13349 - Escaping Lyman Continuum in Strongly Lensed Galaxies at z=2.0-2.5

Cycle: 21, 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) J090122.37+181432.3	WFC3/UVIS	3	11-Jul-2013 21:13:07.0	yes
02	(2) J134332.85+415503.4	WFC3/UVIS	3	11-Jul-2013 21:13:16.0	yes
03	(3) J090002.79+223403.6	WFC3/UVIS	3	11-Jul-2013 21:13:23.0	yes
04	(4) J120602.09+514229.5	WFC3/UVIS	3	11-Jul-2013 21:13:30.0	yes
05	(5) MACS0451	WFC3/UVIS	3	11-Jul-2013 21:13:36.0	yes
06	(6) A2188-EBBELS-FLANKING	WFC3/UVIS	3	11-Jul-2013 21:13:44.0	yes

18 Total Orbits Used

ABSTRACT

We propose to obtain deep WFC3 UVIS channel near ultraviolet (NUV) images of a sample of 6 bright lensed galaxies at z = 2.0 - 2.5 to detect the escaping Lyman continuum (LyC) radiation in order to study the physical properties of the LyC emitting region and the evolution of ionizing photon

escape fraction with redshift. The LyC escape fraction is a key parameter in determining the contribution of star-forming galaxies to UV ionization background and to the cosmic reionization. It is, however, poorly constrained with conflicting results. In this proposal, we will use the observations of the brightest lensed galaxies (r<21.0) to provide accurate measurement of escape fraction in high-redshift galaxies, sensitive to the flux ratio between intergalactic medium corrected LyC and 1500A of as low as 0.5-3% in individual galaxies, and 0.2% when stacking all galaxies. In addition, lensing effect will allow us to probe a wide range of intrinsic luminosity (-20.5<M_UV<-23.5, 0.6L*-10L*), and the highly stretched images provide a high spatial resolution to study of the detailed LyC escape geometry. We will correlate LyC properties with physical properties of the lensed galaxies provided by existing deep HST imaging and ground-based near-IR spectroscopy to constrain physical models of LyC escape mechanism. Our sample will also fill the gap of the redshift range between 2.0 - 2.5 that has not been probed in previous works, allowing study of the evolution of escape fraction in the redshift range of z = 1 to 3.5.

OBSERVING DESCRIPTION

This UV imaging observations of bright Lensed galaxies at z~2-3 is aiming to detect the Lyman continuum in these star-forming galaxies, which will give a strong constraint on the escape fraction in the galaxies at z~2-3. The filters are selected based on the redshift of the galaxies to cover the Lyman continuum emission from the galaxy. 3-orbits are planned for each galaxy, which are divided into 6 individual exposures.

As the WFC/UVIS detector has low ETC efficiency problem, we plan to post-flash the detector to 12e- per pxiel level, and post offset x=-60.00 y=-25.00 to move the target to lower left conner.

Visit

Proposal 13349, J0901 (01), implementation Fri Jul 12 01:13:52 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J090122.37+181432.3	RA: 09 01 22.3700 (135.3432083d) Dec: +18 14 32.30 (18.24231d) Equinox: J2000	Epoch of Position: 2000 Redshift: 2.25	V=(?) r = 19.7	Reference Frame: SDSS

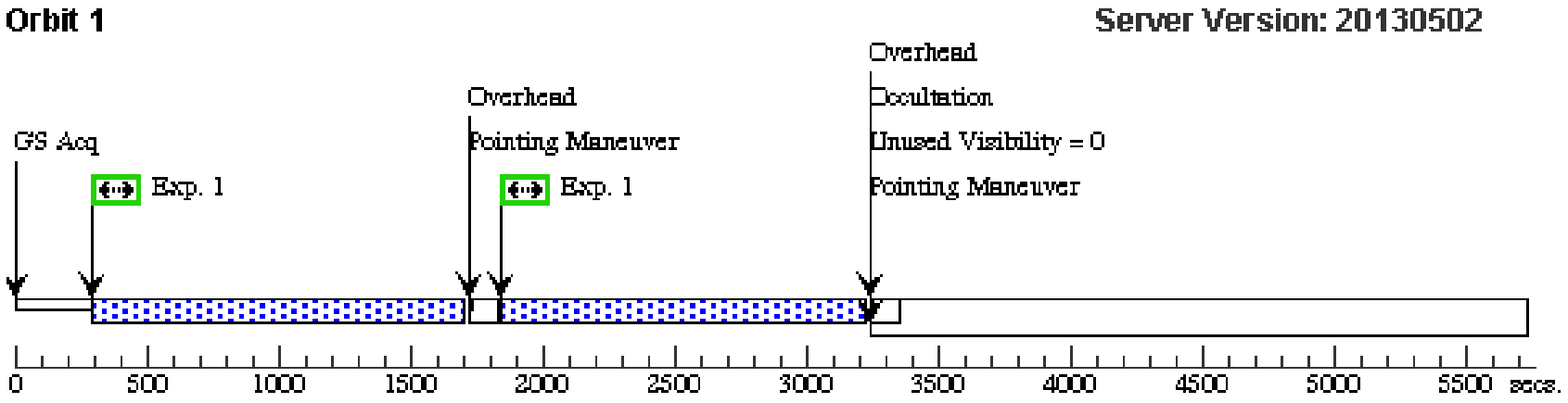
Comments: Einstein radius of ~8''

