diagnostic Status: Error</b></p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: (none)</p>																	
	<b>Diagnostics</b>	<p>(ACQ/PEAKXD (03.001)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(ACQ/PEAKD (03.002)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (03.003)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1291 (03.004)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (03.005)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(G130M/1327 (03.006)) Error (Form): LIFETIME-POS is required with G130M when not in Supported mode.</p> <p>(Visit 03) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.</p> <p>(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p> <p>(G130M/1327 (03.005)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p> <p>(G130M/1327 (03.006)) Warning (Form): Defaults for SEGMENT have changed in APT25.2 for use of LP4 with G130M. See full description for details.</p>																
<b>Fixed Targets</b>		<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(3)</td> <td>AAOMEGA-30DOR-187</td> <td>RA: 05 35 51.8560 (83.9660667d) Dec: -69 23 19.09 (-69.38864d) Equinox: J2000</td> <td></td> <td>V=13.40 B-V=-0.18, O6n(fp)</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(3)	AAOMEGA-30DOR-187	RA: 05 35 51.8560 (83.9660667d) Dec: -69 23 19.09 (-69.38864d) Equinox: J2000		V=13.40 B-V=-0.18, O6n(fp)	Reference Frame: ICRS	<p><i>Comments: Extended=NO</i></p>			
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous												
(3)	AAOMEGA-30DOR-187	RA: 05 35 51.8560 (83.9660667d) Dec: -69 23 19.09 (-69.38864d) Equinox: J2000		V=13.40 B-V=-0.18, O6n(fp)	Reference Frame: ICRS													

