10904 - Star formation in extended UV disk (XUV-disk) galaxies

Cycle: 15, Proposal Category: GO

(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) NGC5055-XUV-A ANY	ACS/WFC WFPC2	4	29-Jun-2007 21:01:17.0	yes
02	(2) NGC5055-XUV-B ANY	ACS/SBC WFPC2	2	29-Jun-2007 21:01:32.0	yes
03	(3) NGC2090-XUV-A	WFPC2	4	29-Jun-2007 21:01:36.0	yes
07	(3) NGC2090-XUV-A	WFPC2	4	29-Jun-2007 21:01:39.0	yes
08	(3) NGC2090-XUV-A	WFPC2	4	29-Jun-2007 21:01:41.0	yes
05	(3) NGC2090-XUV-A	WFPC2	4	29-Jun-2007 21:01:44.0	yes
06	(3) NGC2090-XUV-A	WFPC2	4	29-Jun-2007 21:01:48.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(4) NGC2090-XUV-B ANY	ACS/SBC WFPC2	2	29-Jun-2007 21:01:54.0	yes

28 Total Orbits Used

ABSTRACT

The Galaxy Evolution Explorer (GALEX) has discovered the existence of extended UV-disk (XUV-disk) galaxies. This class of intriguing spiral galaxies is distinguished by UV-bright regions of star formation located at extreme galactocentric radii, commonly reaching many times the optical extent of each target. XUV-disks represent a population of late-type galaxies still actively building, or significantly augmenting, their stellar disk in the outer, low-density environment. Prior to GALEX, such regions were considered to be far more stable against star formation than now realized. Our work on these targets has led to the recognition of the XUV phenomenon as probing a diverse population of galaxies which, although having certain commonality in terms of their present XUV star formation, have apparently experienced different star formation histories (as judged by their outer disk UV-optical colors and morphology). In ordinary spirals, disk formation occurred at a much earlier epoch, making today's XUV-disks useful templates for commonplace, high z galaxies.

The diverse XUV-disks in our sample may represent snapshots of different phases in the disk building process. We seek to characterize the demographics of star forming regions occupying this environmental range, especially in contrast to their inner disk counterparts. HST imaging is needed to accurately characterize the massive stars and clusters which have, in fact, managed to form. The GALEX observations are limited by 5" resolution. Deep ACS FUV, B, V, I, and H-alpha imaging (along with parallel WFPC2 data) will allow: (1) photometric classification of the OB star population, (2) constraint on the cluster mass function and age distribution, (3) critical accounting for possible leakage of Lyman continuum photons in a porous ISM or an IMF change, and (4) population synthesis modeling of the field SFH on Gyr timescales. We benefit from extensive archival HST observations of our target galaxies, although the outer disk has yet to be probed.

OBSERVING DESCRIPTION

We request ACS/SBC + ACS/WFC (FUV, B, V, I, H-alpha) observations, and similar parallel WFPC2 imagery, to scrutinize the massive star content and young cluster properties within selected UV-bright regions typifying the diversity of extended UV-disk (XUV-disk) systems. We propose to image one ACS/WFC field per XUV-disk galaxy (NGC2090 and NGC5055). Each of these ACS/WFC fields will in turn contain a single ACS/SBC pointing. The resulting data will be used to characterize the XUV-disk star forming regions through SED fitting of multi-color ACS/SBC+WFC photometry for discrete sources (clusters and stars), in addition to any detected diffuse field star emission. All young stellar sources will be correlated against the observed H-alpha distribution. If "bare O stars" are found, we will estimate the gross XUV-disk contribution to the intergalactic (ionizing) radiation field. Several analysis methods will be used:

(1) We will measure magnitudes of individual massive stars reaching spectral type B3V in several bands (SBC F150LP, and ACS F435W, F606W, F814W). This combination of bands will resolve the early spectral types (or young ages for clusters) whose colors are saturated at optical wavelengths (Bianchi & Efremova 2006). SBC FUV observations maximize sensitivity to changes in Teff and extinction (see Massey 1998). Without vacuum-UV, HST-resolution observations we could not use imaging data to discriminate between O and B stars. We will also use the (V-I, I) CMD of evolved (AGB and RGB) stars to constrain the several Gyr-term SFH of the outer disk and provide metallicity information.

(2) We will characterize all young to moderate age stellar clusters. Source photometry will be fit using model SEDs from the population synthesis library of Bruzual & Charlot (2003), to concurrently determine age, luminosity, mass, and extinction. Cluster size will also be measured when possible. The H-alpha flux and morphology of associated HII regions will be compared to embedded stellar mass and photometric age, to address the possibility of Lyman continuum leakage.

(3) We will use the requested ACS data to constrain the SFH of the general (unresolved) field star population on Gyr timescales. This has been demonstrated by Eskridge et al. (2003) using HST.

(4) We will compare outer disk star forming regions against their inner disk analogues using ample archival HST data, looking for changes in the bivariate cluster (mass, age) distribution.

For the ACS/SBC observations, a total integration time of ~6000 sec (taking 2 orbits per SBC field) is required to detect a single B3V star with ~5-sigma significance in the FUV (F150LP) bandpass (at 8.2 Mpc). Our phase-II proposal breaks this integration into 8 segments within a 2-orbit visit per ACS/SBC field. We also employ the a standard ACS-SBC-DITHER-LINE pattern for this set of exposures. The corresponding ACS/WFC B (F435W) integration time necessary to detect a B3V star with 6-sigma significance is ~2200 sec. While computing these estimates, we assumed a total (foreground+internal) extinction corresponding to E(B-V) = 0.1. In phase-II, we planned our ACS/WFC F435W observation for each galaxy as a set of four exposures (a CR-split at each of two dithered positions). Exposure times for the F606W and F814W filters on the ACS/WFC are determined not by detecting the main sequence stellar population found within and possibly amongst clusters, but rather by our desire to characterize resolved asymptotic giant branch (AGB) and red giant branch (RGB) stars in the field population. This will provide constraint on disk metallicity and the SFH of the XUV environment over several Gyr, much longer than probed by GALEX or the requested FUV, B-band HST observations. However, this is only feasible for NGC5055 given our Cycle 15 allocation. We would expect to detect the tip of the RGB (TRGB) near I = 25.5 if we assume MI,TRGB = -4 and use a typical distance modulus of m-M = 29.5. Further adopting K0 as the average spectral type of stars comprising the TRGB, we estimate a required F814W integration of 2200 sec to detect stars one magnitude fainter (in I) than the TRGB at ~5-sigma. Similar considerations lead to a F606W integration of 4600 sec. Overhead costs in our program will only allow us to achieve ~2200 sec in F606W. Other science drivers, including cluster size measurement and SFH constraint for the unresolved background, are less demanding in exposure time although spatial binning may be needed for the SFH analysis. Relative to individual OB stars, the FUV and BVI integrations quoted above will produce S/N >> 10 for typical star clusters (few x 1e3 M_sun) in the age range, 0.1-100 Myr.

The goal of our proposed H-alpha imaging is to reliably detect HII emission produced by a single massive star for as wide a range in spectral type as possible, given the distance to NGC5055 (8.2 Mpc) and NGC2090 (11.3 Mpc). A single B0V star is expected to have L(H-alpha) = 1e36 erg/s, whereas an O3V star should have L(H-alpha) = 1e38 erg/s. Both of these figures assume no LyC leakage. Preliminary work with the HST archival data confirms that in 1600 sec, we can reach a 5-sigma flux limit of 7x10-17 erg s-2 cm-2 after continuum subtraction for a point source. This implies that such an exposure can detect a B0V HII region out to a representative distance of 10 Mpc, if there is no leakage and the nebulae is unresolved. However, we do expect leakage (50% is common in the inner disk) and the HII emission may be extended because of the low density environment. We propose to devote the equivalent of one orbit to the H-alpha exposure for each galaxy, allowing a nearly complete inventory of the HII regions produced by single OB stars even with LyC leakage.

As noted above, our HST program takes advantage of a parallel observing strategy to maximize our overall data acquisition efficiency for the XUV-disk environment. It is important to note that we selected ACS/SBC for our UV imaging, rather than WFPC2, primarily due to the SBC's much superior FUV sensitivity which allows us to push down the ZAMS considerably further.

Visit orientation has been constrained in order to place the parallel WFPC2 fields within the XUV-disk whenever possible. Visit orientation has also been optimized to guarantee that the ACS/SBC field lies away from the interchip gap of the ACS/WFC. Even though we dither across the WFC gap, the net effective exposure will be lower in this area.

In order to critically assess the brightness-limit safety check for the ACS/SBC targets, we have measured observed fluxes on our GALEX FUV (1530A) imagery. In particular, at the position of each SBC pointing, we have extracted the total flux and peak flux (at 5" resolution) over a 45x45 arcsec region. In both cases, the measured fluxes translate into predicted SBC-F150LP count rates which are well below the global/local safety (and non-linearity) thresholds. The measured values are specified in the Phase 2 target blocks on a source-by-source basis.

Our target positions were primarily selected on the basis of the GALEX FUV and NUV imagery, with a check on ground-based H-alpha observations. Positional accuracy of the GALEX pipeline image reconstruction process (working from photon-counting data) is considered to be about one arcsecond.

Visit

Proposal 10904, Visit 01, completed Sat Jun 30 01:01:57 GMT 2007

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC, WFPC2

Special Requirements: ORIENT 259.0D TO 265.0 D

Diagnostics

(Visit 01) Warning: PATTERN AND COORDINATED PARALLEL MISMATCH

(Visit 01) Warning: PATTERN AND COORDINATED PARALLEL MISMATCH

(Visit 01) Warning: PATTERN AND COORDINATED PARALLEL MISMATCH

(Visit 01) Warning: PATTERN AND COORDINATED PARALLEL MISMATCH

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-12)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC5055-XUV-A	RA: 13 16 17.4636 (199.0727650d) Dec: +42 05 58.88 (42.09969d) Equinox: J2000		V=8.59+/-0.01	Reference Frame: ICRS