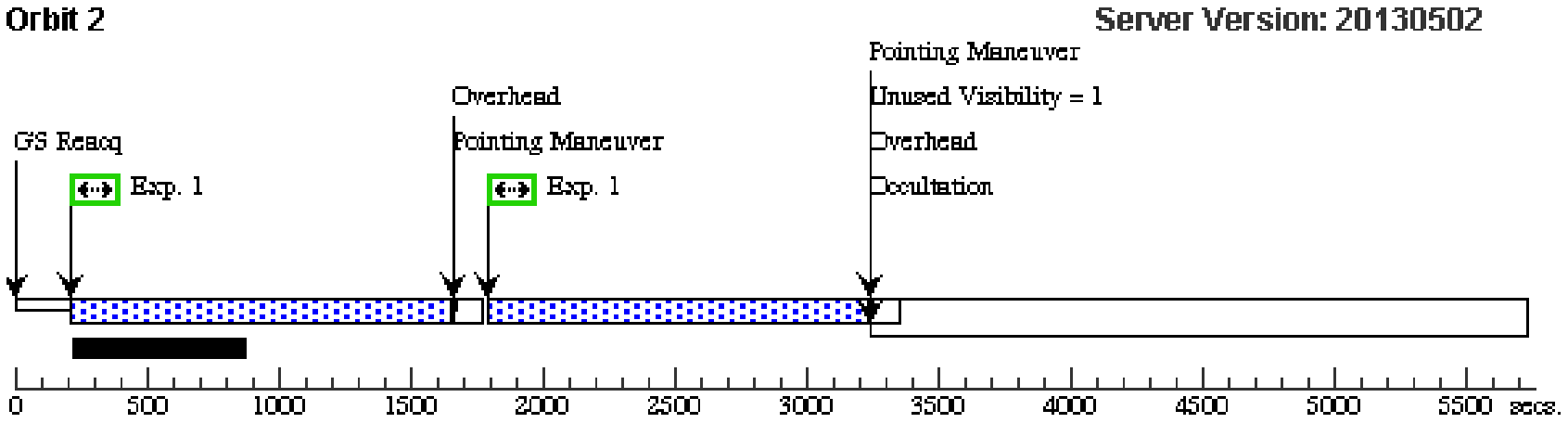
Every interesting structure is within a circle with a raduis of 10'' at the certer of the coordinate

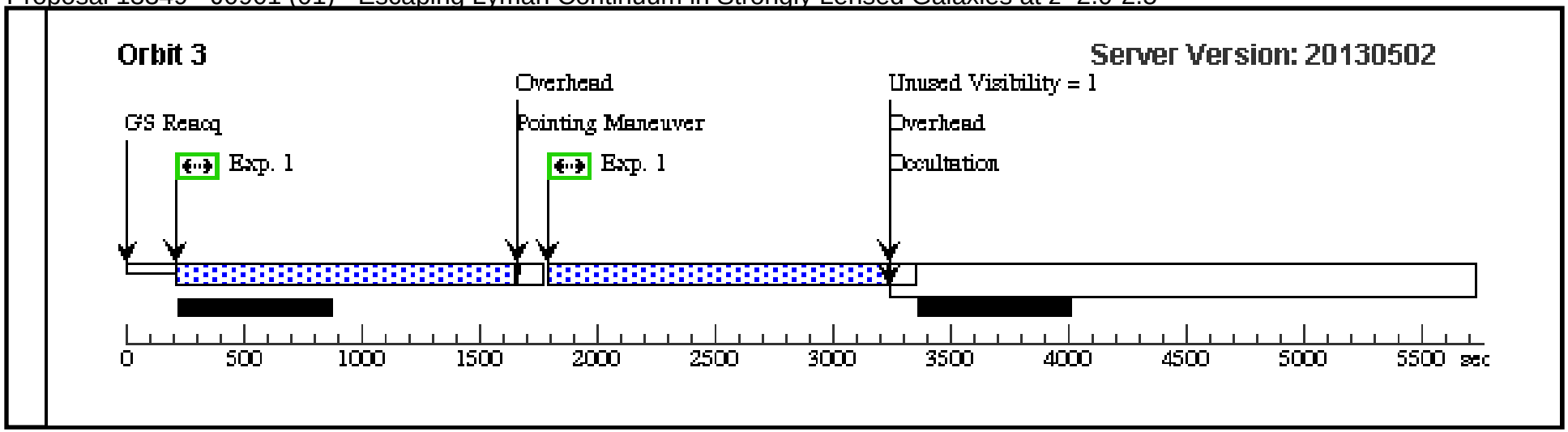
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	J0901	(1) J090122.37+181432.3	WFC3/UVIS, ACCUM, UVIS2	F225W	FLASH=12	POS TARG -60.00,-25.00	Pattern 1, Exps 1-1 in J0901 (01) (1)	1200 Secs (8524 Secs)	
								[==>1384.0 Secs (Pattern 1)] *[==>1384.0 Secs (Pattern 2)]*	***[1]***
								[==>1439.0 Secs (Pattern 3)] *[==>1439.0 Secs (Pattern 4)]*	***[2]***
								[==>1439.0 Secs (Pattern 5)] *[==>1439.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20130502
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Unused Visibility = 1
Overhead
Occultation
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500
1000
1500
2000
2500
3000
3500
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4500
5000
5500
sec

Visit

Proposal 13349, J1343 (02), implementation Fri Jul 12 01:13:54 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

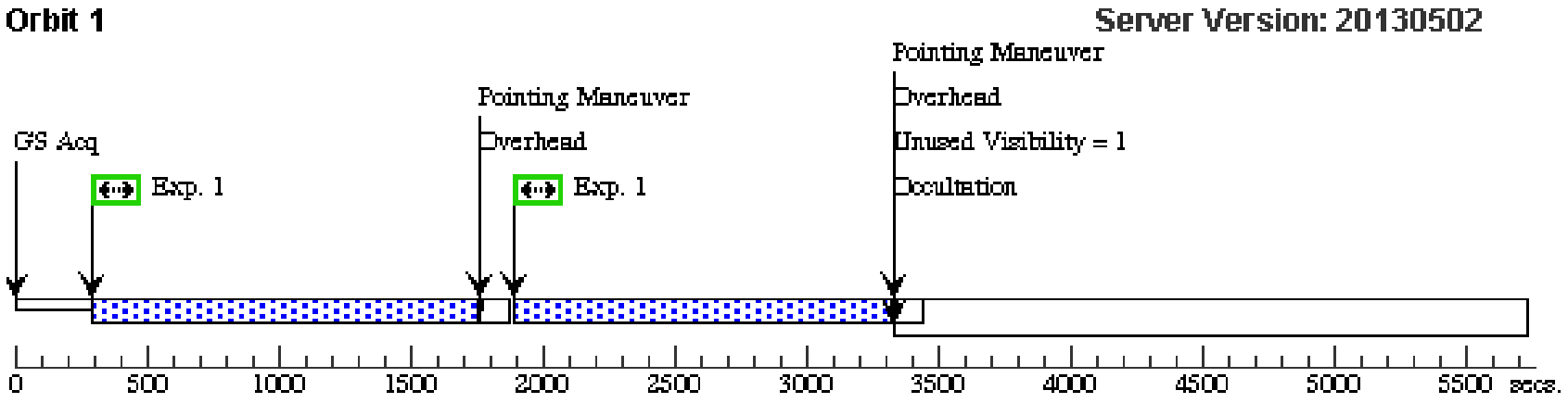
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	J134332.85+415503.4	RA: 13 43 33.7780 (205.8907417d) Dec: +41 55 9.32 (41.91926d) Equinox: J2000	Epoch of Position: 2000 Redshift: 2.09	V=(?) r = 20.2	Reference Frame: SDSS

