10492 - A detailed study of the mass properties for the galaxy cluster RX J1347-1145

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) LCDCS-0829 ANY	ACS/WFC WFPC2	3	20-Jun-2005 12:57:40.0	yes

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(1) LCDCS-0829 ANY	ACS/WFC WFPC2	3	20-Jun-2005 12:58:33.0	yes
03	(1) LCDCS-0829 ANY	ACS/WFC WFPC2	3	20-Jun-2005 12:59:11.0	yes

9 Total Orbits Used

ABSTRACT

We propose to obtain deep, multi-colour imaging for the galaxy cluster RX J1347-1145 at z=0.45. Together with our high-quality ground-based optical and X-ray data sets already at hand this observation will produce a precise mass determination of this most X-ray luminous cluster. The analysis will mainly be carried out by a newly developed and novel technique that combines weak and strong lensing information and which is able to break the mass-sheet degeneracy that hampered most previous lensing mass determinations.

Within our extensive campaign to understand the mass properties of RX J1347-1145, the main goal of the ACS images will be a refined, high-resolution lensing mass reconstruction of the cluster core. This will be achieved by a substantially increased number density of background sources for a weak lensing analysis in combination with constraints from multiply lensed images that are identified with morphology and colour information. Both of these require the unique resolving power of ACS. RX J1347-1145 is an ideal candidate for elucidating the discrepant mass estimates obtained from traditional methods. It plays the same role at high redshift as A1689 at intermediate redshifts for which a similar analysis has been performed with ACS. Our results will therefore be an important ingredient in the use of galaxy clusters as cosmological probes.

OBSERVING DESCRIPTION

This is an imaging program of the high-redshift (z=0.45) galaxy cluster RXJ1347-1145 with ACS/WFC in three sloan broad-band filters (g, i and z). Our scientific objectives are weak and strong gravitational lensing studies requiring high S/N measurements of faint background sources and a high resolution for morphological studies of lensed arc systems.

Each filter will be observed for a total integration time of 3 orbits. Each orbit is split in 4 exposures a 440s with a dither pattern large enough to close the ACS interchip gap. Our actual dither pattern for the three orbits is a combination of two proposed ACS dither line patterns. Each orbit takes 4 exposures of the ACS-WFC-DITHER-LINE pattern which is slightly shifted in consecutive orbits.
The short exposure times are chosen to have enough images for correcting image defects (such as hot pixels or cosmic rays), to increase the pixel resolution with the drizzle technique and to avoid saturation effects from a 12th magnitude (R-band) star within our field-of-view. In addition, we do not loose a significant fraction of our observing time if an image cannot be used because of extreme jittering in the 2-Gyro mode (our weak-lensing studies strongly depend on a clean ACS PSF). As we have 12 images per pointing and filter we observe with CR-SPLIT=NO.
In each orbit we take, in parallel, one 300sec. WFPC2 exposure in the broad-band R (F702W) filter which does not conflict with our primary observations.

The three orbits belonging to one filter define an HST visit and we need the whole campaign taken with the same, but not with a predefined, position angle.

For a high S/N weak lensing mass map and the search for multiple image systems we need the highest depth reachable within the given observing time. Hence we require the LOW-SKY special requirement for the whole program.

Visit

Proposal 10492, Visit 01 Mon Jun 20 16:59:22 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC, WFPC2

Special Requirements: (none)

Comments: Visit to perform three ACS/WFC orbits of z-band (F850LP) observations for RXJ1347-1145

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	LCDCS-0829 Alt Name1: RXJ1347-1145	RA: 13 47 32.0000 (206.8833333d) Dec: -11 45 10.00 (-11.75278d) Equinox: J2000 Plate Id: (?)	Redshift: 0.45	V=22.0	Coordinate Source: IMAGE_TIED_TO_GSC_FRAME

Comments: The coordinates were extracted from a ground-based image tied to the USNO-A2 catalog.