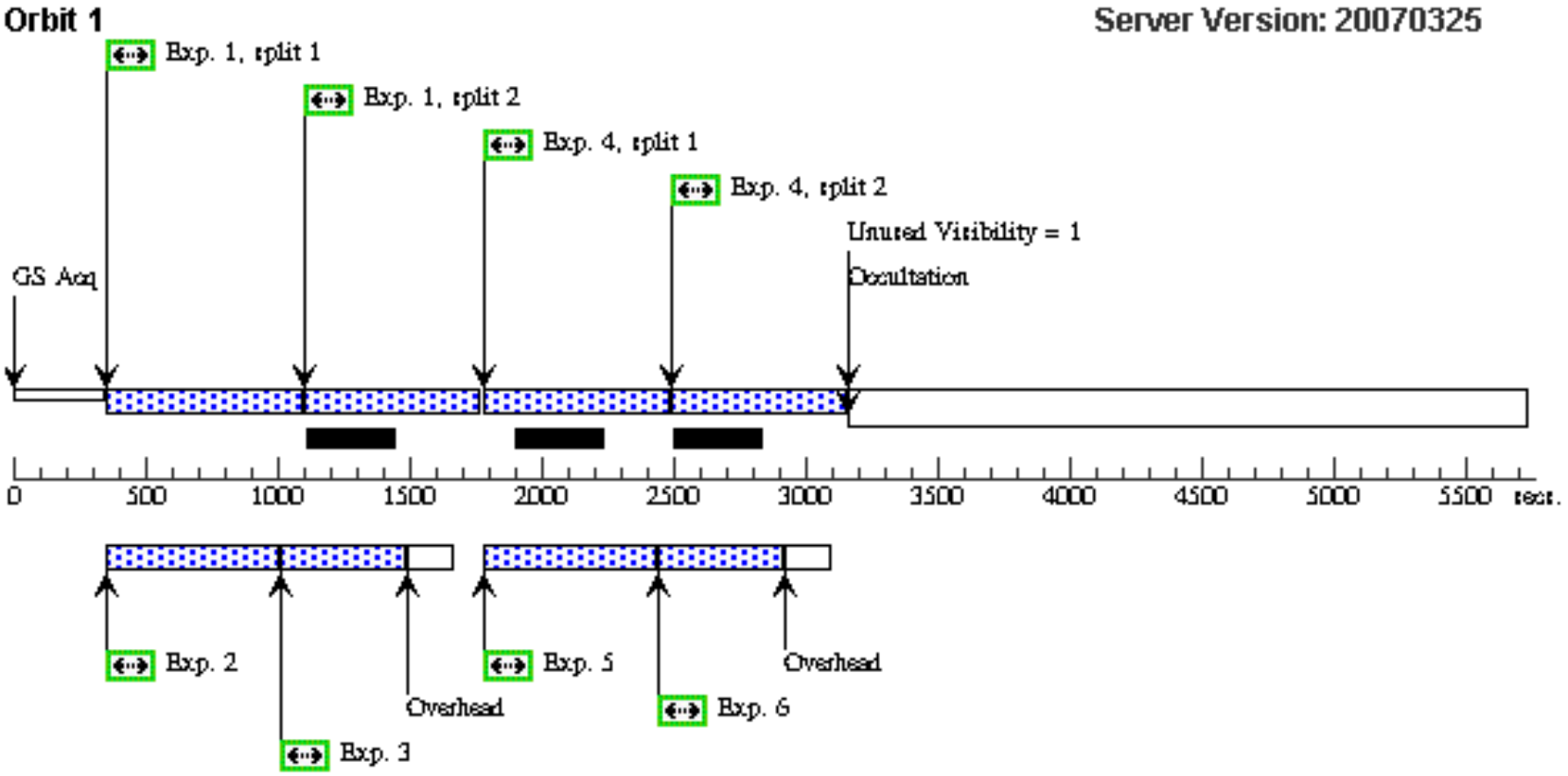
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) NGC5055-XUV-A	ACS/WFC, ACCUM, WFC-FIX	F814W			Pattern 1-12 (1)	1050.0 Secs	
							Prime + Parallel Group 1-3	*[==>536.0 Secs (Pattern 1, Split 1)]* *[==>536.0 Secs (Pattern 1, Split 2)]*	***[1]***
								[==>551.0 Secs (Pattern 2, Split 1)] *[==>551.0 Secs (Pattern 2, Split 2)]*	***[3]***
2		ANY	WFPC2, IMAGE, WFALL-FIX	F814W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 1-3	*[==>400.0 Secs (Pattern 1)]*	***[1]***
								[==>400.0 Secs (Pattern 2)]	***[3]***
3		ANY	WFPC2, IMAGE, WFALL-FIX	F606W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 1-3	*[==>400.0 Secs (Pattern 1)]*	***[1]***
								[==>400.0 Secs (Pattern 2)]	***[3]***
4		(1) NGC5055-XUV-A	ACS/WFC, ACCUM, WFC-FIX	F658N			Pattern 1-12 (1)	1050.0 Secs	
							Prime + Parallel Group 4-6	*[==>536.0 Secs (Pattern 1, Split 1)]* *[==>536.0 Secs (Pattern 1, Split 2)]*	***[1]***
								[==>551.0 Secs (Pattern 2, Split 1)] *[==>551.0 Secs (Pattern 2, Split 2)]*	***[3]***

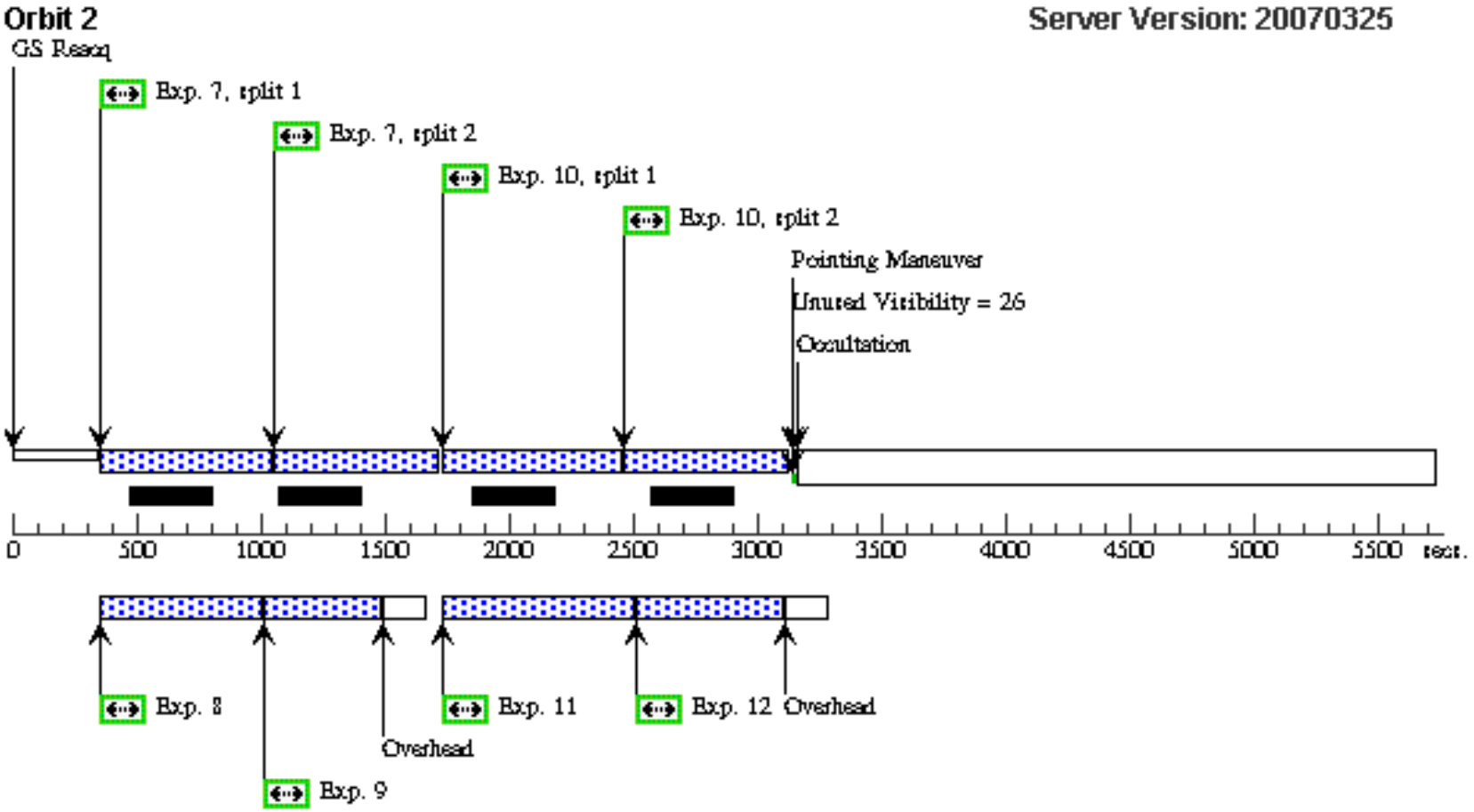
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
5		ANY	WFPC2, IMAGE, WFALL-FIX	F606W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 4-6	*[==>400.0 Secs (Pattern 1)]*	***[1]***
								[==>500.0 Secs (Pattern 2)]	***[3]***
6		ANY	WFPC2, IMAGE, WFALL-FIX	F439W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 4-6	*[==>400.0 Secs (Pattern 1)]*	***[1]***
								[==>500.0 Secs (Pattern 2)]	***[3]***
7		(1) NGC5055-XUV-A	ACS/WFC, ACCUM, WFC-FIX	F606W			Pattern 1-12 (1)	1050.0 Secs	
							Prime + Parallel Group 7-9	*[==>539.0 Secs (Pattern 1, Split 1)]*	***[2]***
								[==>539.0 Secs (Pattern 1, Split 2)]	
								[==>545.0 Secs (Pattern 2, Split 1)]	***[4]***
								[==>545.0 Secs (Pattern 2, Split 2)]	
8		ANY	WFPC2, IMAGE, WFALL-FIX	F814W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 7-9	*[==>400.0 Secs (Pattern 1)]*	***[2]***
								[==>400.0 Secs (Pattern 2)]	***[4]***
9		ANY	WFPC2, IMAGE, WFALL-FIX	F439W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 7-9	*[==>400.0 Secs (Pattern 1)]*	***[2]***
								[==>400.0 Secs (Pattern 2)]	***[4]***
10		(1) NGC5055-XUV-A	ACS/WFC, ACCUM, WFC-FIX	F435W			Pattern 1-12 (1)	1050.0 Secs	
							Prime + Parallel Group 10-12	*[==>539.0 Secs (Pattern 1, Split 1)]*	***[2]***
								[==>539.0 Secs (Pattern 1, Split 2)]	
								[==>545.0 Secs (Pattern 2, Split 1)]	***[4]***
								[==>545.0 Secs (Pattern 2, Split 2)]	
11		ANY	WFPC2, IMAGE, WFALL-FIX	F606W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 10-12	*[==>500.0 Secs (Pattern 1)]*	***[2]***
								[==>500.0 Secs (Pattern 2)]	***[4]***
12		ANY	WFPC2, IMAGE, WFALL-FIX	F439W			Pattern 1-12 (1)	400.0 Secs	
							Prime + Parallel Group 10-12	*[==>500.0 Secs (Pattern 1)]*	***[2]***
								[==>500.0 Secs (Pattern 2)]	***[4]***