Proposal 14683 - Visit 03 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

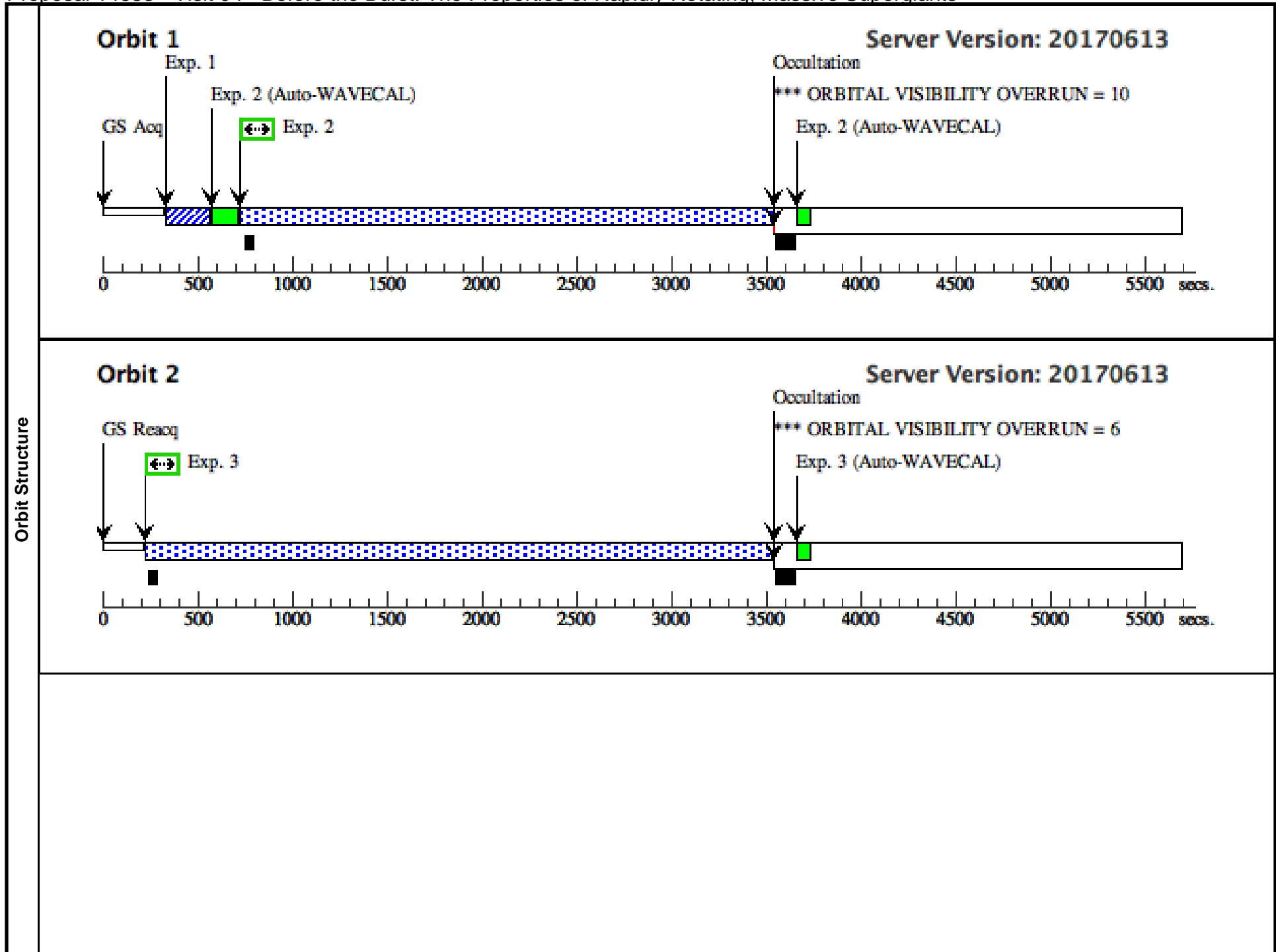
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ/PEAK XD (COS.sa.841 350)	(3) AAOMEGA-30D OR-187	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				0.2 Secs (0.2 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.841 350)	(3) AAOMEGA-30D OR-187	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	CENTER=FLUX-W T-FLR; NUM-POS=5; STEP-SIZE=0.9; SEGMENT=BOTH			0.2 Secs (0.2 Secs) [==>]	[1]
	3	G130M/129 1 (COS.sp.824 867)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=80 ; FLASH=YES			80 Secs (80 Secs) [==>80.0 Secs ]	[1]
	4	G130M/129 1 (COS.sp.824 867)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=80 ; FLASH=YES			80 Secs (80 Secs) [==>80.0 Secs ]	[1]
	5	G130M/132 7 (COS.sp.824 828)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=3; BUFFER-TIME=80 ; FLASH=YES			80 Secs (80 Secs) [==>80.0 Secs ]	[1]
	6	G130M/132 7 (COS.sp.824 828)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=4; BUFFER-TIME=80 ; FLASH=YES			80 Secs (80 Secs) [==>80.0 Secs ]	[1]
	7	G160M/157 7 (COS.sp.824 871)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=3; BUFFER-TIME=15 4; FLASH=YES			280 Secs (280 Secs) [==>280.0 Secs ]	[1]
	8	G160M/157 7 (COS.sp.824 871)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G160M 1577 A	FP-POS=4; BUFFER-TIME=15 4; FLASH=YES			280 Secs (280 Secs) [==>280.0 Secs ]	[1]
	9	G160M/162 3 (COS.sp.824 874)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=3; BUFFER-TIME=18 6; FLASH=YES			210 Secs (210 Secs) [==>210.0 Secs ]	[1]
10	G160M/162 3 (COS.sp.824 874)	(3) AAOMEGA-30D OR-187	COS/FUV, TIME-TAG, PSA	G160M 1623 A	FP-POS=4; BUFFER-TIME=18 6; FLASH=YES			210 Secs (210 Secs) [==>210.0 Secs ]	[1]	