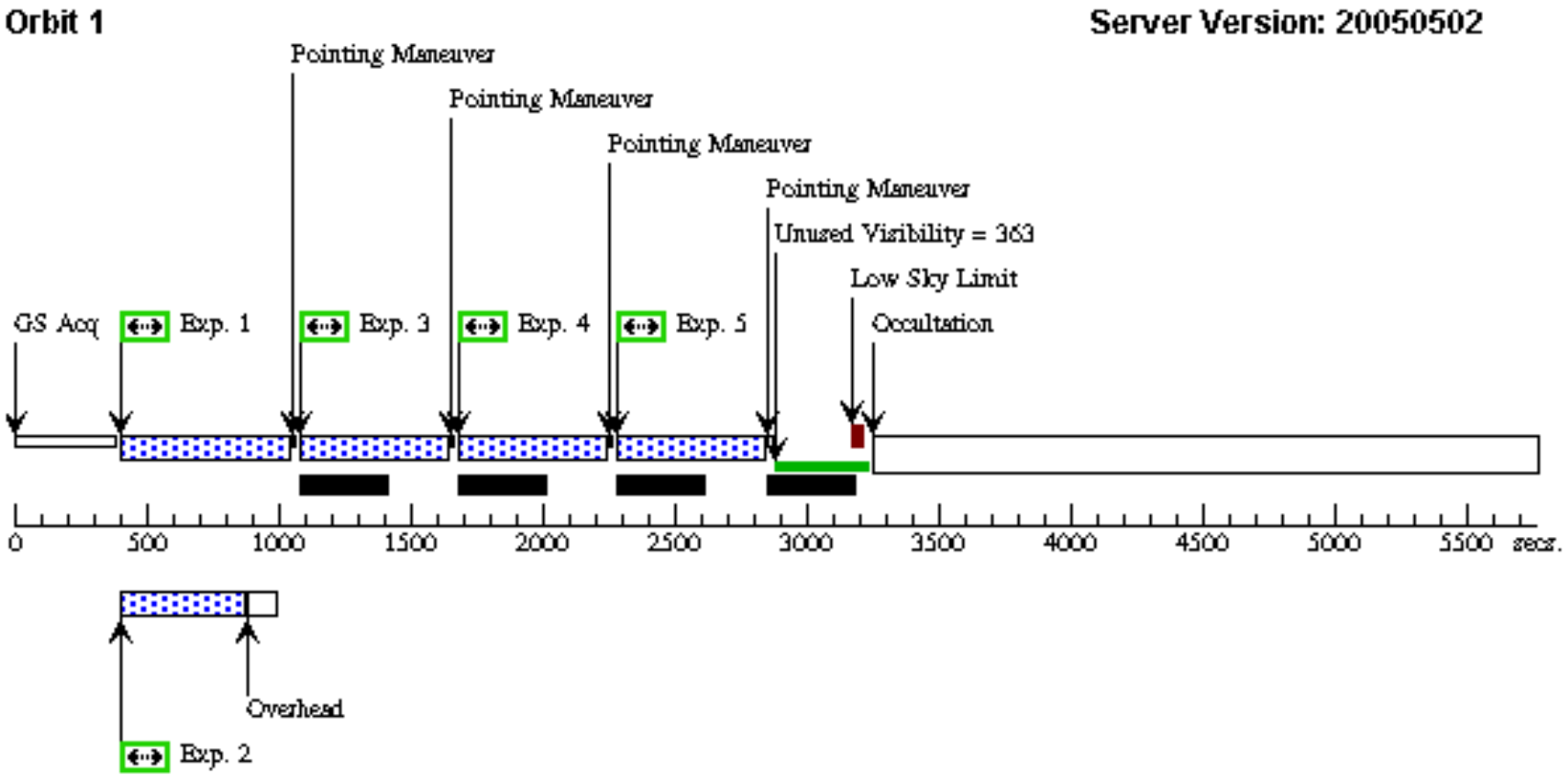
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	LOW-SKY	Prime + Parallel Group 1-2	440.0 Secs	
								[==>]	***[1]***
2		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 1-2	300.0 Secs	
								[==>]	***[1]***
3		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.247,2.984; LOW-SKY		440.0 Secs	
								[==>]	***[1]***
4		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.494,5.968; LOW-SKY		440.0 Secs	
								[==>]	***[1]***
5		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.741,8.952; LOW-SKY		440.0 Secs	
								[==>]	***[1]***
6		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.115,0.125; LOW-SKY	Prime + Parallel Group 6-7	440.0 Secs	
								[==>]	***[2]***
7		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 6-7	300.0 Secs	
								[==>]	***[2]***
8		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.362,3.109; LOW-SKY		440.0 Secs	
								[==>]	***[2]***
9		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.609,6.093; LOW-SKY		440.0 Secs	
								[==>]	***[2]***
10		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.856,9.077; LOW-SKY		440.0 Secs	
								[==>]	***[2]***

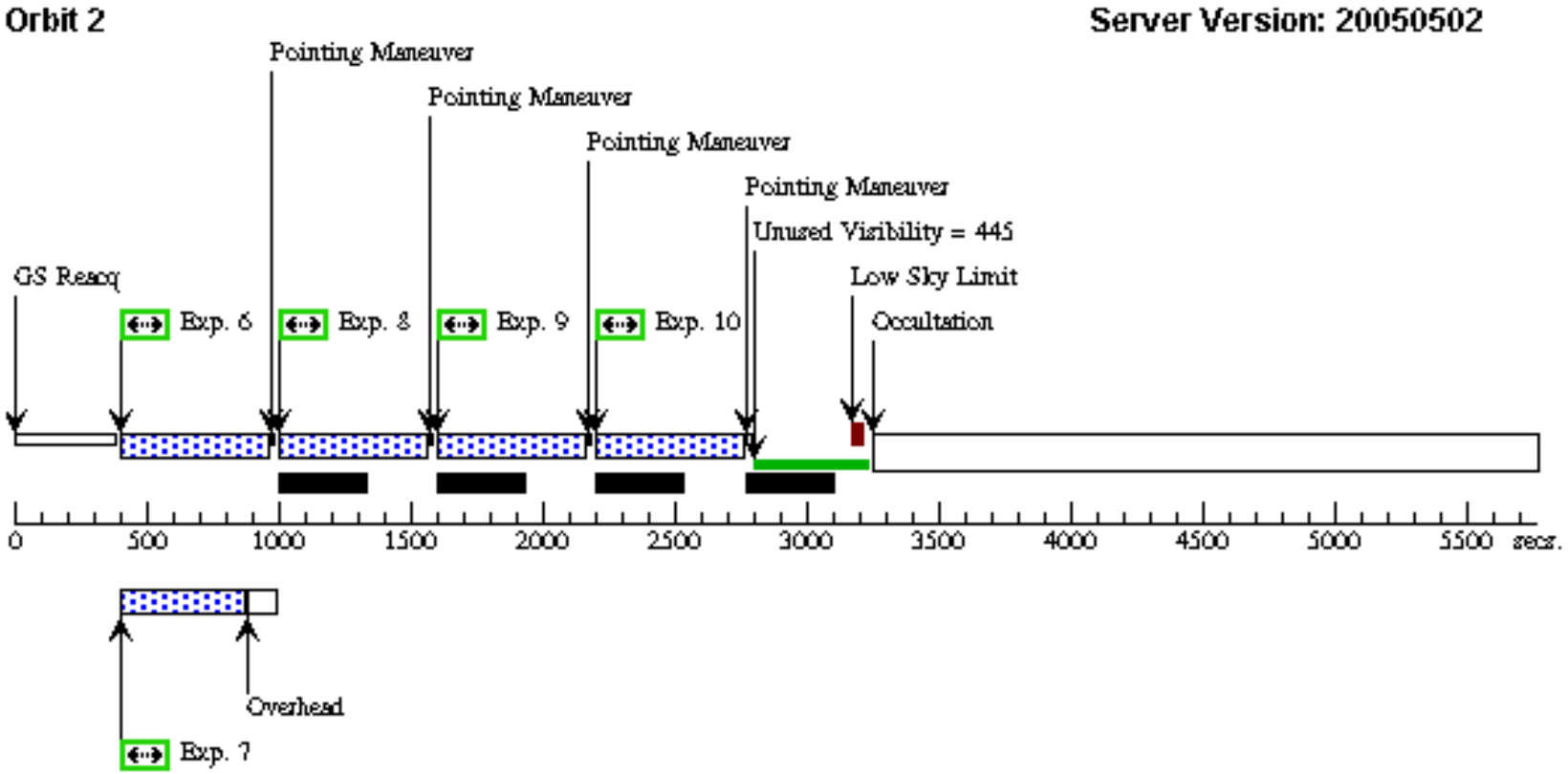
Exposures (continued)