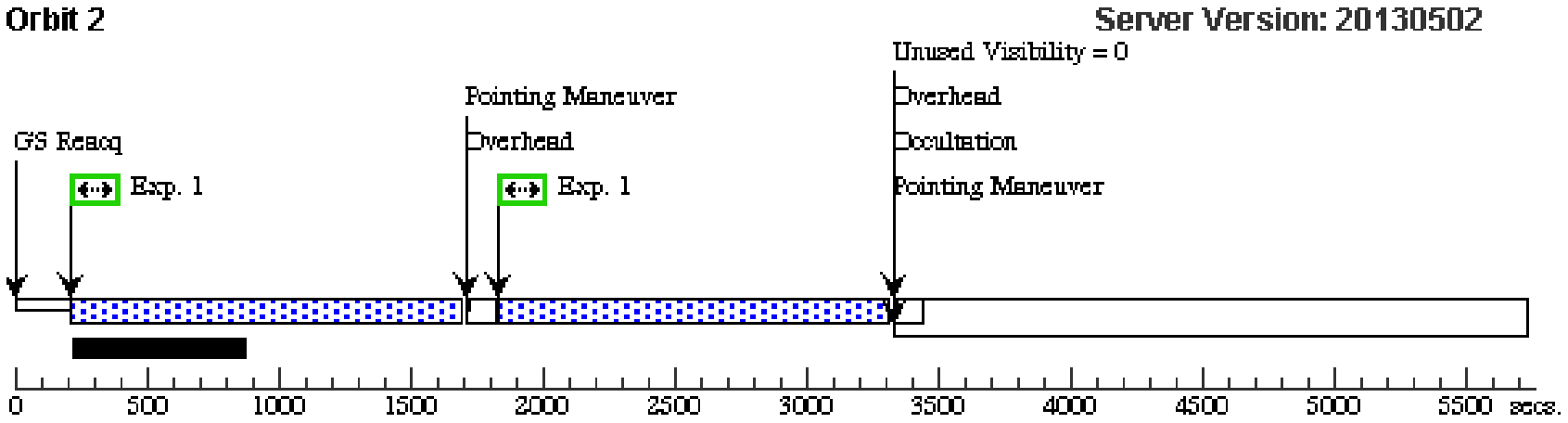
Comments: Einetein radius of 13"

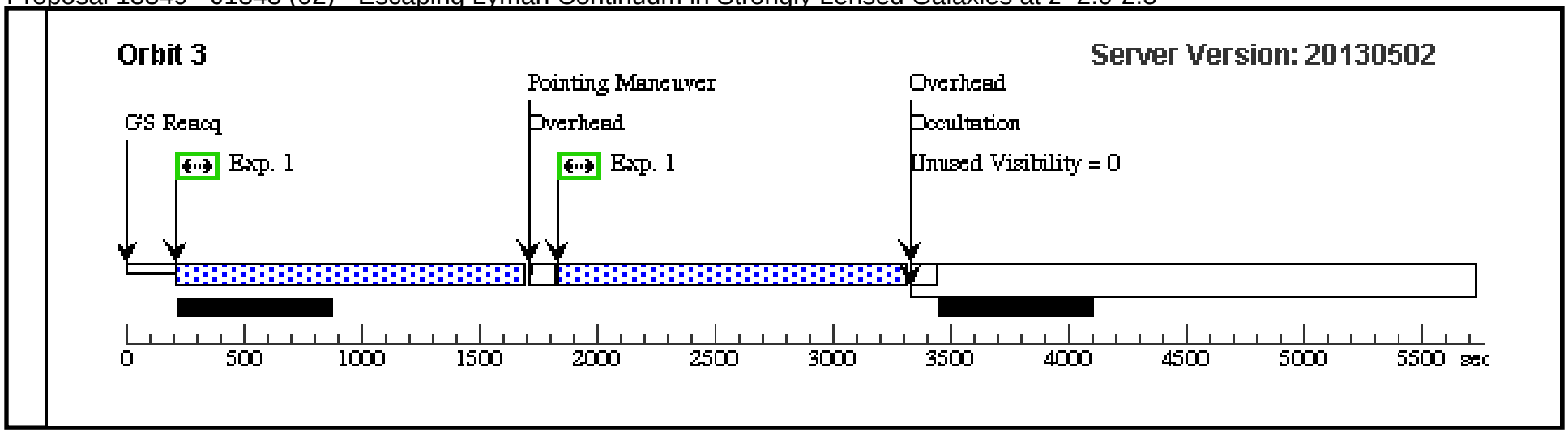
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	J1343	(2) J134332.85+415503.4	WFC3/UVIS, ACCUM, UVIS2	F218W	FLASH=12	POS TARG -60.00,-25.00	Pattern 1, Exps 1-1 in J1343 (02) (1)	1200 Secs (8792 Secs)	
								[==>1428.0 Secs (Pattern 1)] *[==>1428.0 Secs (Pattern 2)]*	***[1]***
								[==>1484.0 Secs (Pattern 3)] *[==>1484.0 Secs (Pattern 4)]*	***[2]***
								[==>1484.0 Secs (Pattern 5)] *[==>1484.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20130502
GS Reacq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Overhead
Occultation
Unused Visibility = 0
0
500
1000
1500
2000
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5500
sec