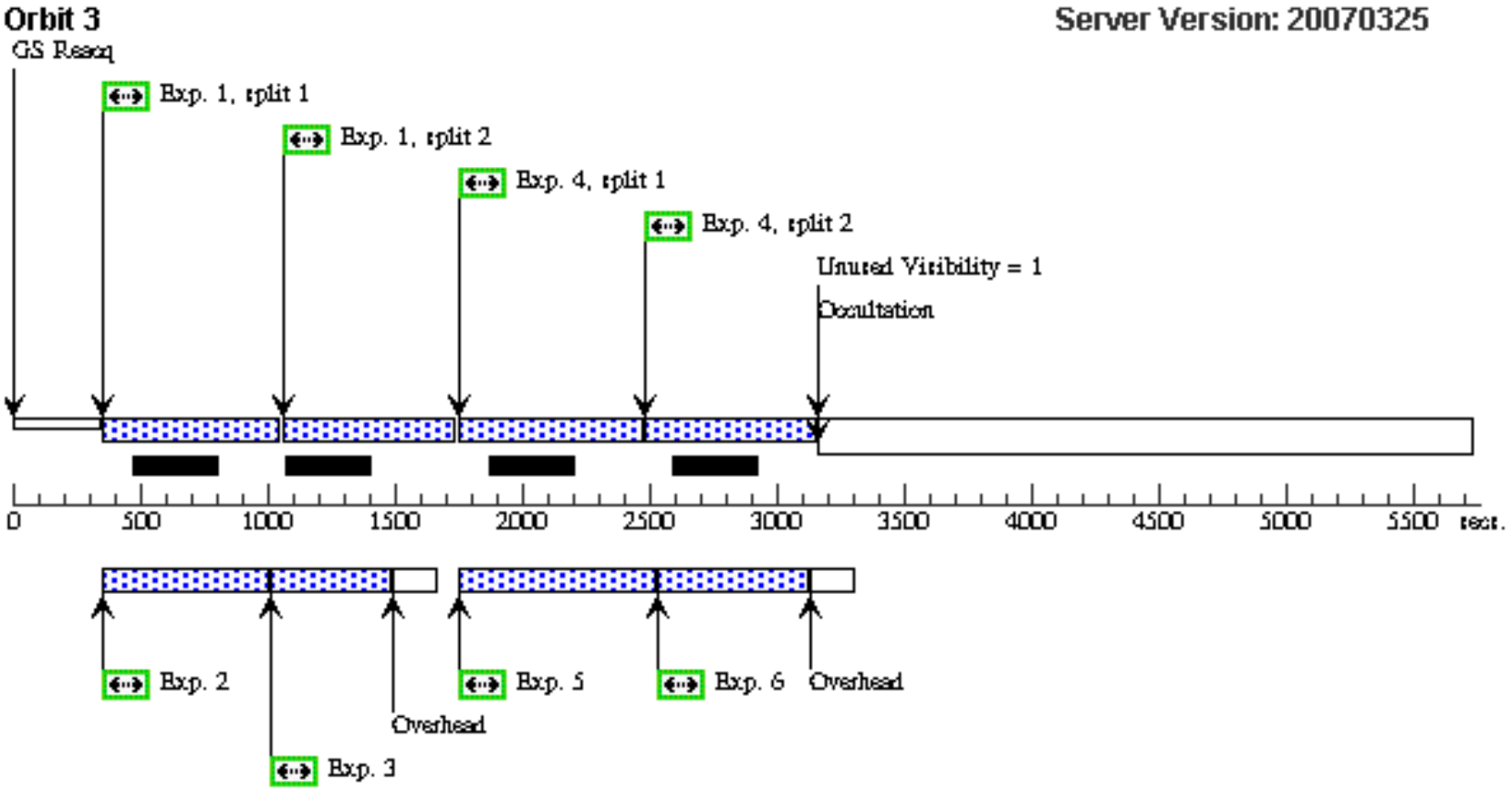
Orbit Structure

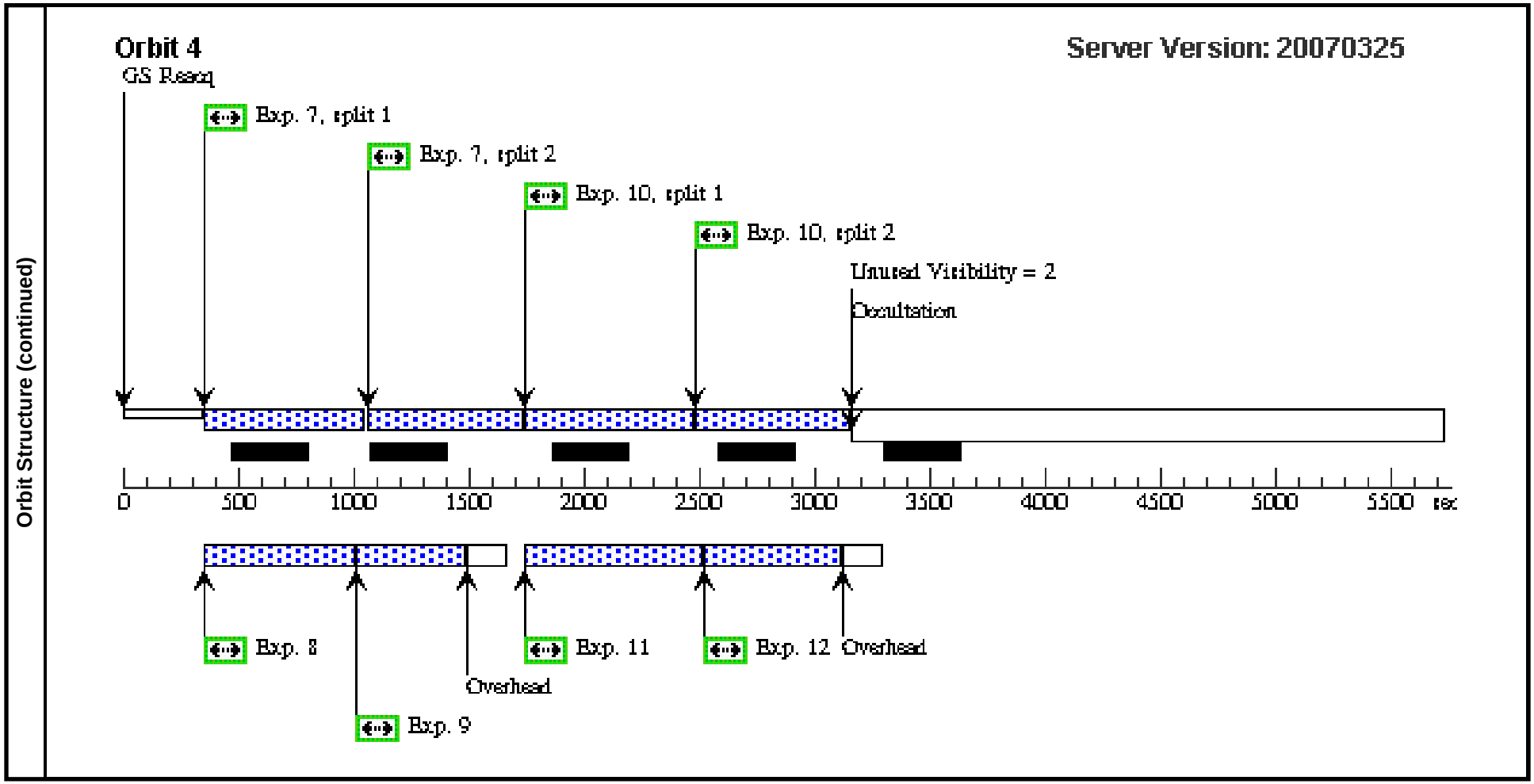


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20070325
GS Reacq
Exp. 7, split 1
Exp. 7, split 2
Exp. 10, split 1
Exp. 10, split 2
Unused Visibility = 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 8
Overhead
Exp. 9
Exp. 11
Exp. 12
Overhead

Visit

Proposal 10904, Visit 02, completed Sat Jun 30 01:01:59 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC, WFPC2

Special Requirements: ORIENT 161.0D TO 173.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.472 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false		(1-4)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC5055-XUV-B	RA: 13 16 22.9400 (199.0955833d) Dec: +42 06 36.20 (42.11006d) Equinox: J2000		V=17.85+/-0.4 but (6.6e-16, 9.4e-18) erg/s/cm2/A at FUV (total, max) in SBC FOV	Reference Frame: ICRS

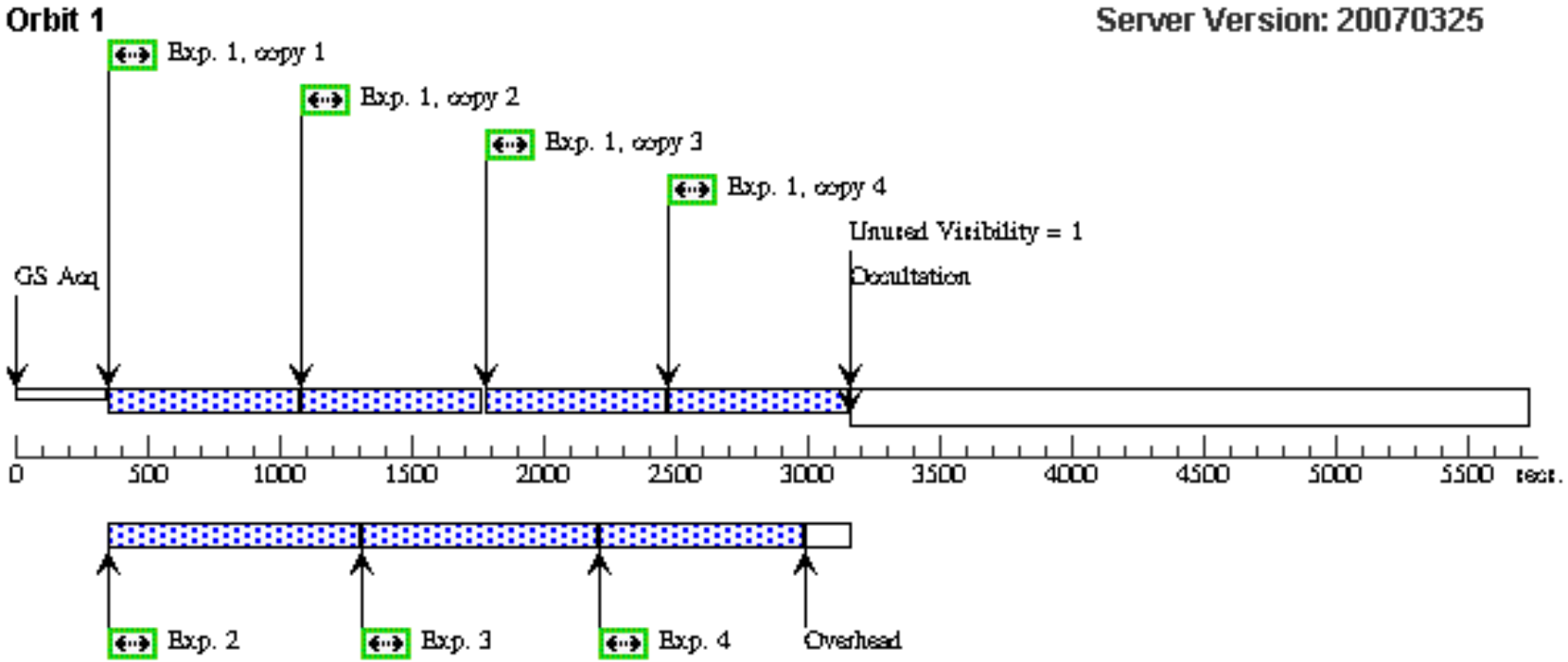
Exposures

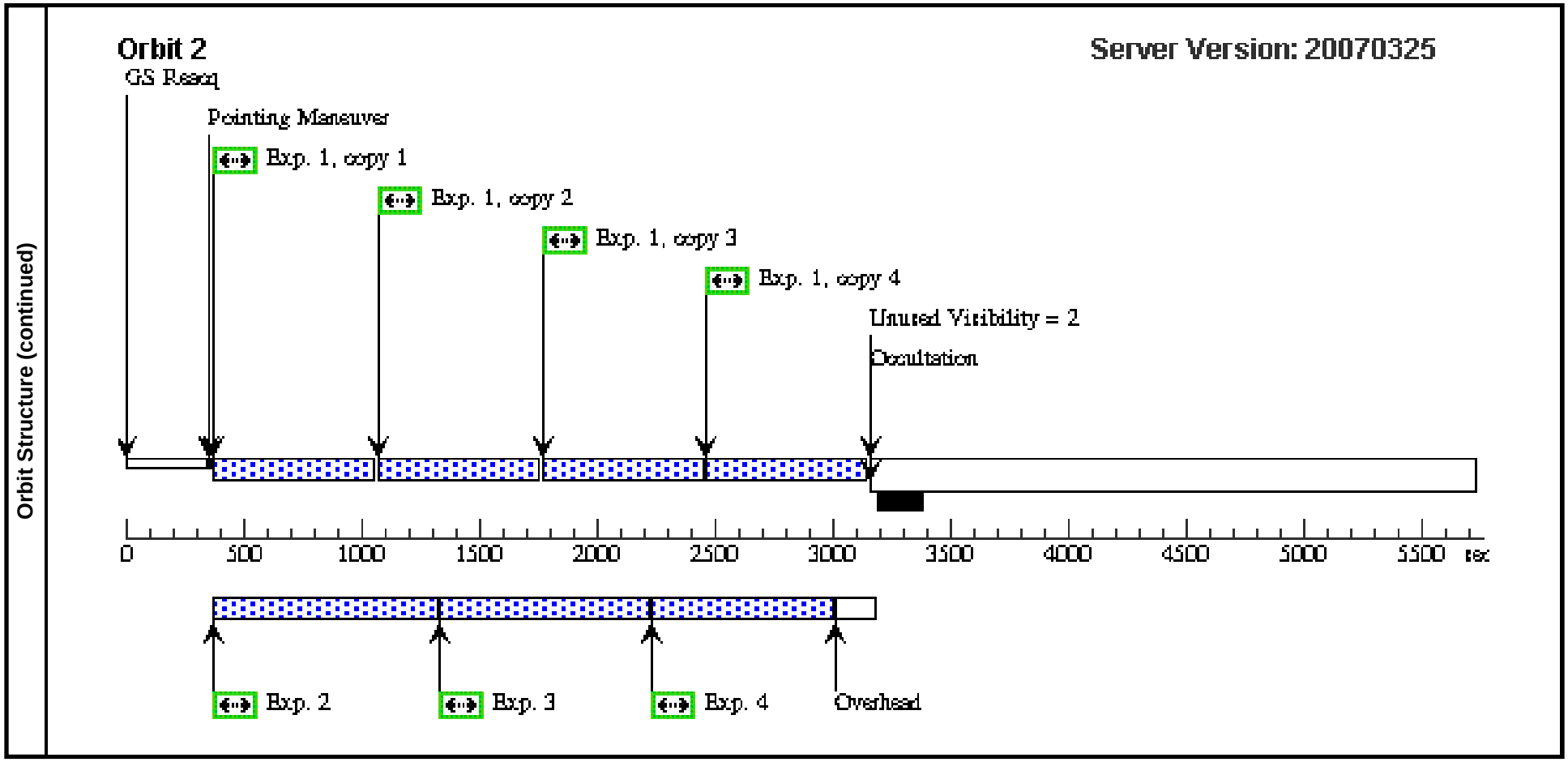
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) NGC5055-XUV-B	ACS/SBC, ACCUM, SBC-FIX	F150LP			Pattern 1-4 (2)	650.0 Secs X 4	
							Prime + Parallel Group 1-4	*[==>653.0 Secs (Pattern 1, Copy 1)]*	***[1]***
								[==>653.0 Secs (Pattern 1, Copy 2)]	
								[==>653.0 Secs (Pattern 1, Copy 3)]	
								[==>653.0 Secs (Pattern 1, Copy 4)]	
								[==>658.0 Secs (Pattern 2, Copy 1)]	***[2]***
								[==>658.0 Secs (Pattern 2, Copy 2)]	
								[==>658.0 Secs (Pattern 2, Copy 3)]	
								[==>658.0 Secs (Pattern 2, Copy 4)]	
2		ANY	WFPC2, IMAGE, WFALL-FIX	F439W			Pattern 1-4 (2)	240.0 Secs	
							Prime + Parallel Group 1-4	*[==>700.0 Secs (Pattern 1)]*	***[1]***
								[==>700.0 Secs (Pattern 2)]	***[2]***
3		ANY	WFPC2, IMAGE, WFALL-FIX	F606W			Pattern 1-4 (2)	240.0 Secs	
							Prime + Parallel Group 1-4	*[==>700.0 Secs (Pattern 1)]*	***[1]***
								[==>700.0 Secs (Pattern 2)]	***[2]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4		ANY	WFPC2, IMAGE, WFALL-FIX	F814W			Pattern 1-4 (2)	240.0 Secs	
							Prime + Parallel Group 1-4	*[==>700.0 Secs (Pattern 1)]*	***[1]***
								[==>700.0 Secs (Pattern 2)]	***[2]***