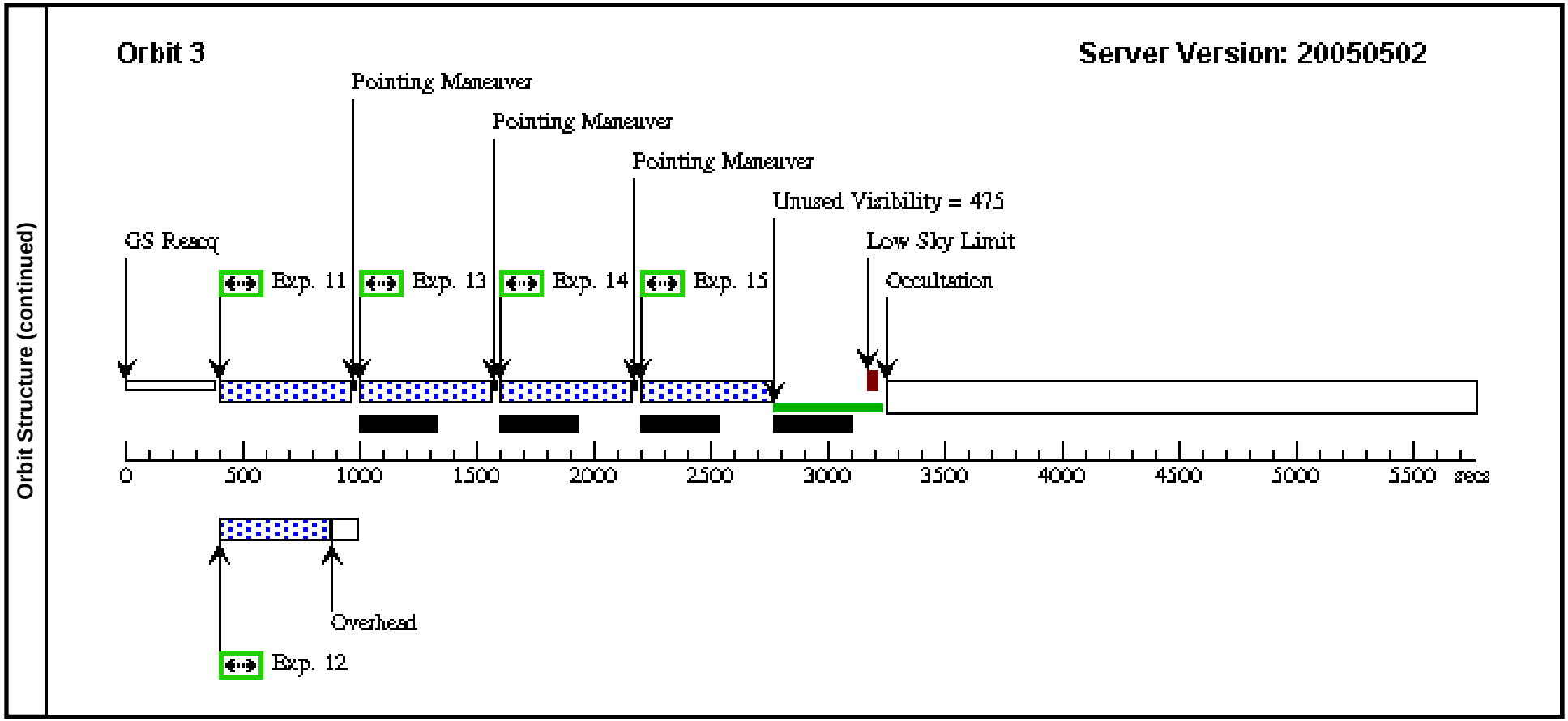
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
11		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.231,0.249; LOW-SKY	Prime + Parallel Group 11-12	440.0 Secs *[==>]*	 ***[3]***
12		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 11-12	300.0 Secs *[==>]*	 ***[3]***
13		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.478,3.233; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
14		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.725,6.217; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
15		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F850LP	CR-SPLIT=NO	POS TARG 0.972,9.201; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***