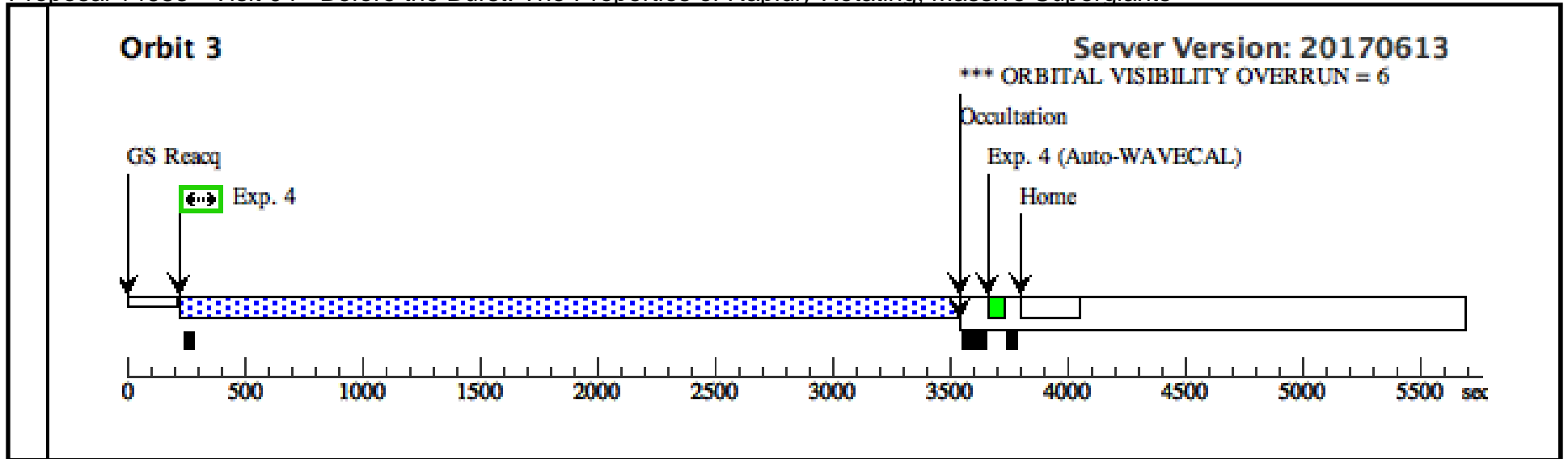


Proposal 14683 - Visit 04 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	<b>Proposal 14683, Visit 04, scheduling</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(4)	AAOMEGA-30DOR-142	RA: 05 34 6.2010 (83.5258375d) Dec: -69 25 9.43 (-69.41929d) Equinox: J2000		V=13.24 B-V=-0.15, O6.5(n)(fp)	Reference Frame: ICRS				
<i>Comments: Extended=NO</i>										
<b>Exposures</b>	<b>#</b>	<b>Label (ETC Run)</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1		(4) AAOMEGA-30D OR-142	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.1 Secs (0.1 Secs) [==>]	[1]
	2	(STIS.sp.82 5205)	(4) AAOMEGA-30D OR-142	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs) [==>]	[1]
	3	(STIS.sp.82 2469)	(4) AAOMEGA-30D OR-142	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs) [==>]	[2]
	4	(STIS.sp.82 2469)	(4) AAOMEGA-30D OR-142	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs) [==>]	[3]