Visit

Proposal 13349, J0900 (03), implementation Fri Jul 12 01:13:56 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

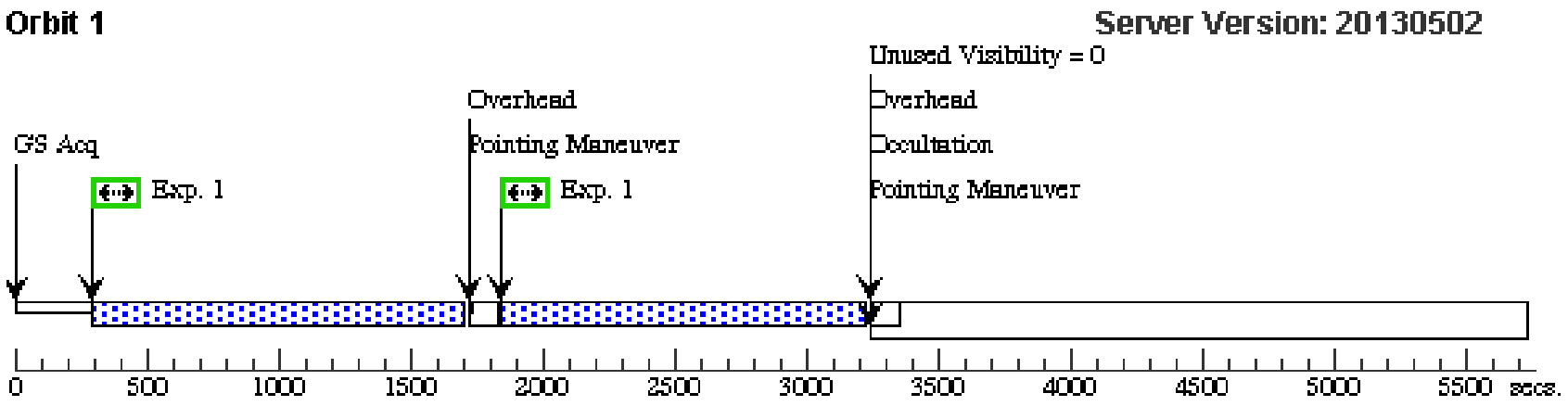
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	J090002.79+223403.6	RA: 09 00 2.7900 (135.0116250d) Dec: +22 34 3.60 (22.56767d) Equinox: J2000	Epoch of Position: 2000 Redshift: 2.03	V=(?) r = 19.6	Reference Frame: SDSS

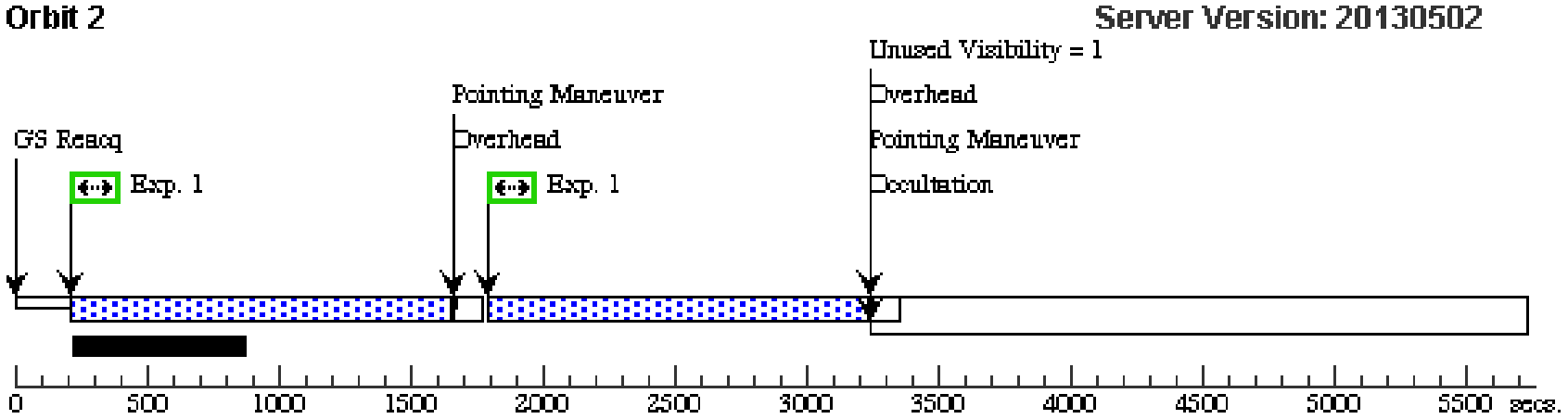
Comments: Einstein radius of 7"