Orbit Structure



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 3
Server Version: 20050502
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Visibility = 475
GS Reacq
Low Sky Limit
Occultation
Exp. 11
Exp. 13
Exp. 14
Exp. 15
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs
Overhead
Exp. 12

Visit

Proposal 10492, Visit 02 Mon Jun 20 16:59:28 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC, WFPC2

Special Requirements: SAME ORIENT AS 01

Comments: Visit to perform three ACS/WFC orbits of i-band (F814W) observations for RXJ1347-1145.
This visit has to be observed with the same orientation as visit 1.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	LCDCS-0829 Alt Name1: RXJ1347-1145	RA: 13 47 32.0000 (206.8833333d) Dec: -11 45 10.00 (-11.75278d) Equinox: J2000 Plate Id: (?)	Redshift: 0.45	V=22.0	Coordinate Source: IMAGE_TIED_TO_GSC_FRAME

Comments: The coordinates were extracted from a ground-based image tied to the USNO-A2 catalog.

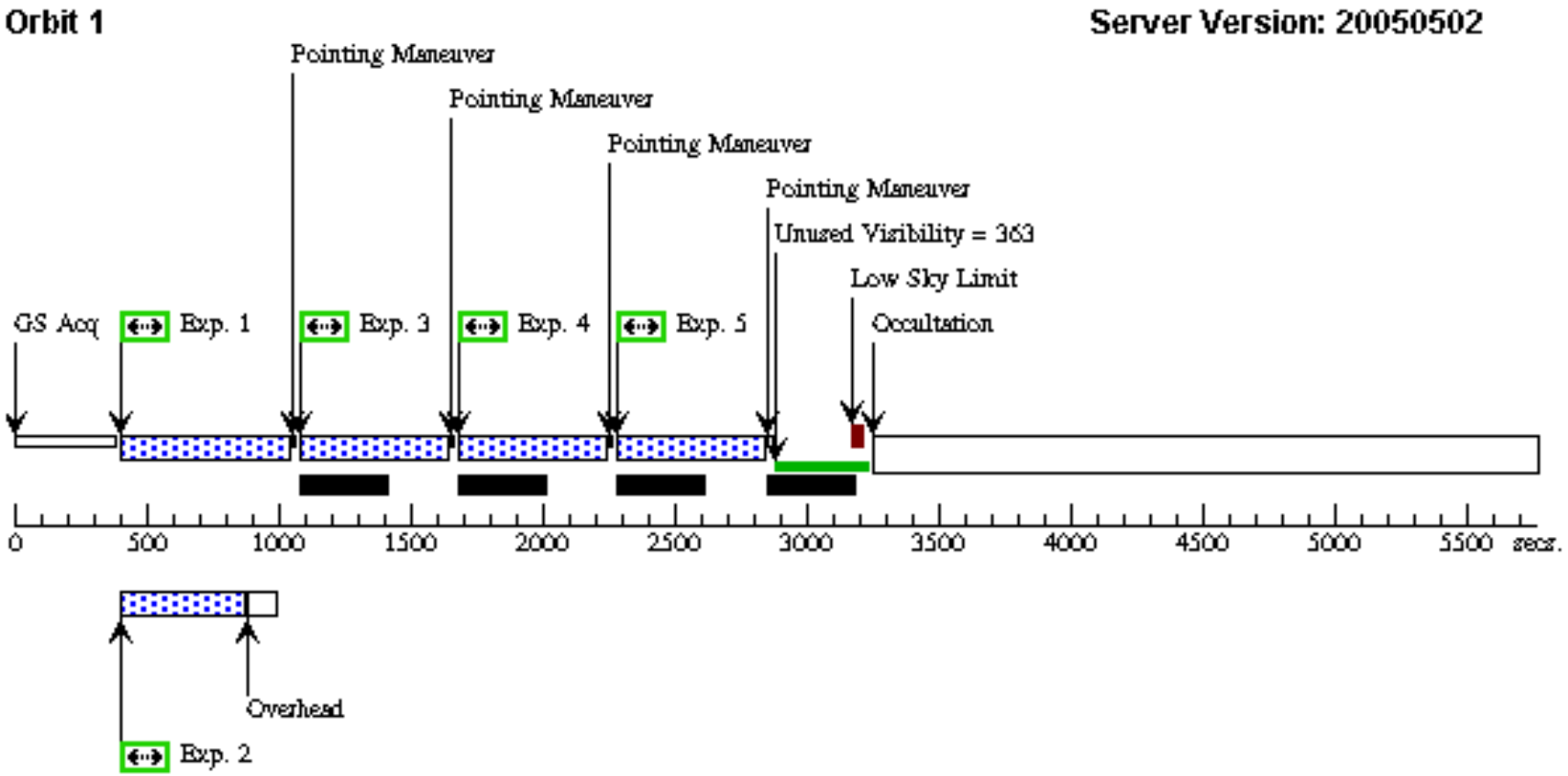
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	LOW-SKY	Prime + Parallel Group 1-2	440.0 Secs *[==>]*	*[1]*
2		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 1-2	300.0 Secs *[==>]*	*[1]*
3		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.247,2.984; LOW-SKY		440.0 Secs *[==>]*	*[1]*
4		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.494,5.968; LOW-SKY		440.0 Secs *[==>]*	*[1]*
5		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.741,8.952; LOW-SKY		440.0 Secs *[==>]*	*[1]*
6		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.115,0.125; LOW-SKY	Prime + Parallel Group 6-7	440.0 Secs *[==>]*	*[2]*
7		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 6-7	300.0 Secs *[==>]*	*[2]*
8		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.362,3.109; LOW-SKY		440.0 Secs *[==>]*	*[2]*
9		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.609,6.093; LOW-SKY		440.0 Secs *[==>]*	*[2]*
10		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.856,9.077; LOW-SKY		440.0 Secs *[==>]*	*[2]*