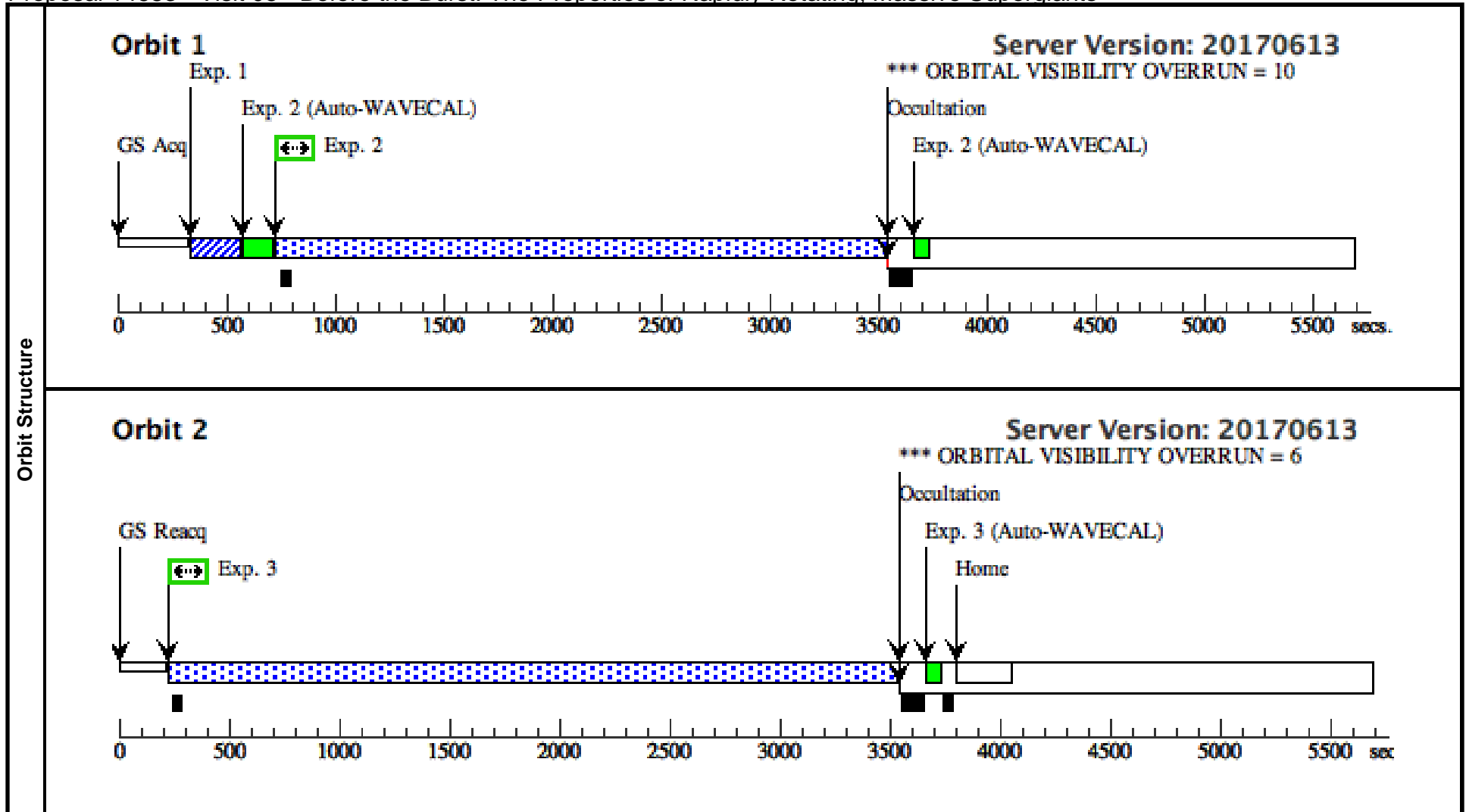




Proposal 14683 - Visit 05 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	<b>Proposal 14683, Visit 05, scheduling</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(5)	ELS2006-N11-020	RA: 04 56 50.3210 (74.2096708d) Dec: -66 31 3.80 (-66.51772d) Equinox: J2000		V=13.18 B-V=-0.22, O5n Ifp	Reference Frame: ICRS				
<i>Comments: Extended=NO</i>										
<b>Exposures</b>	<b>#</b>	<b>Label (ETC Run)</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1		(5) ELS2006-N11-020	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs)	
			0						[==>]	[1]
	2	(STIS.sp.82 5206)	(5) ELS2006-N11-020	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs)	
		0						[==>]	[1]	
3	(STIS.sp.82 2778)	(5) ELS2006-N11-020	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs)		
		0						[==>]	[2]	