Orbit Structure




Orbit Structure (continued)
Orbit 2
Server Version: 20070325
GS Reacq
Pointing Maneuver
Exp. 1, copy 1
Exp. 1, copy 2
Exp. 1, copy 3
Exp. 1, copy 4
Unused Visibility = 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 2
Exp. 3
Exp. 4
Overhead

Visit

Proposal 10904, Visit 03, scheduling Sat Jun 30 01:02:00 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 200.0D TO 220.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=26.57		
	Number Of Points=4	Angle Between Sides=143.13		
	Point Spacing=0.559	Center Pattern=false		
	Line Spacing=0.559			

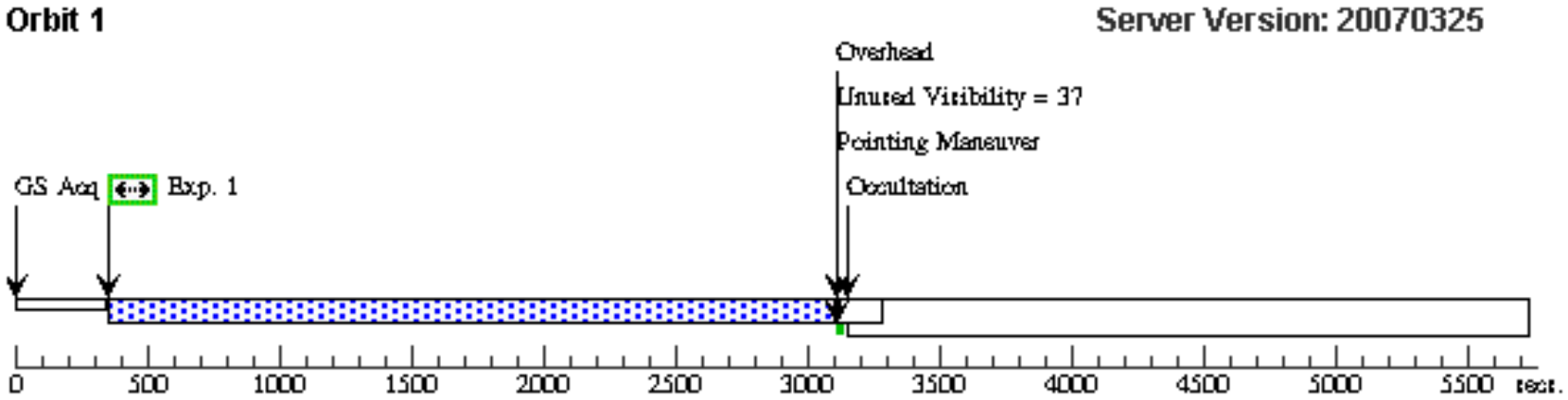
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC2090-XUV-A	RA: 05 47 7.3900 (86.7807917d)		V=11.2+/-0.01	Reference Frame: ICRS
		Dec: -34 11 16.10 (-34.18781d)			
		Equinox: J2000			

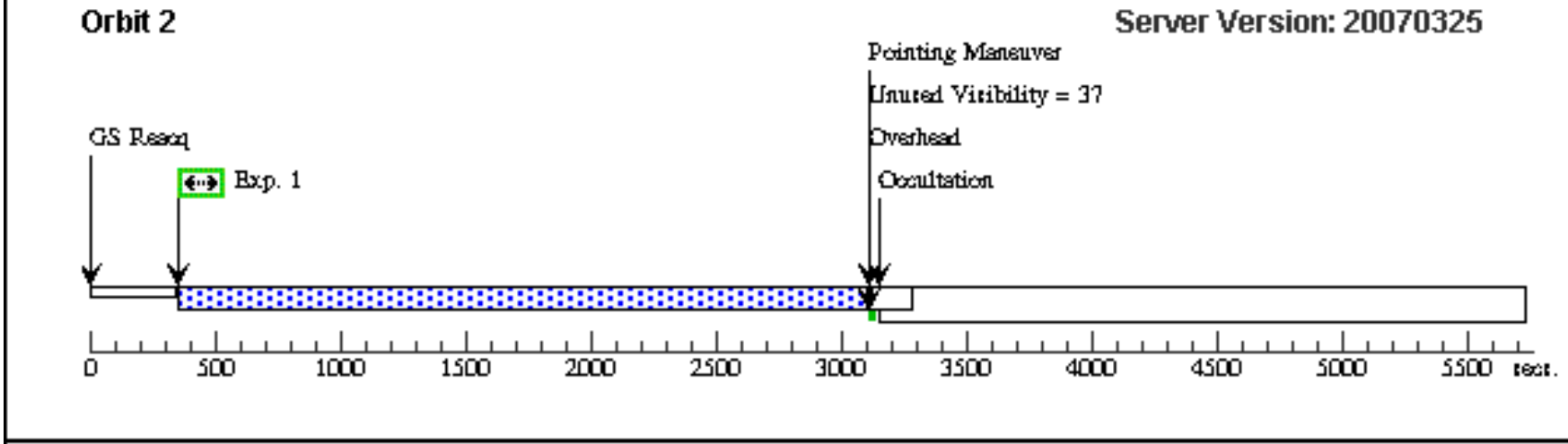
Exposures

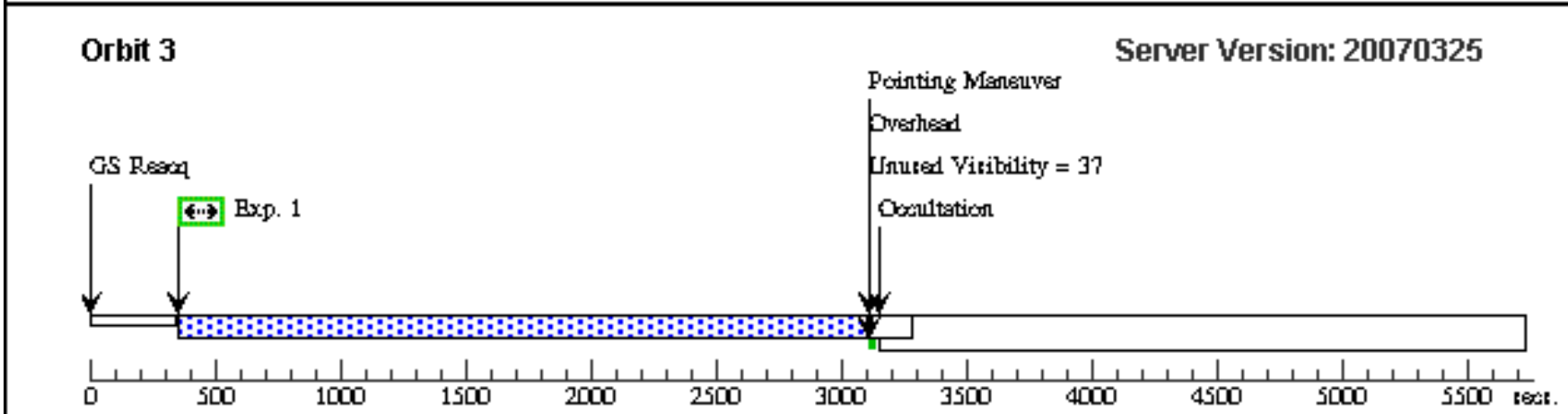
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F439W	CR-SPLIT=NO		Pattern 1-1 (3)	2200.0 Secs	
								[==>2600.0 Secs (Pattern 1)]	***[1]***
								[==>2600.0 Secs (Pattern 2)]	***[2]***
								[==>2600.0 Secs (Pattern 3)]	***[3]***
								[==>2600.0 Secs (Pattern 4)]	***[4]***

Orbit Structure

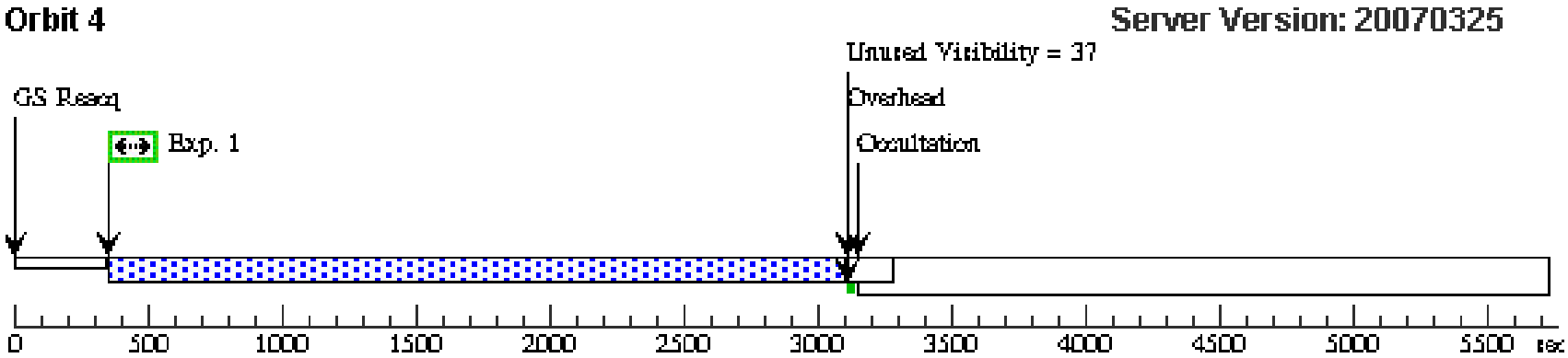


Orbit Structure (continued)