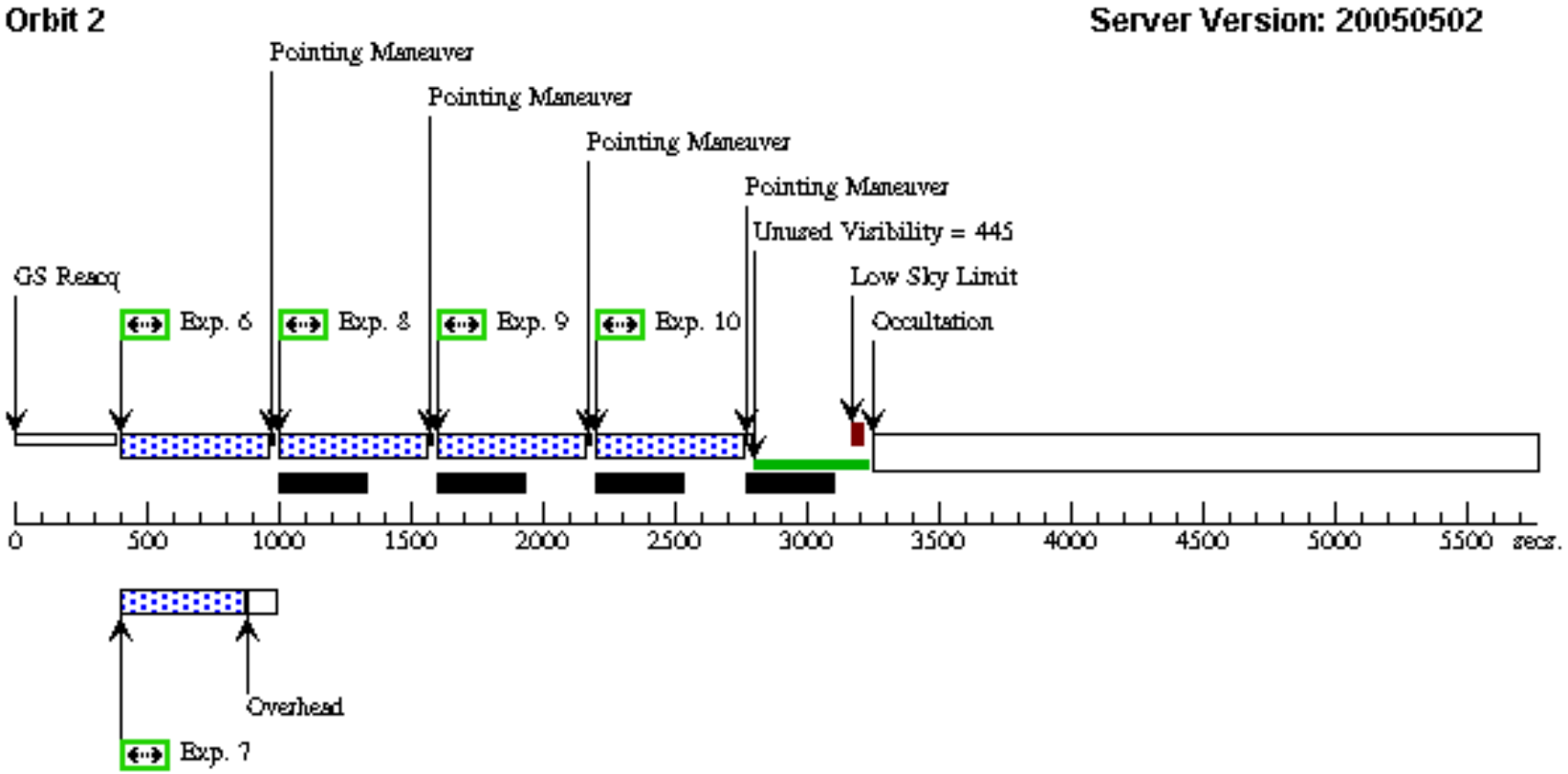
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
11		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.231,0.249; LOW-SKY	Prime + Parallel Group 11-12	440.0 Secs *[==>]*	 ***[3]***
12		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 11-12	300.0 Secs *[==>]*	 ***[3]***
13		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.478,3.233; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
14		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.725,6.217; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
15		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F814W	CR-SPLIT=NO	POS TARG 0.972,9.201; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***