Proposal 14683 - Visit 06 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

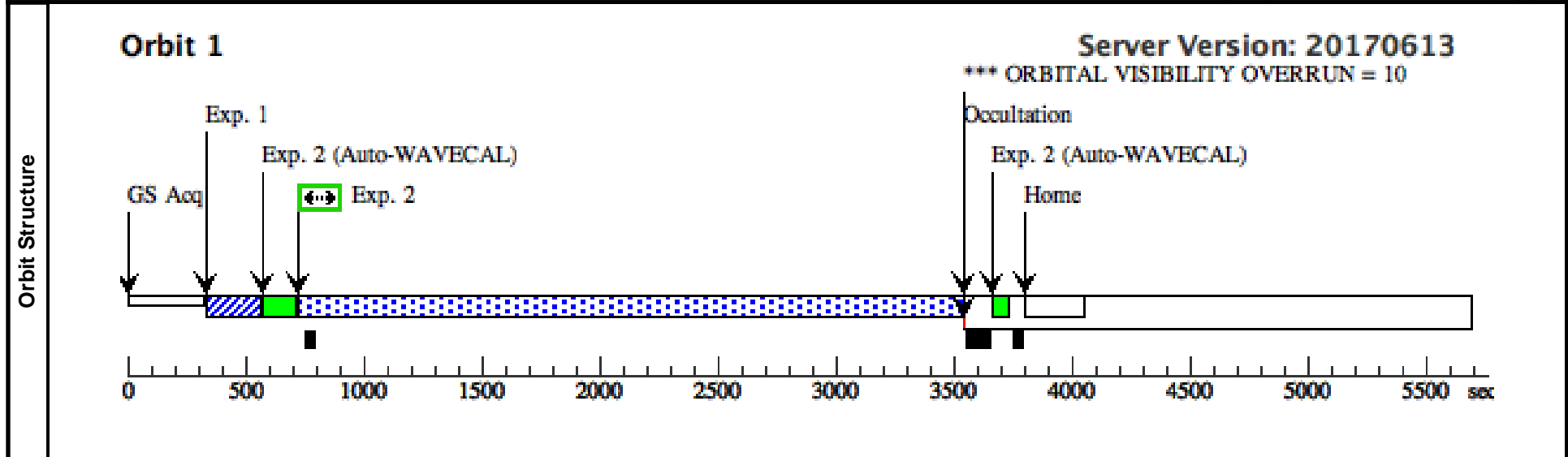
Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	Proposal 14683, Visit 06, scheduling <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)
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<b>Diagnostics</b>	(Visit 06) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN
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<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(6)</td> <td>ST2-53</td> <td>RA: 05 36 6.3770 (84.0265708d) Dec: -69 11 47.56 (-69.19654d) Equinox: J2000</td> <td></td> <td>V=12.29 B-V=-0.15, O5n(f)p</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(6)	ST2-53	RA: 05 36 6.3770 (84.0265708d) Dec: -69 11 47.56 (-69.19654d) Equinox: J2000		V=12.29 B-V=-0.15, O5n(f)p	Reference Frame: ICRS
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous							
(6)	ST2-53	RA: 05 36 6.3770 (84.0265708d) Dec: -69 11 47.56 (-69.19654d) Equinox: J2000		V=12.29 B-V=-0.15, O5n(f)p	Reference Frame: ICRS								
Comments: Extended=NO													