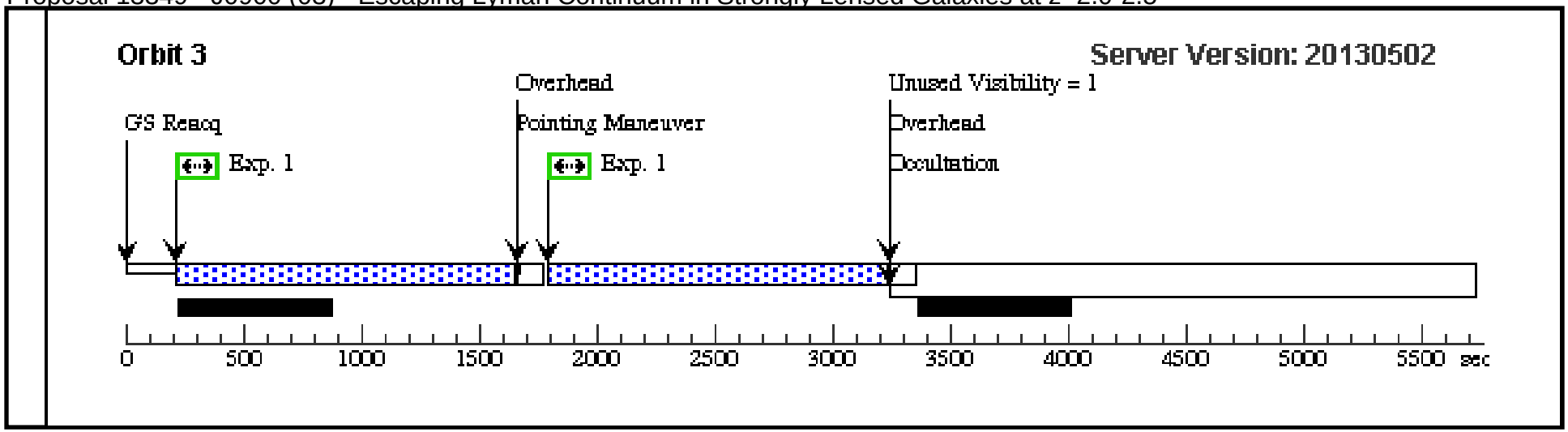
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	J0900	(3) J090002.79+223403.6	WFC3/UVIS, ACCUM, UVIS2	F218W	FLASH=12	POS TARG -60.00,-25.00	Pattern 1, Exps 1-1 in J0900 (03) (1)	1200 Secs (8524 Secs)	
								[==>1384.0 Secs (Pattern 1)] *[==>1384.0 Secs (Pattern 2)]*	***[1]***
								[==>1439.0 Secs (Pattern 3)] *[==>1439.0 Secs (Pattern 4)]*	***[2]***
								[==>1439.0 Secs (Pattern 5)] *[==>1439.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20130502
GS Reacq
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Unused Visibility = 1
Overhead
Occultation
0
500
1000
1500
2000
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3000
3500
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sec

Visit

Proposal 13349, J1206 (04), implementation Fri Jul 12 01:13:57 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	J120602.09+514229.5	RA: 12 06 2.0900 (181.5087083d) Dec: +51 42 29.50 (51.70819d) Equinox: J2000	Epoch of Position: 2000	V=(?) r = 19.0	Reference Frame: SDSS

Comments: Einstein Radius of 4"

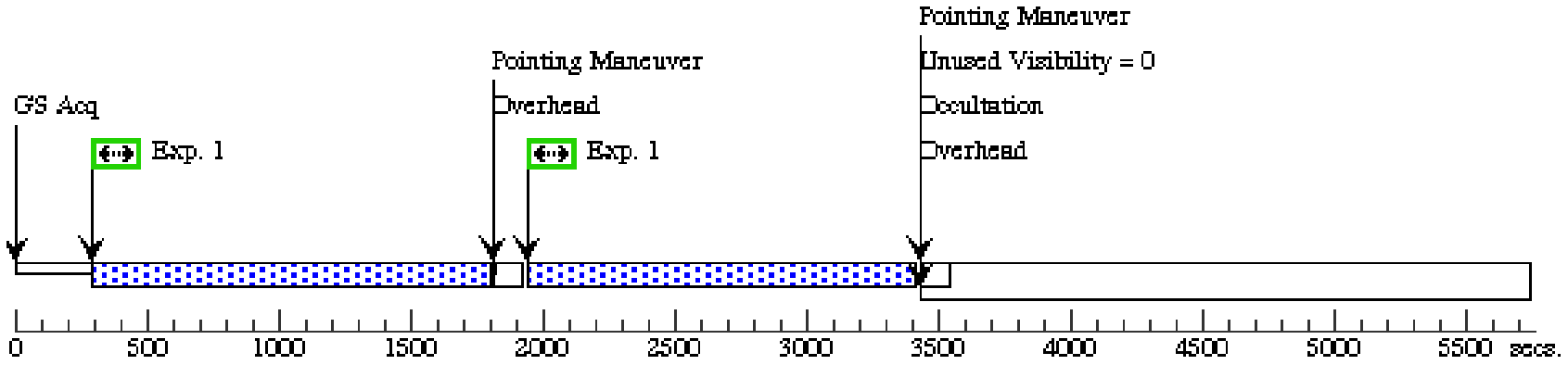
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	J1206	(4) J120602.09+514229.5	WFC3/UVIS, ACCUM, UVIS2	F218W	FLASH=12	POS TARG -60.00,-25.00; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in J1206 (04) (1)	1200 Secs (9082 Secs)	
								[==>1477.0 Secs (Pattern 1)] *[==>1477.0 Secs (Pattern 2)]*	***[1]***
								[==>1532.0 Secs (Pattern 3)] *[==>1532.0 Secs (Pattern 4)]*	***[2]***
								[==>1532.0 Secs (Pattern 5)] *[==>1532.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure