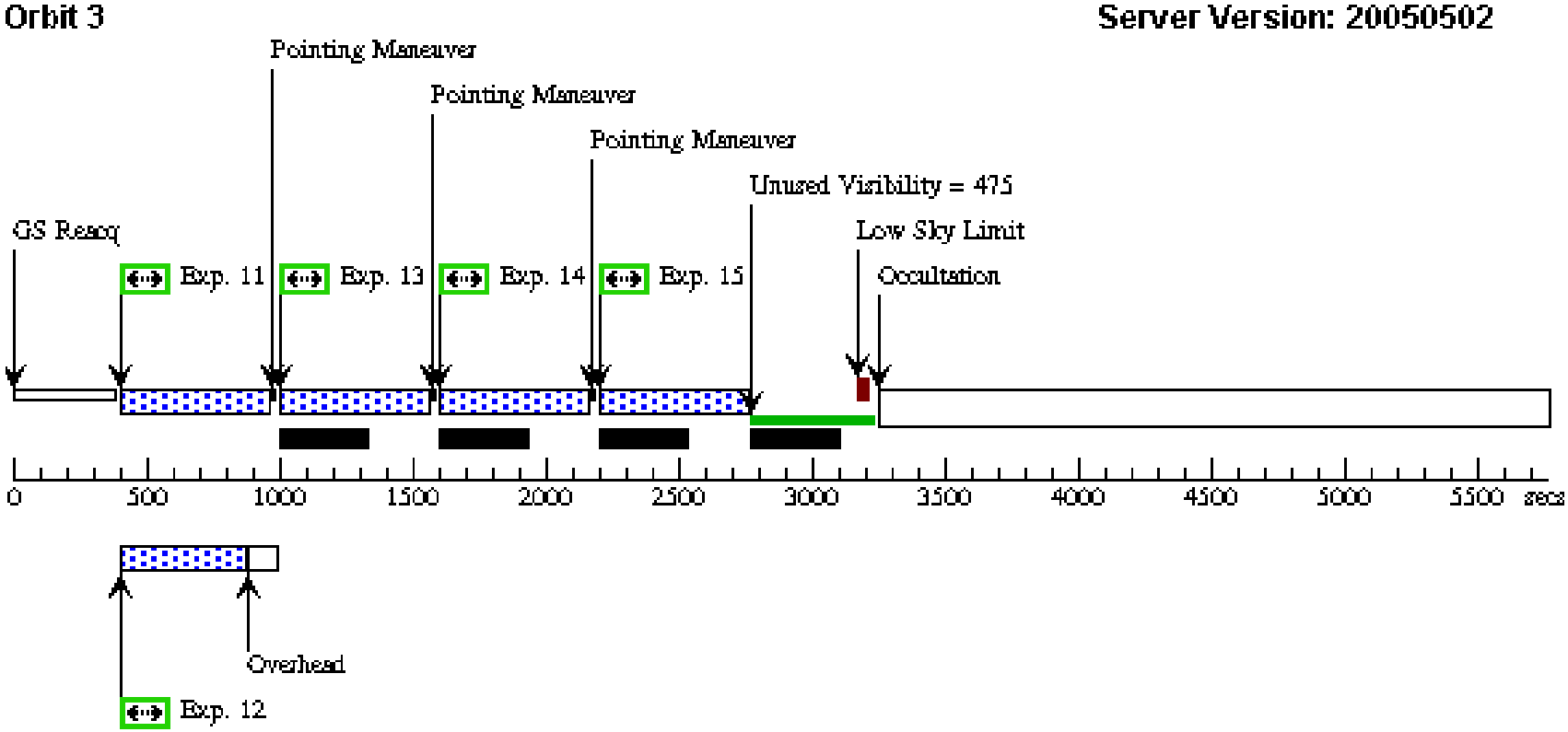
Orbit Structure



Orbit Structure (continued)



Orbit Structure (continued)



Visit

Proposal 10492, Visit 03 Mon Jun 20 16:59:33 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC, WFPC2

Special Requirements: SAME ORIENT AS 01

Comments: Visit to perform three ACS/WFC orbits of g-band (F475W) observations for RXJ1347-1145
This visit has to be observed with the same orientation as visit 1.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	LCDCS-0829 Alt Name1: RXJ1347-1145	RA: 13 47 32.0000 (206.8833333d) Dec: -11 45 10.00 (-11.75278d) Equinox: J2000 Plate Id: (?)	Redshift: 0.45	V=22.0	Coordinate Source: IMAGE_TIED_TO_GSC_FRAME

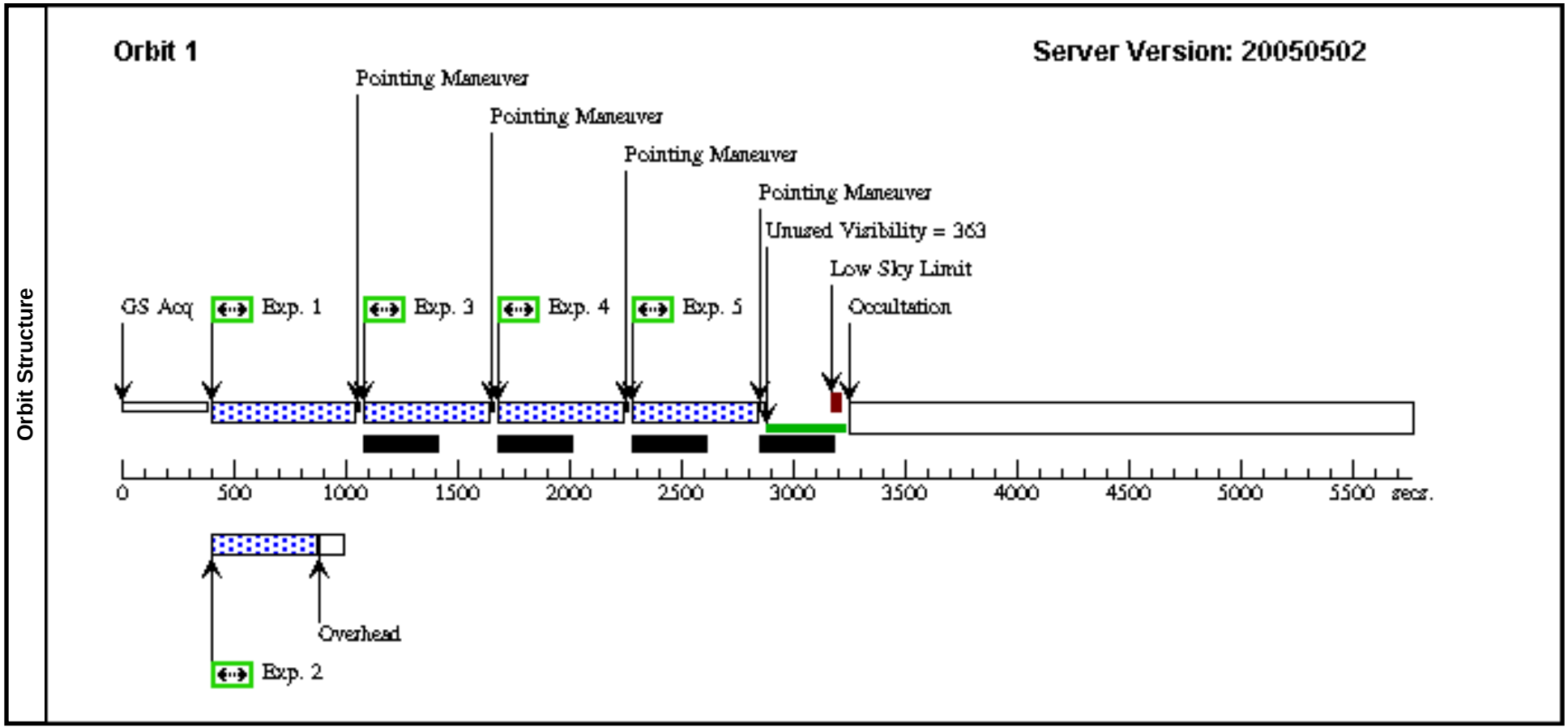
Comments: The coordinates were extracted from a ground-based image tied to the USNO-A2 catalog.