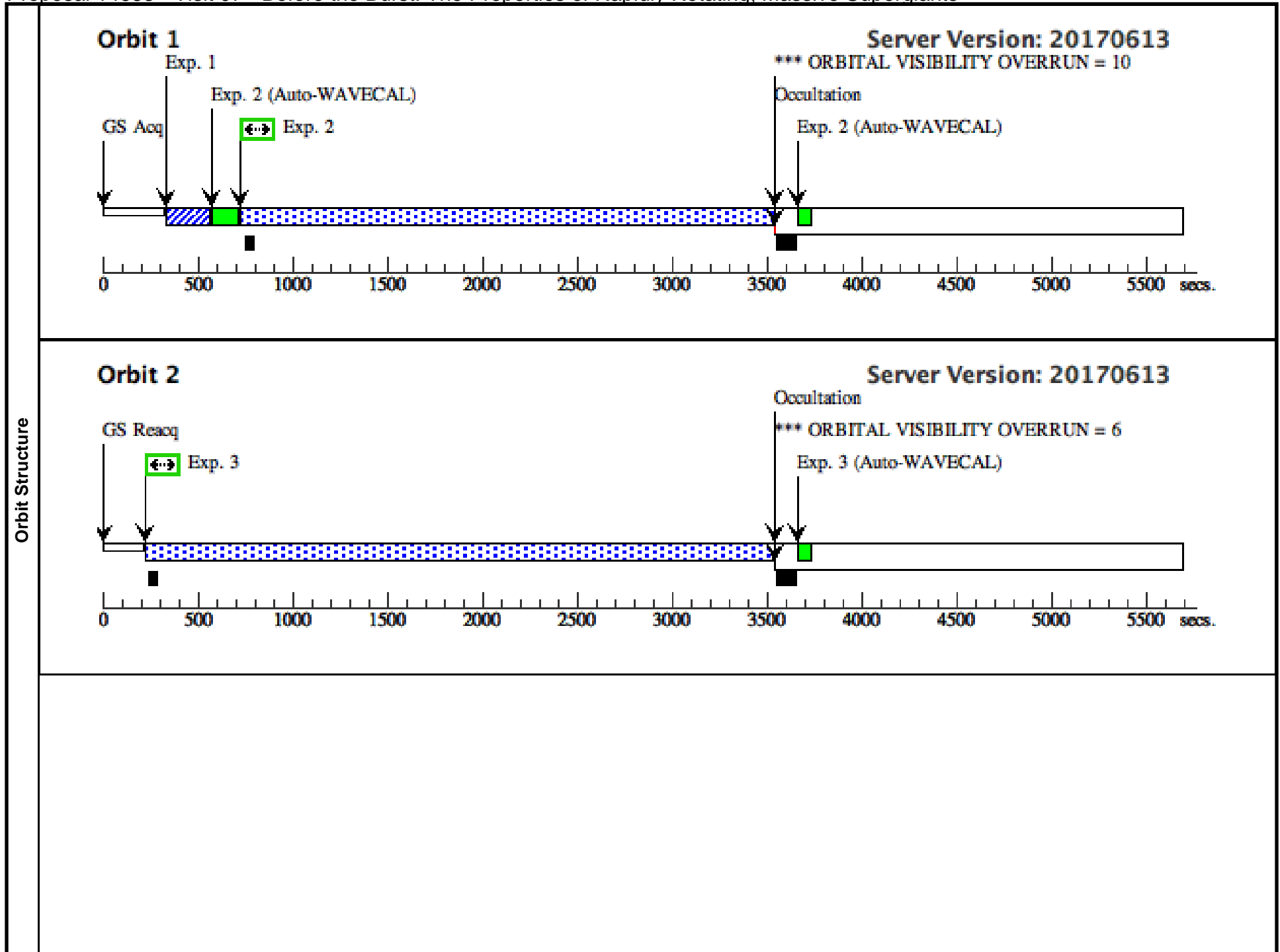
<b>Exposures</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Label (ETC Run)</th> <th>Target</th> <th>Config,Mode,Aperture</th> <th>Spectral Els.</th> <th>Opt. Params.</th> <th>Special Reqs.</th> <th>Groups</th> <th>Exp. Time (Total)/[Actual Dur.]</th> <th>Orbit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>(6) ST2-53</td> <td>STIS/CCD, ACQ, F28X50LP</td> <td>MIRROR</td> <td>ACQTYPE=POINT</td> <td></td> <td></td> <td>0.2 Secs (0.2 Secs) [=&gt;]</td> <td>[1]</td> </tr> <tr> <td>2</td> <td>(STIS.sp.82 5207)</td> <td>(6) ST2-53</td> <td>STIS/FUV-MAMA, ACCUM, 0.2X0.2</td> <td>E140M 1425 A</td> <td></td> <td></td> <td></td> <td>2800 Secs (2800 Secs) [=&gt;]</td> <td>[1]</td> </tr> </tbody> </table>	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	1		(6) ST2-53	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs) [=>]	[1]	2	(STIS.sp.82 5207)	(6) ST2-53	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs) [=>]	[1]
	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit																					
	1		(6) ST2-53	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs) [=>]	[1]																					
2	(STIS.sp.82 5207)	(6) ST2-53	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs) [=>]	[1]																						