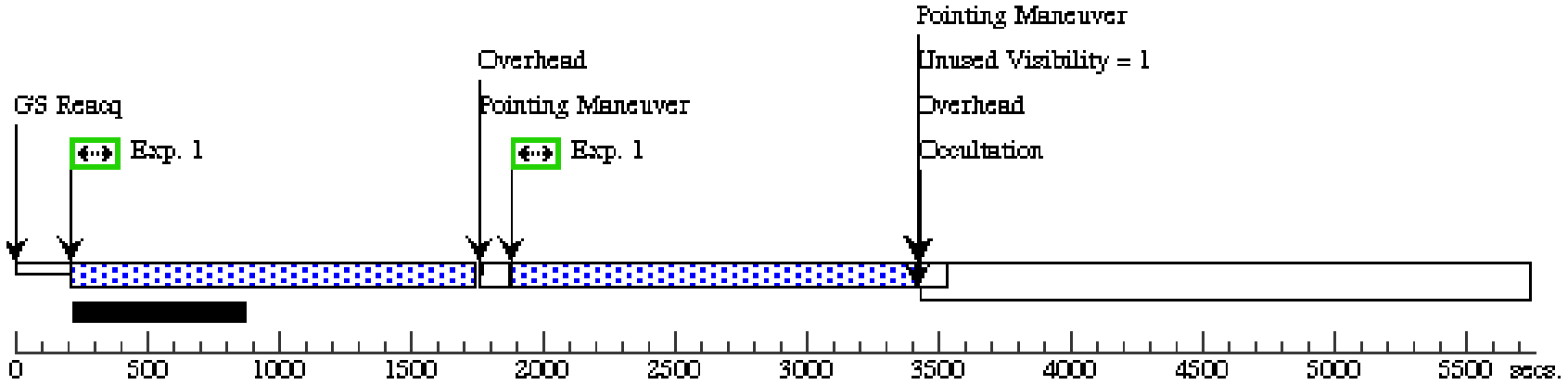
Orbit 1

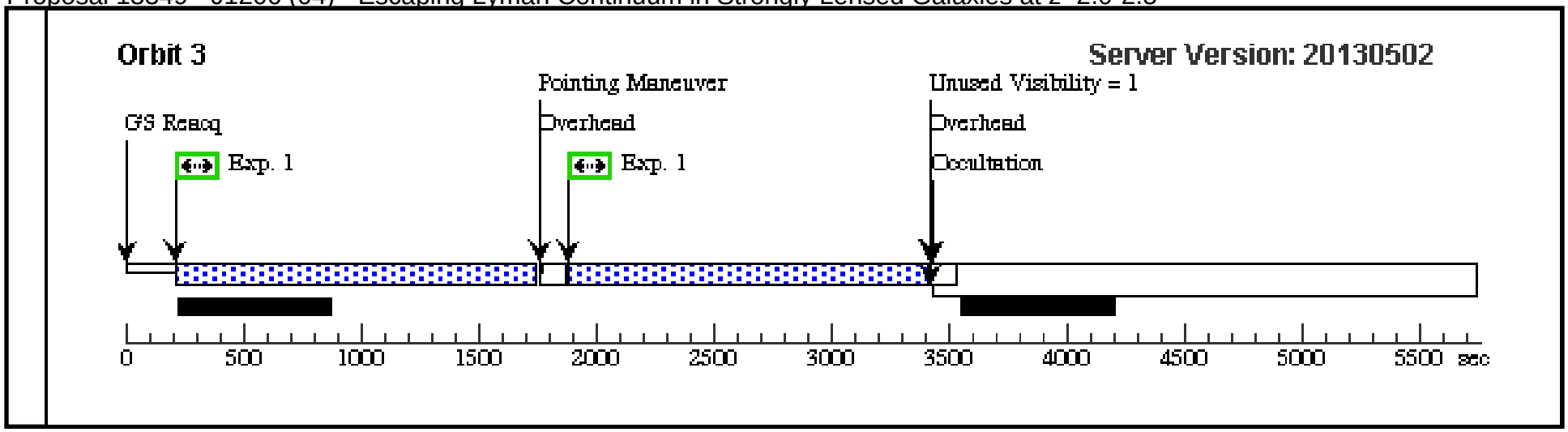
Server Version: 20130502



Orbit 2

Server Version: 20130502




Orbit 3
Server Version: 20130502
Pointing Maneuver
Unused Visibility = 1
GS Reacq
Overhead
Overhead
Exp. 1
Exp. 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
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4500
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5500
sec

Visit

Proposal 13349, MACS0451 (05), implementation Fri Jul 12 01:13:58 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

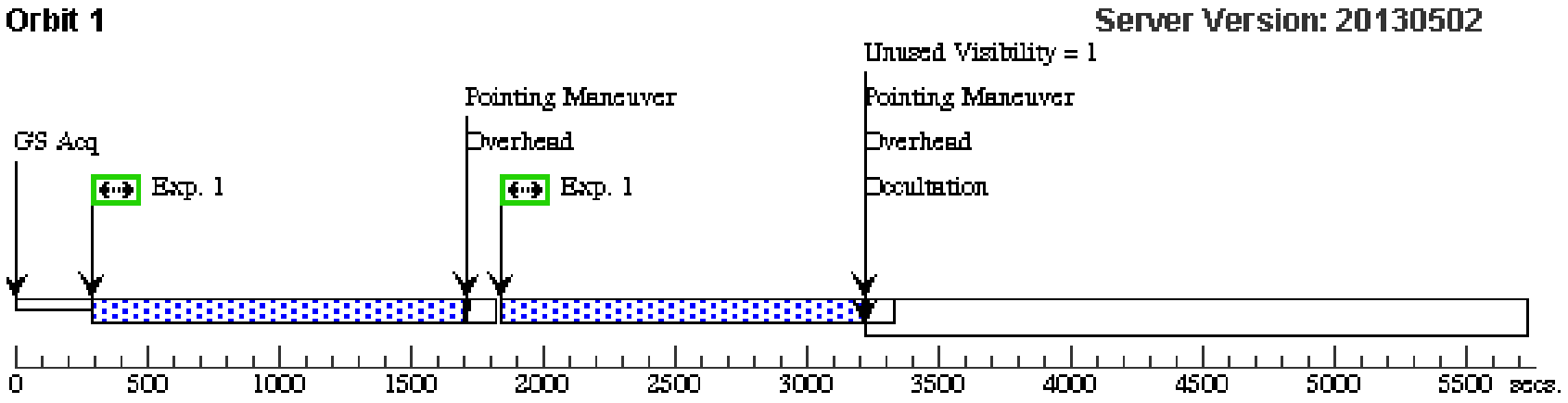
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	MACS0451	RA: 04 51 57.1860 (72.9882750d) Dec: +00 06 14.87 (.10413d) Equinox: J2000	Redshift: 2.01	V=(?) r = 19.6	Reference Frame: GSC