Exposures

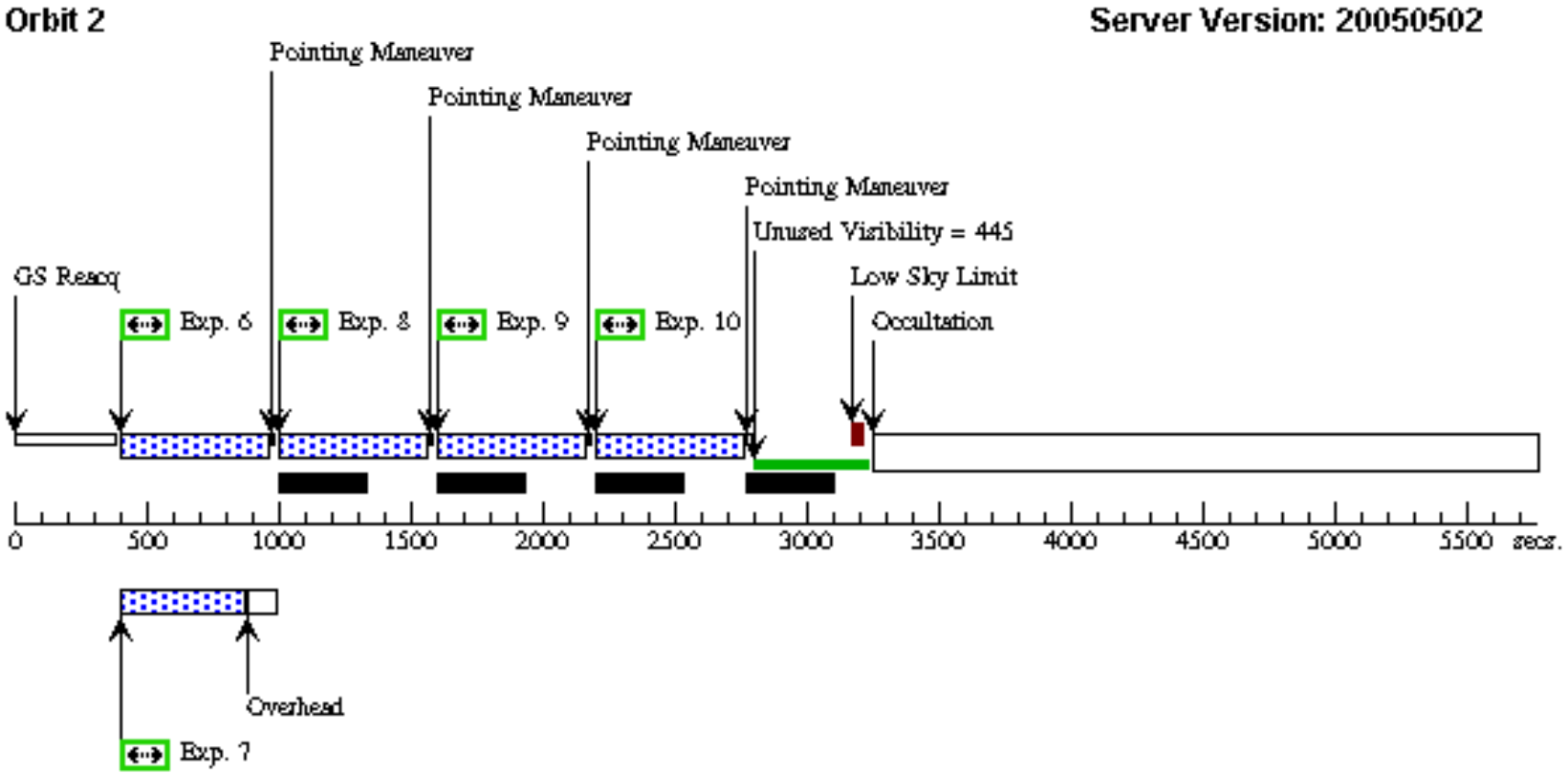
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	LOW-SKY	Prime + Parallel Group 1-2	440.0 Secs *[==>]*	*[1]*
2		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 1-2	300.0 Secs *[==>]*	*[1]*
3		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.247,2.984; LOW-SKY		440.0 Secs *[==>]*	*[1]*
4		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.494,5.968; LOW-SKY		440.0 Secs *[==>]*	*[1]*
5		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.741,8.952; LOW-SKY		440.0 Secs *[==>]*	*[1]*
6		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.115,0.125; LOW-SKY	Prime + Parallel Group 6-7	440.0 Secs *[==>]*	*[2]*
7		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 6-7	300.0 Secs *[==>]*	*[2]*
8		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.362,3.109; LOW-SKY		440.0 Secs *[==>]*	*[2]*
9		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.609,6.093; LOW-SKY		440.0 Secs *[==>]*	*[2]*
10		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.856,9.077; LOW-SKY		440.0 Secs *[==>]*	*[2]*