Orbit Structure (continued)



Visit

Proposal 10904, Visit 07 Sat Jun 30 01:02:00 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 200.0D TO 220.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=26.57		
	Number Of Points=4	Angle Between Sides=143.13		
	Point Spacing=0.559	Center Pattern=false		
	Line Spacing=0.559			

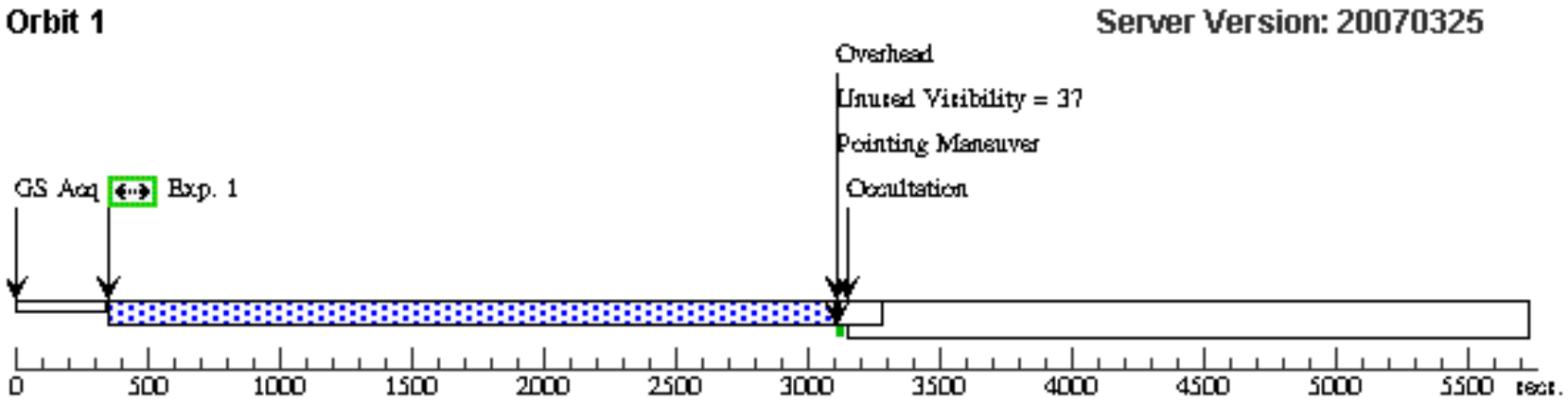
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC2090-XUV-A	RA: 05 47 7.3900 (86.7807917d) Dec: -34 11 16.10 (-34.18781d) Equinox: J2000		V=11.2+/-0.01	Reference Frame: ICRS

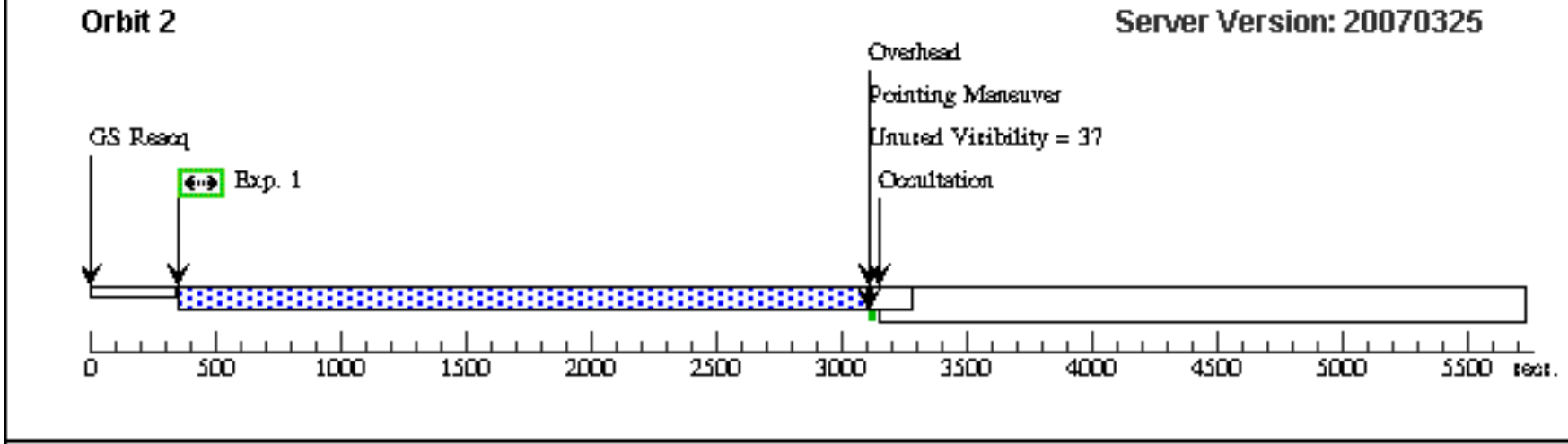
Exposures

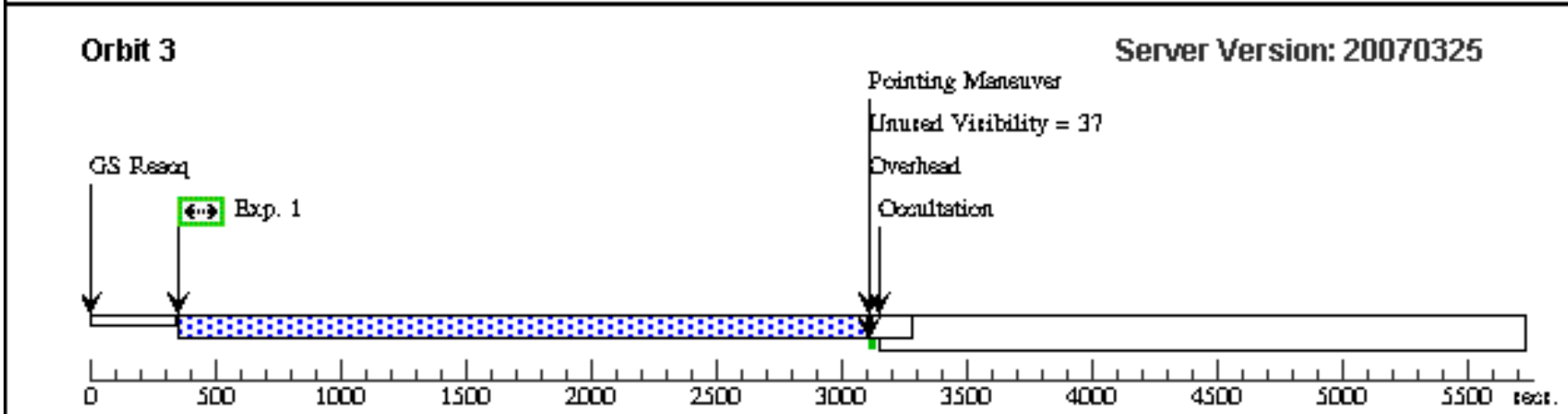
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F814W	CR-SPLIT=NO		Pattern 1-1 (3)	2200.0 Secs	
								[==>2600.0 Secs (Pattern 1)]	***[1]***
								[==>2600.0 Secs (Pattern 2)]	***[2]***
								[==>2600.0 Secs (Pattern 3)]	***[3]***
								[==>2600.0 Secs (Pattern 4)]	***[4]***

Orbit Structure

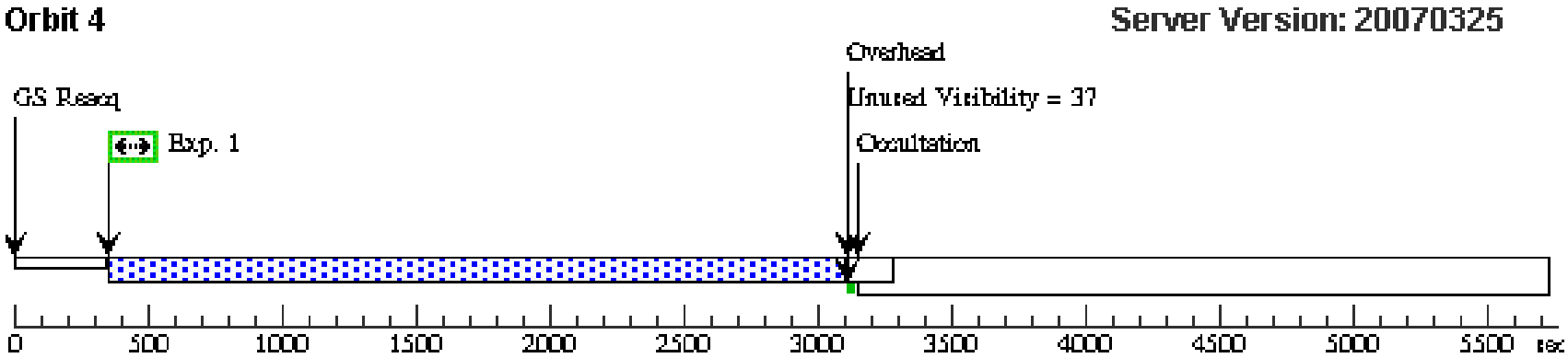


Orbit Structure (continued)





Orbit Structure (continued)



Visit

Proposal 10904, Visit 08 Sat Jun 30 01:02:01 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 200.0D TO 220.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=26.57		
	Number Of Points=4	Angle Between Sides=143.13		
	Point Spacing=0.559	Center Pattern=false		
	Line Spacing=0.559			

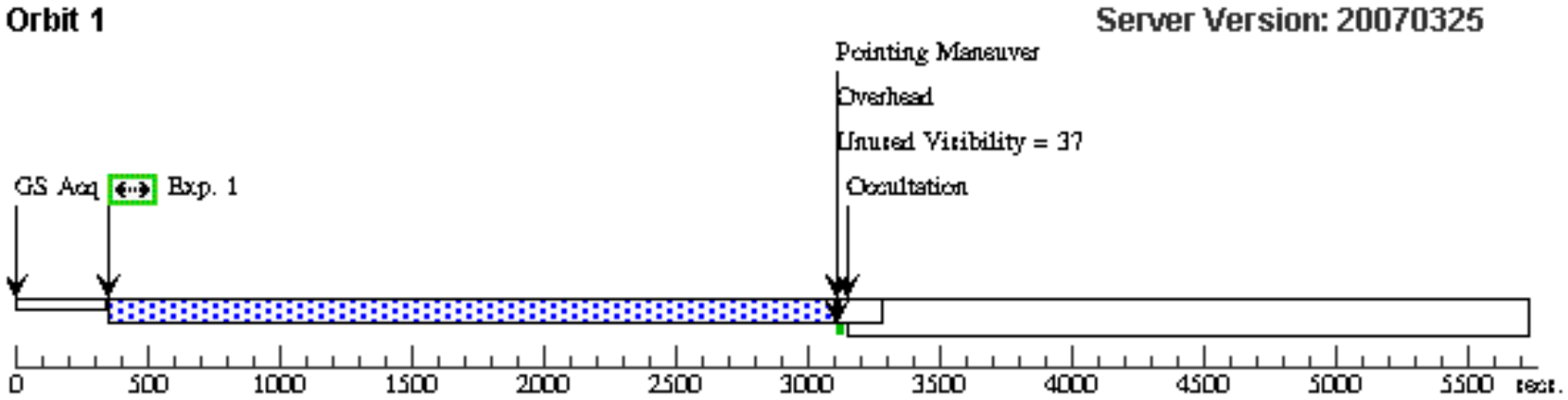
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC2090-XUV-A	RA: 05 47 7.3900 (86.7807917d)		V=11.2+/-0.01	Reference Frame: ICRS
		Dec: -34 11 16.10 (-34.18781d)			
		Equinox: J2000			