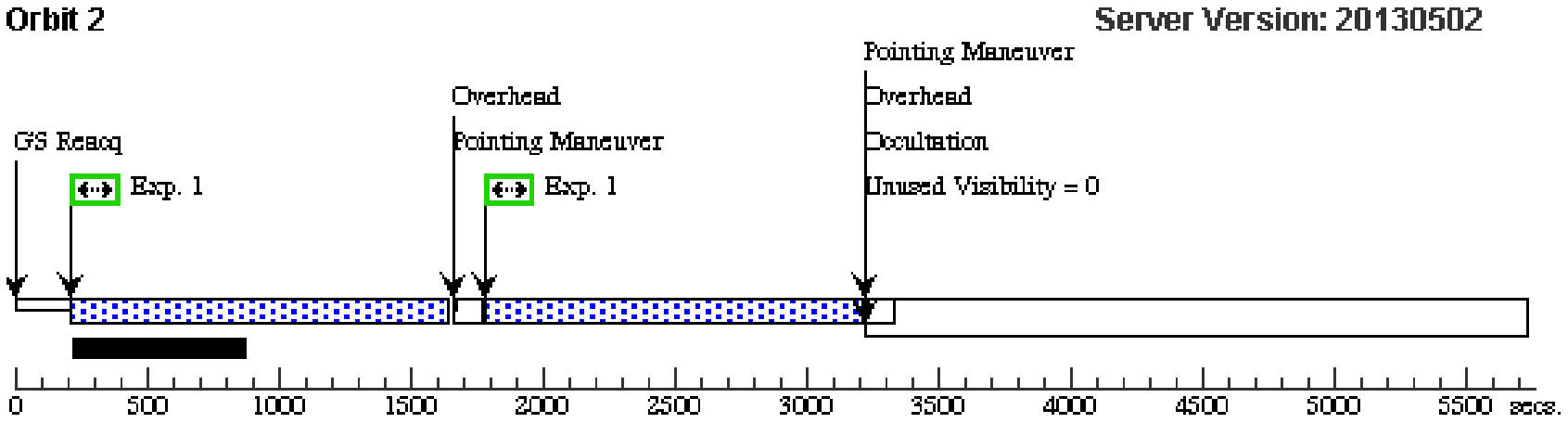
Comments: The length of the Arc is 20"

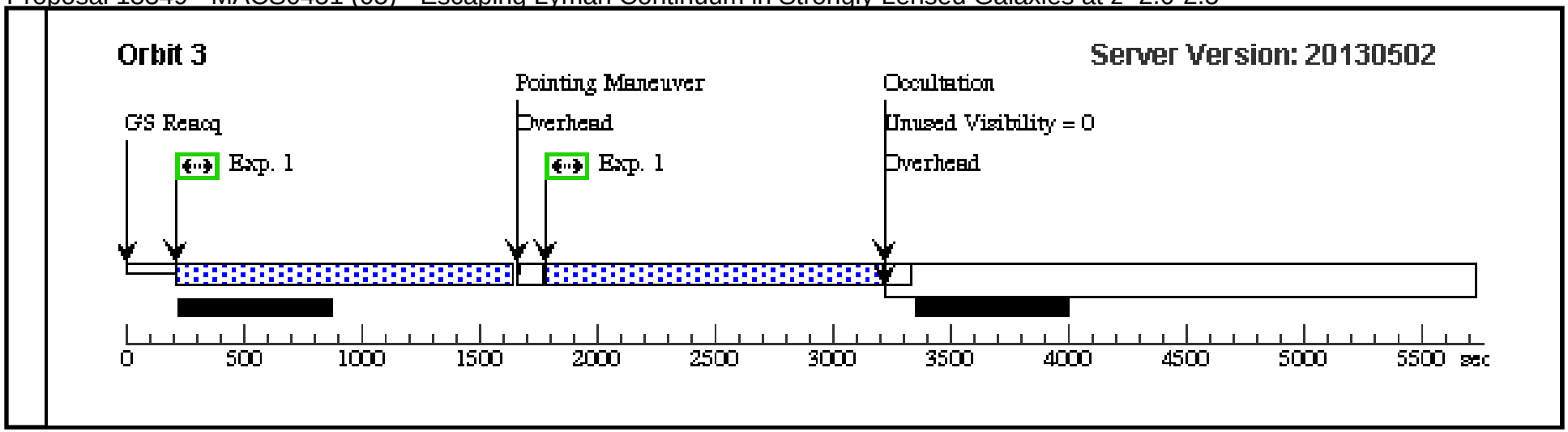
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	MACS0451	(5) MACS0451	WFC3/UVIS, ACCUM, UVIS2	F218W	FLASH=12	POS TARG -60.00,-25.00	Pattern 1, Exps 1-1 in MACS0451 (05) (1)	1200 Secs (8480 Secs)	
								[==>1376.0 Secs (Pattern 1)] *[==>1376.0 Secs (Pattern 2)]*	***[1]***
								[==>1432.0 Secs (Pattern 3)] *[==>1432.0 Secs (Pattern 4)]*	***[2]***
								[==>1432.0 Secs (Pattern 5)] *[==>1432.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20130502
Pointing Maneuver
Occultation
GS Reacq
Overhead
Unused Visibility = 0
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Exp. 1
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3500
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4500
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5500
sec

Visit

Proposal 13349, A2188 (06), implementation Fri Jul 12 01:14:00 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=6 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