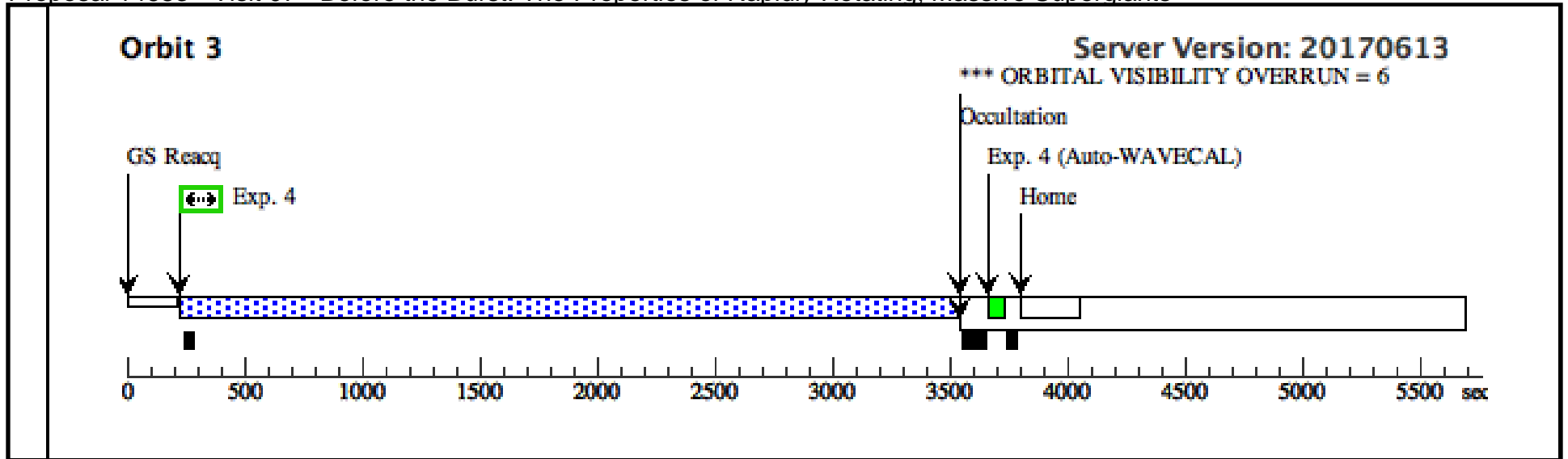


Proposal 14683 - Visit 07 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	Proposal 14683, Visit 07, scheduled <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
<b>Diagnostics</b>	(Visit 07) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 07) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 07) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
(7)	FARINA82	RA: 05 40 4.6200 (85.0192500d) Dec: -69 39 50.60 (-69.66406d) Equinox: J2000		V=12.38 B-V=-0.03, O5n(f)p	Reference Frame: ICRS					
<i>Comments: Extended=NO</i>										
<b>Exposures</b>	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(7) FARINA82	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs) [==>]	[1]
	2	(STIS.sp.82 5208)	(7) FARINA82	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs) [==>]	[1]
	3	(STIS.sp.82 5209)	(7) FARINA82	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs) [==>]	[2]
	4	(STIS.sp.82 5209)	(7) FARINA82	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs) [==>]	[3]





Proposal 14683 - Visit 08 - Before the Burst: The Properties of Rapidly Rotating, Massive Supergiants

Thu Aug 10 18:00:30 GMT 2017

<b>Visit</b>	<b>Proposal 14683, Visit 08, scheduled</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
	(Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(8)	2DFL-51-50	RA: 05 31 8.0250 (82.7834375d) Dec: -68 36 54.66 (-68.61518d) Equinox: J2000		V=12.82 B-V=-0.18, O7.5(n)(fp)	Reference Frame: ICRS				
<i>Comments: Extended=NO</i>										
<b>Exposures</b>	<b>#</b>	<b>Label (ETC Run)</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1		(8) 2DFL-51-50	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			0.2 Secs (0.2 Secs) [==>]	[1]
	2	(STIS.sp.82 5210)	(8) 2DFL-51-50	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2800 Secs (2800 Secs) [==>]	[1]
	3	(STIS.sp.82 6477)	(8) 2DFL-51-50	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				3300 Secs (3300 Secs) [==>]	[2]