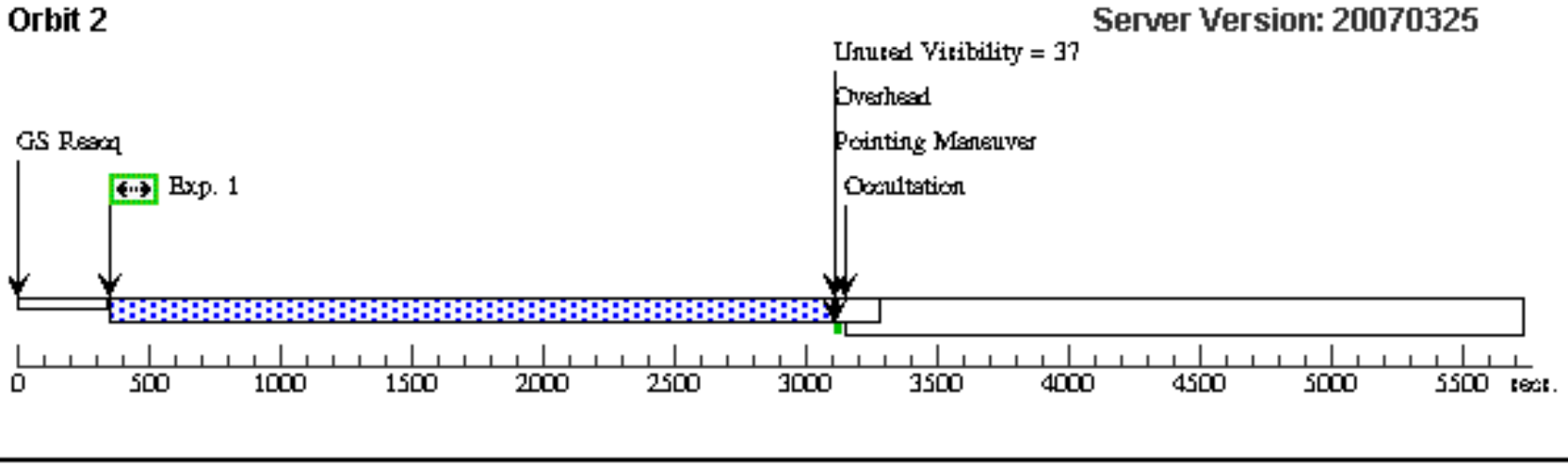
Exposures

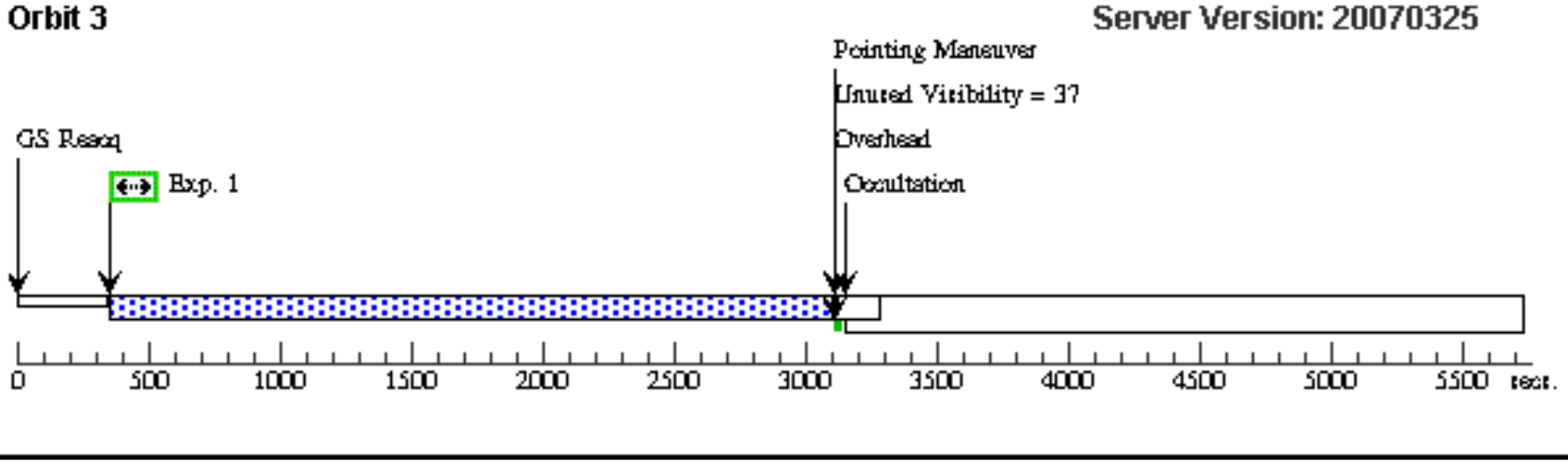
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F658N	CR-SPLIT=NO		Pattern 1-1 (3)	2200.0 Secs	
								[==>2600.0 Secs (Pattern 1)]	***[1]***
								[==>2600.0 Secs (Pattern 2)]	***[2]***
								[==>2600.0 Secs (Pattern 3)]	***[3]***
								[==>2600.0 Secs (Pattern 4)]	***[4]***

Orbit Structure

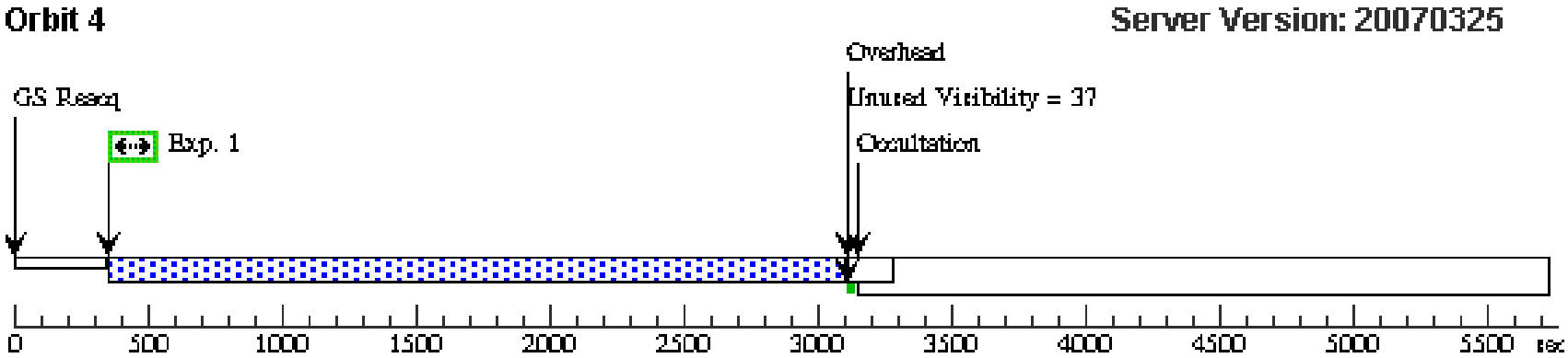


Orbit Structure (continued)





Orbit Structure (continued)



Visit

Proposal 10904, Visit 05, scheduling Sat Jun 30 01:02:01 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 200.0D TO 220.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=26.57		
	Number Of Points=4	Angle Between Sides=143.13		
	Point Spacing=0.559	Center Pattern=false		
	Line Spacing=0.559			

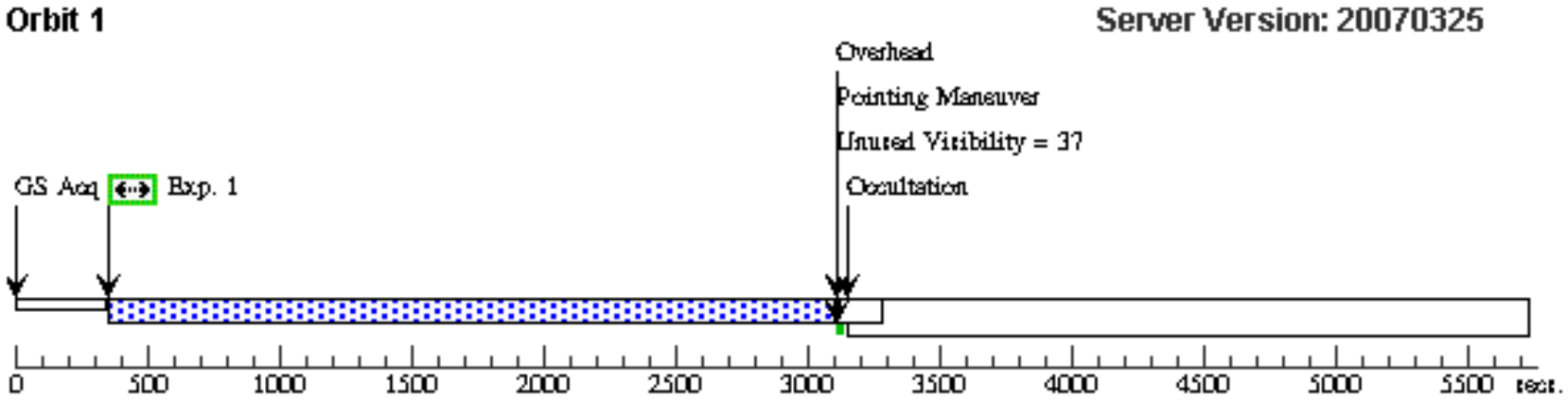
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC2090-XUV-A	RA: 05 47 7.3900 (86.7807917d) Dec: -34 11 16.10 (-34.18781d) Equinox: J2000		V=11.2+/-0.01	Reference Frame: ICRS