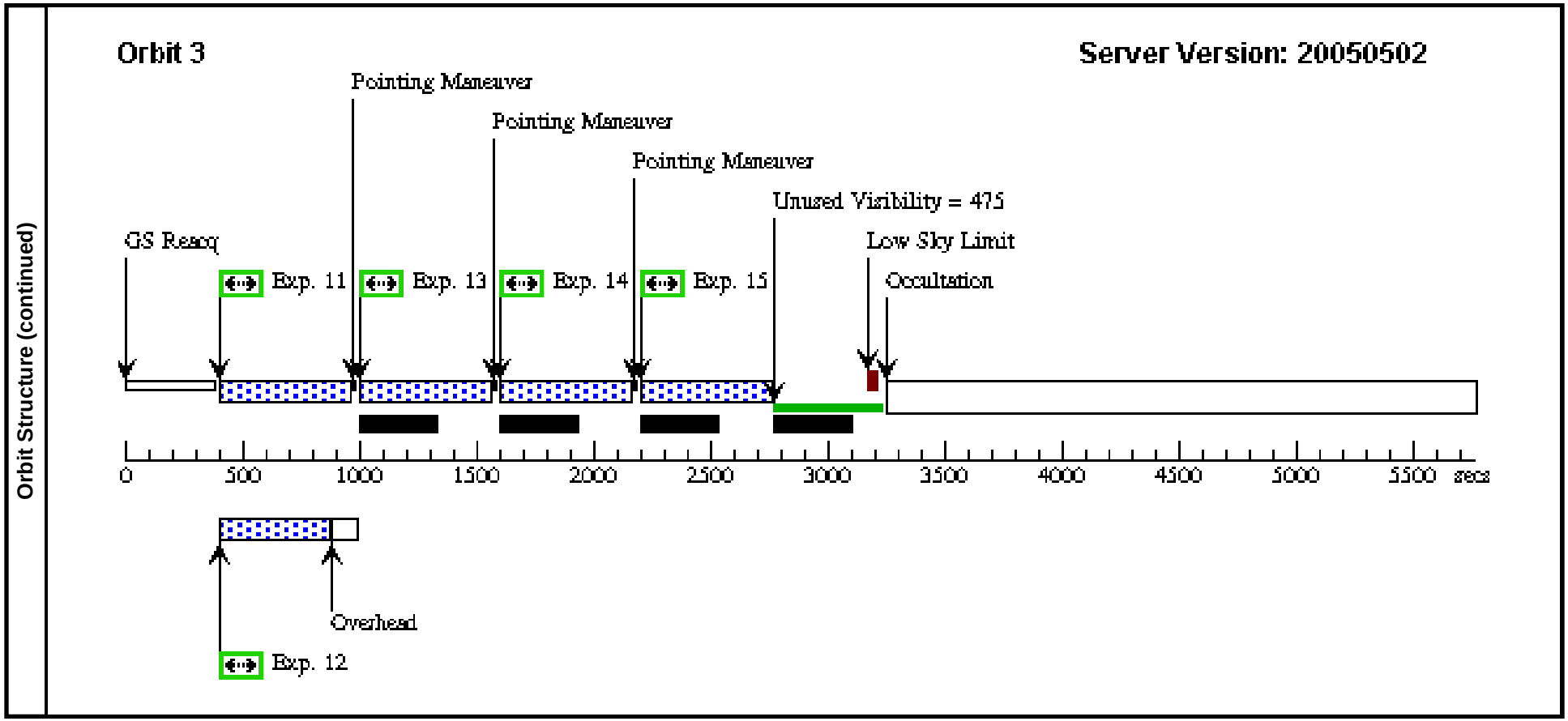
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
11		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.231,0.249; LOW-SKY	Prime + Parallel Group 11-12	440.0 Secs *[==>]*	 ***[3]***
12		ANY	WFPC2, IMAGE, WFALL-FIX	F702W	CLOCKS=YES; CR-SPLIT=NO		Prime + Parallel Group 11-12	300.0 Secs *[==>]*	 ***[3]***
13		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.478,3.233; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
14		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.725,6.217; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***
15		(1) LCDCS-0829	ACS/WFC, ACCUM, WFC-FIX	F475W	CR-SPLIT=NO	POS TARG 0.972,9.201; LOW-SKY		440.0 Secs *[==>]*	 ***[3]***


Orbit Structure
Orbit 1
Server Version: 20050502
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Visibility = 363
Low Sky Limit
GS Acq
Exp. 1
Exp. 3
Exp. 4
Exp. 5
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Overhead
Exp. 2

Orbit Structure (continued)




Orbit Structure (continued)
Orbit 3
Server Version: 20050502
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Visibility = 475
GS Reacq
Low Sky Limit
Occultation
Exp. 11
Exp. 13
Exp. 14
Exp. 15
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs
Overhead
Exp. 12