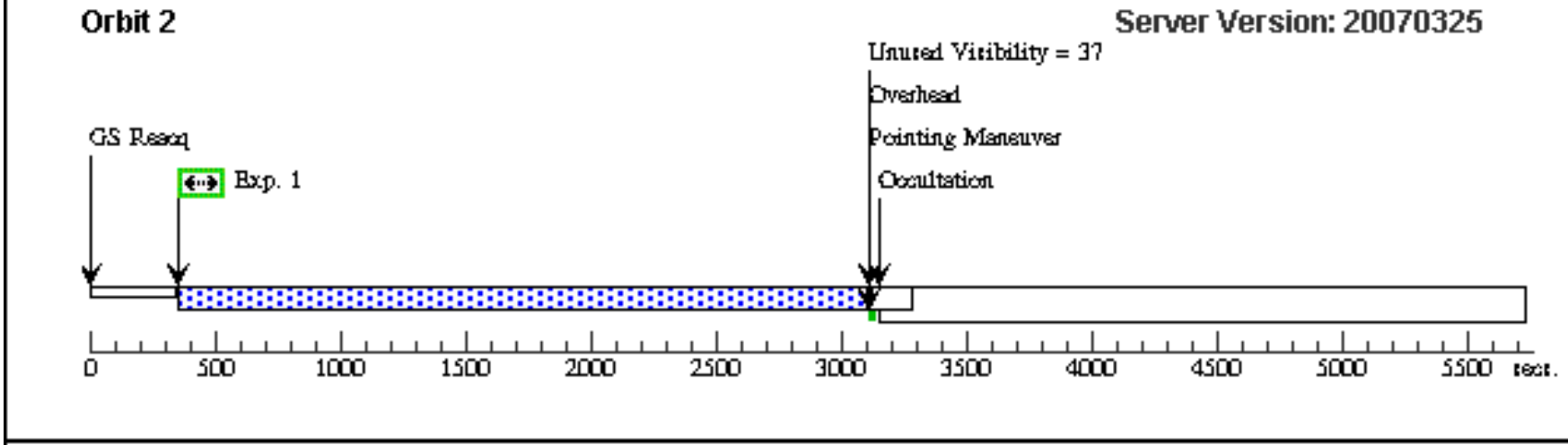
Exposures

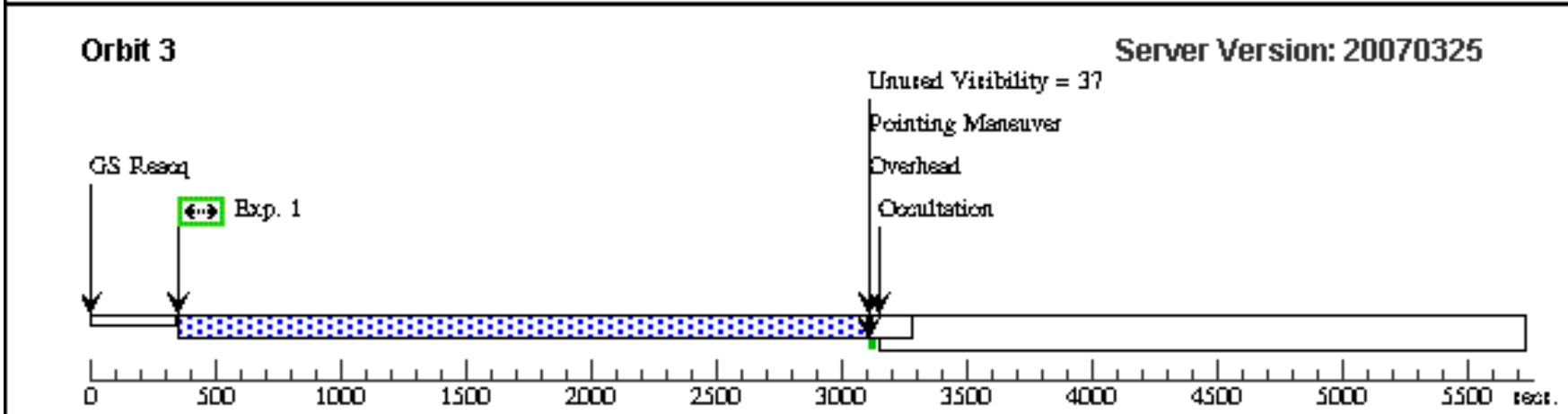
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F606W	CR-SPLIT=NO		Pattern 1-1 (3)	2200.0 Secs	
								[==>2600.0 Secs (Pattern 1)]	***[1]***
								[==>2600.0 Secs (Pattern 2)]	***[2]***
								[==>2600.0 Secs (Pattern 3)]	***[3]***
								[==>2600.0 Secs (Pattern 4)]	***[4]***

Orbit Structure

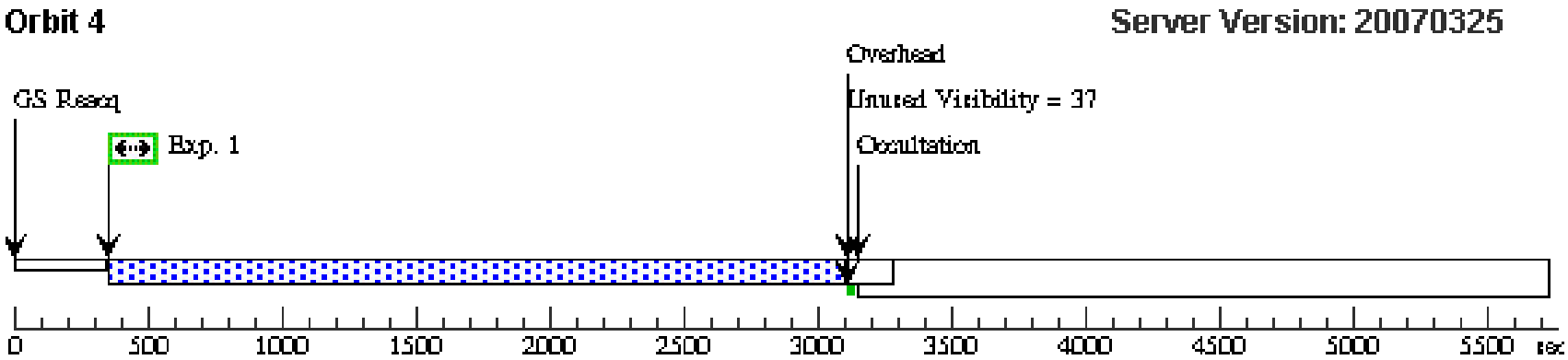


Orbit Structure (continued)





Orbit Structure (continued)



Visit

Proposal 10904, Visit 06, scheduling Sat Jun 30 01:02:02 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 200.0D TO 220.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1-4)
	Purpose=DITHER	Pattern Orientation=26.57		
	Number Of Points=4	Angle Between Sides=143.13		
	Point Spacing=0.559	Center Pattern=false		
	Line Spacing=0.559			

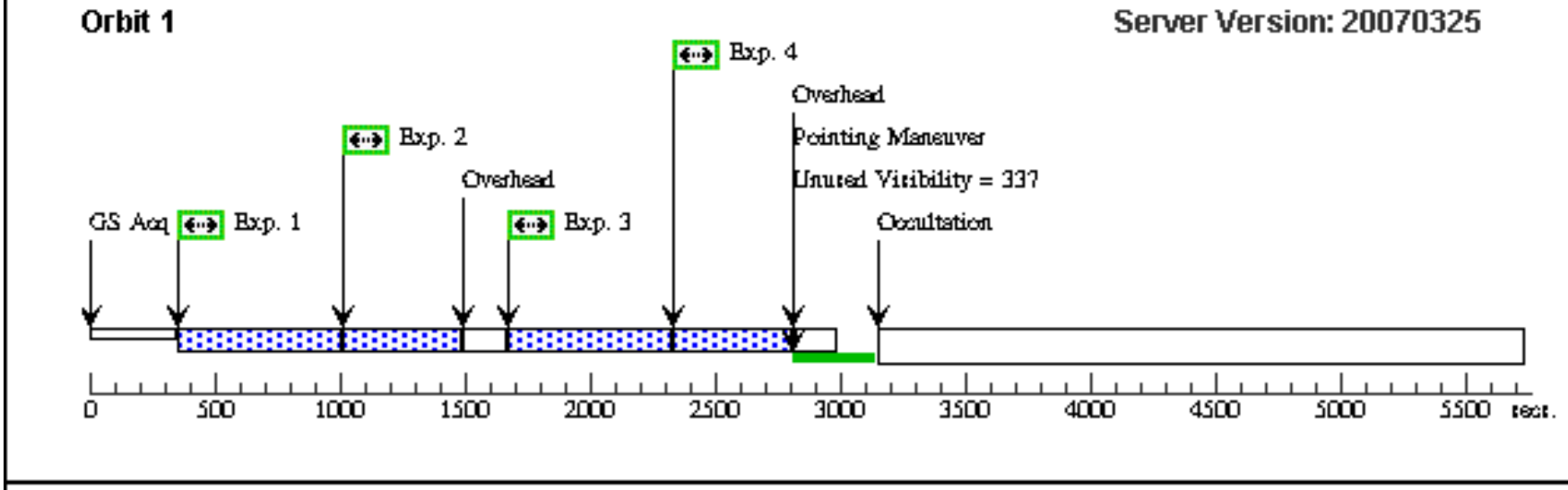
Fixed Targets

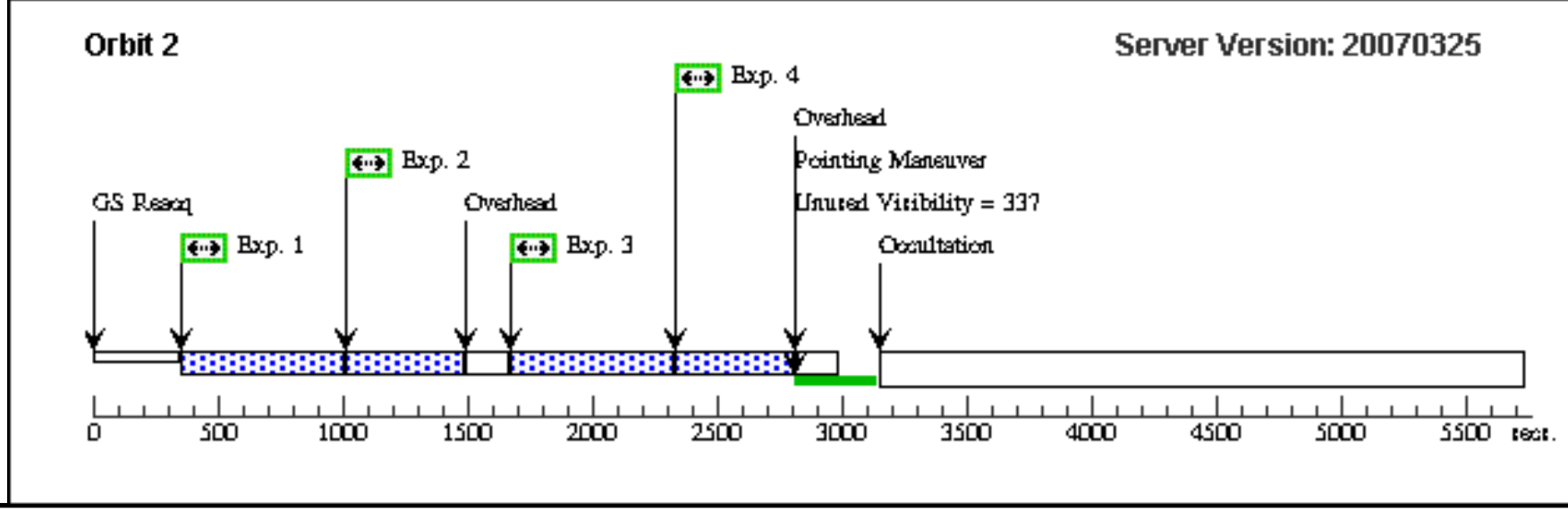
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC2090-XUV-A	RA: 05 47 7.3900 (86.7807917d)		V=11.2+/-0.01	Reference Frame: ICRS
		Dec: -34 11 16.10 (-34.18781d)			
		Equinox: J2000			

Exposures

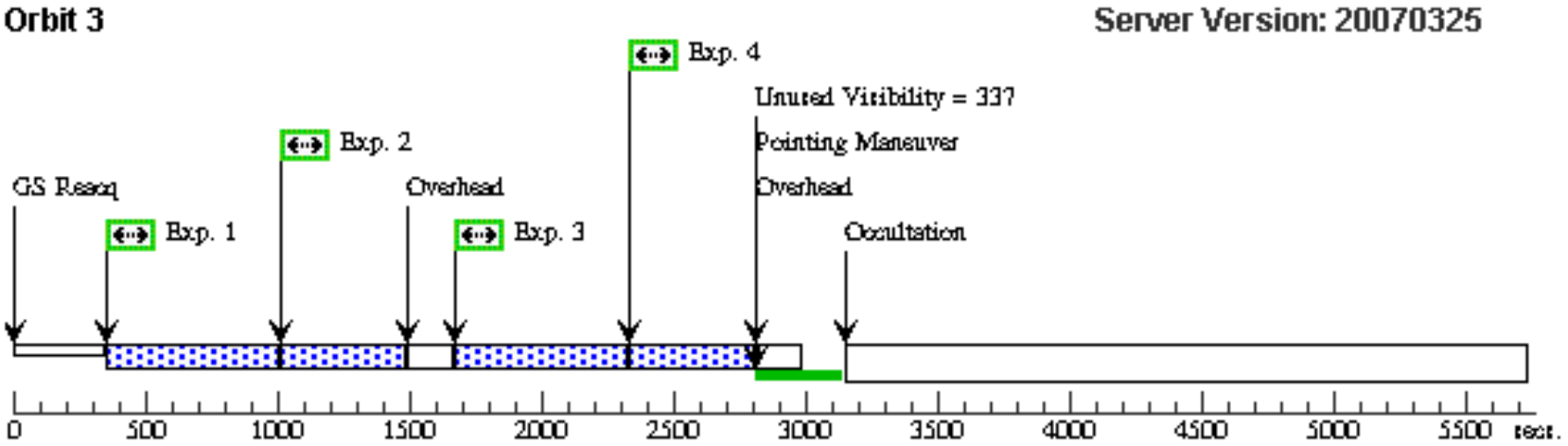
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F606W	CR-SPLIT=NO		Pattern 1-4 (3)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
2		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F658N	CR-SPLIT=NO		Pattern 1-4 (3)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
3		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F439W	CR-SPLIT=NO		Pattern 1-4 (3)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
4		(3) NGC2090-XUV-A	WFPC2, IMAGE, WFALL-FIX	F814W	CR-SPLIT=NO		Pattern 1-4 (3)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***

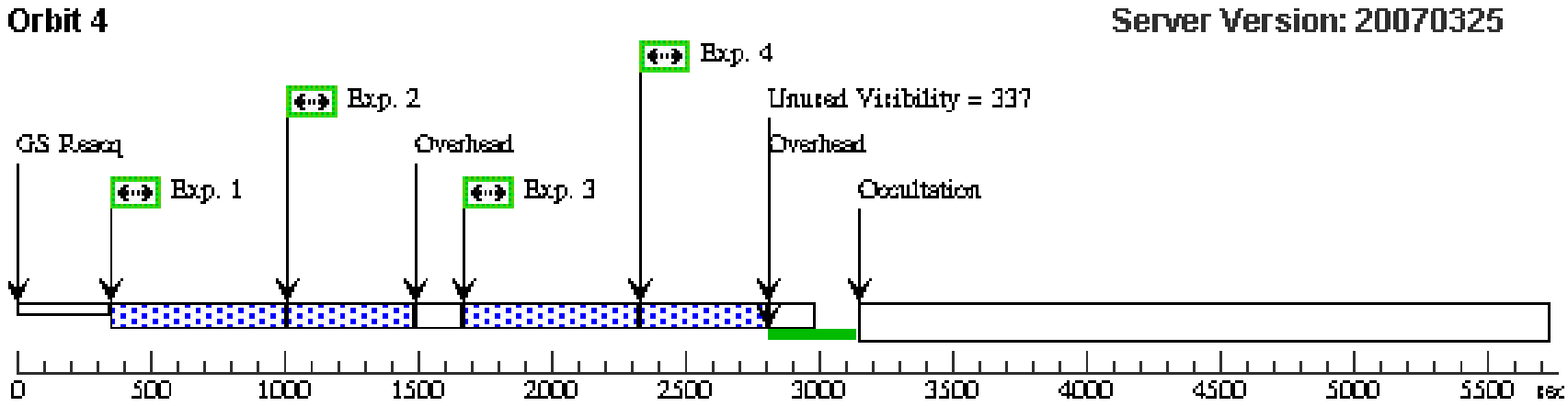
Orbit Structure





Orbit Structure (continued)





Visit

Proposal 10904, Visit 04, scheduling Sat Jun 30 01:02:03 GMT 2007

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC, WFPC2

Special Requirements: ORIENT 145.0D TO 215.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-SBC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.472 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.4 Angle Between Sides= Center Pattern=false		(1-4)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	NGC2090-XUV-B	RA: 05 47 11.3571 (86.7973212d) Dec: -34 11 39.96 (-34.19443d) Equinox: J2000		V=17.0+/-0.4 but (4.0e-15, 4.2e-17) erg/s/cm2/A at FUV (total, max) in SBC FOV	Reference Frame: ICRS

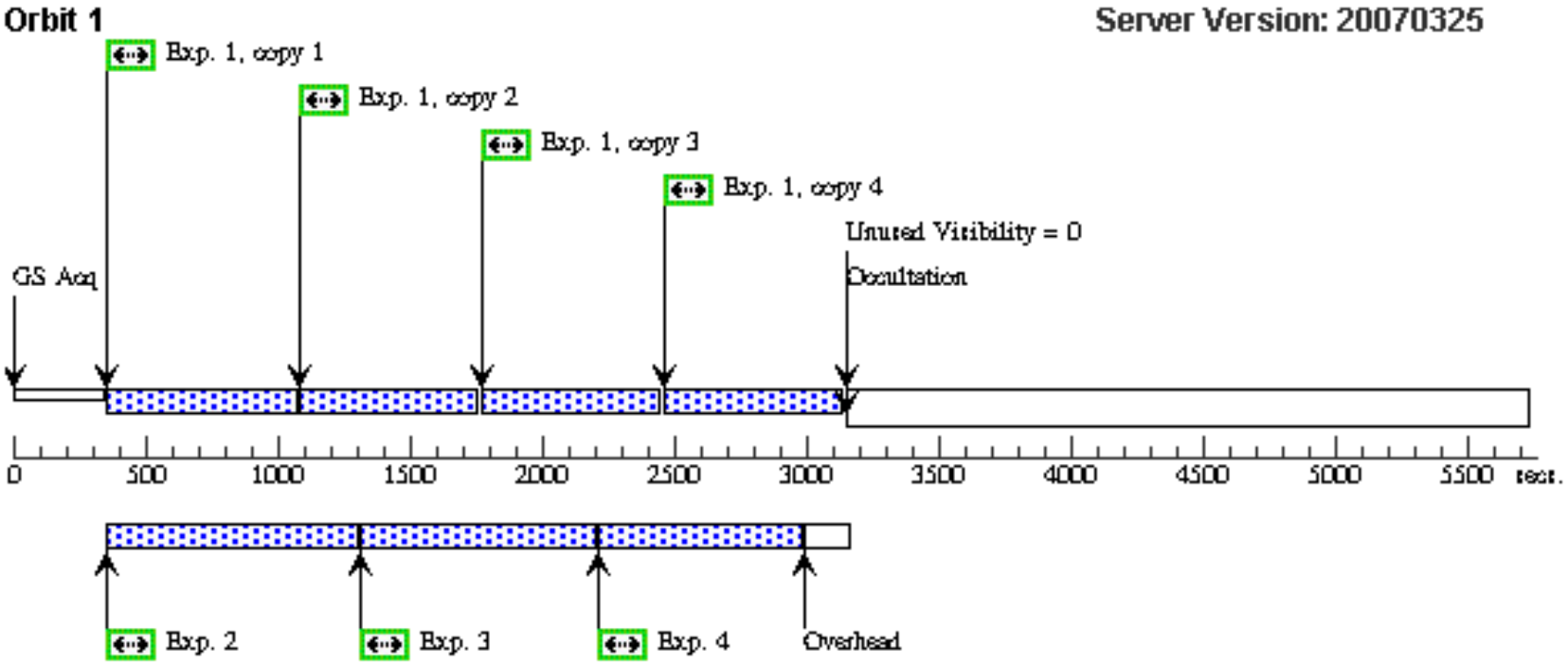
Exposures

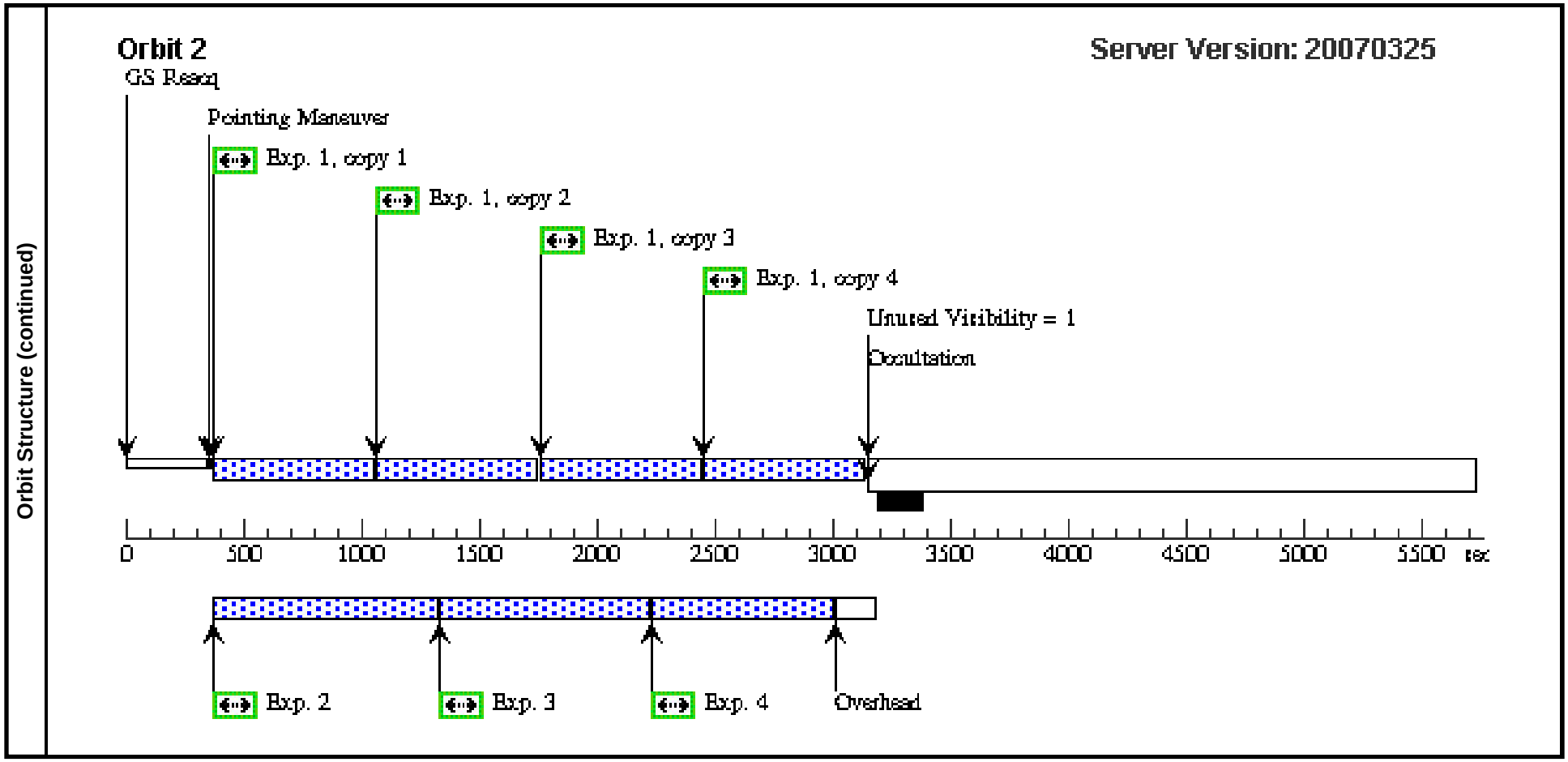
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) NGC2090-XUV-B	ACS/SBC, ACCUM, SBC-FIX	F150LP			Pattern 1-4 (2)	650.0 Secs X 4	
							Prime + Parallel Group 1-4	*[==>649.0 Secs (Pattern 1, Copy 1)]*	***[1]***
								[==>649.0 Secs (Pattern 1, Copy 2)]	
								[==>649.0 Secs (Pattern 1, Copy 3)]	
								[==>649.0 Secs (Pattern 1, Copy 4)]	
								[==>654.0 Secs (Pattern 2, Copy 1)]	***[2]***
								[==>654.0 Secs (Pattern 2, Copy 2)]	
								[==>654.0 Secs (Pattern 2, Copy 3)]	
								[==>654.0 Secs (Pattern 2, Copy 4)]	
2		ANY	WFPC2, IMAGE, WFALL-FIX	F439W			Pattern 1-4 (2)	240.0 Secs	
							Prime + Parallel Group 1-4	*[==>700.0 Secs (Pattern 1)]*	***[1]***
								[==>700.0 Secs (Pattern 2)]	***[2]***
3		ANY	WFPC2, IMAGE, WFALL-FIX	F606W			Pattern 1-4 (2)	240.0 Secs	
							Prime + Parallel Group 1-4	*[==>700.0 Secs (Pattern 1)]*	***[1]***
								[==>700.0 Secs (Pattern 2)]	***[2]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4		ANY	WFPC2, IMAGE, WFALL-FIX	F814W			Pattern 1-4 (2) Prime + Parallel Group 1-4	240.0 Secs *[==>700.0 Secs (Pattern 1)]* *[==>700.0 Secs (Pattern 2)]*	*[1]* *[2]*

Orbit Structure




Orbit Structure (continued)
Orbit 2
Server Version: 20070325
GS Reacq
Pointing Maneuver
Exp. 1, copy 1
Exp. 1, copy 2
Exp. 1, copy 3
Exp. 1, copy 4
Unused Visibility = 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 2
Exp. 3
Exp. 4
Overhead