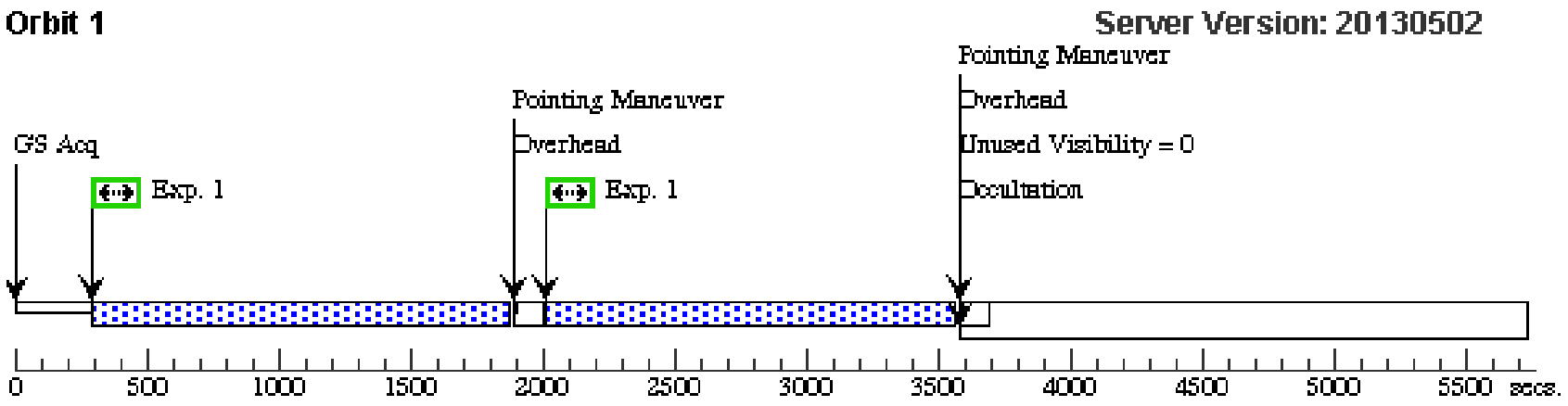
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	A2188-EBBELS-FLANKING	RA: 16 35 49.1790 (248.9549125d) Dec: +66 13 6.51 (66.21848d) Equinox: J2000		V=(?) r = 20.7	Reference Frame: HST

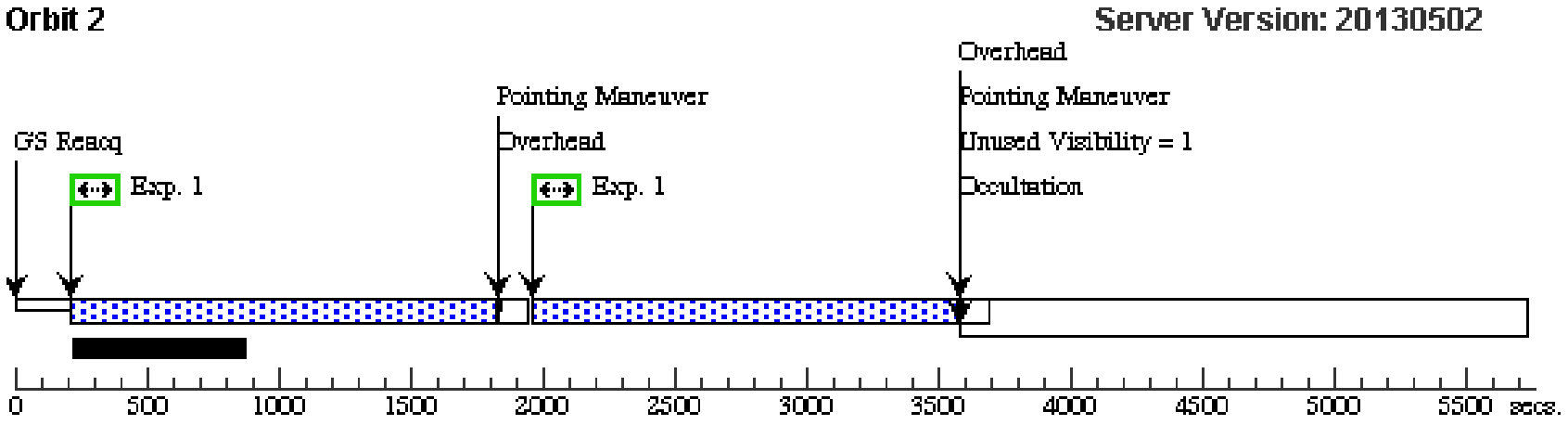
Comments: Too componets separated by 8"

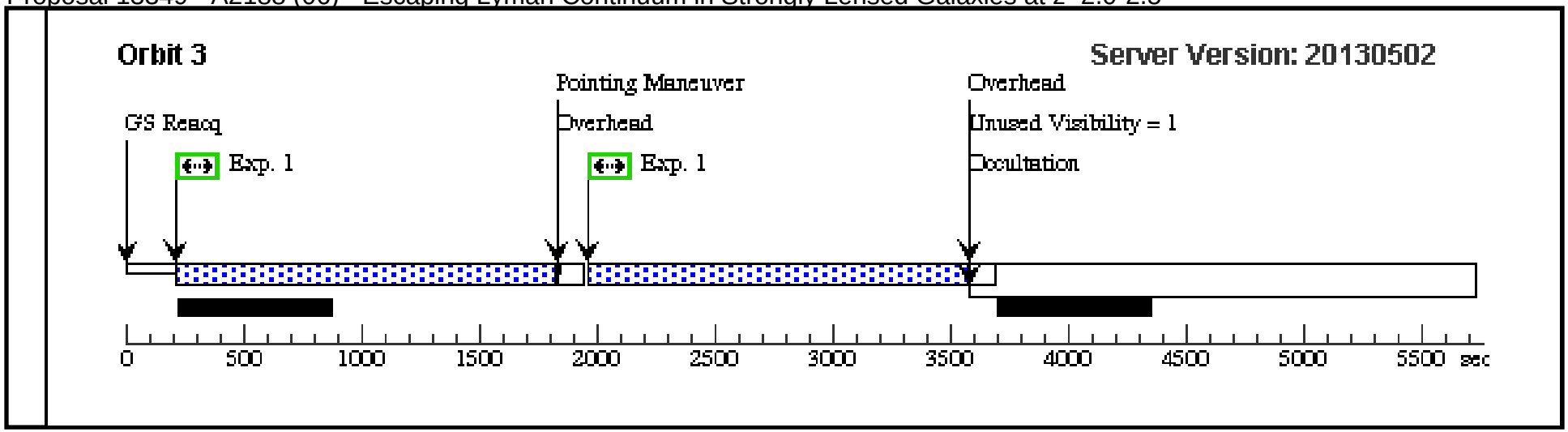
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	A2188	(6) A2188-EBBELS-FLANKING	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12	POS TARG -60.00,-25.00	Pattern 1, Exps 1-1 in A2188 (06) (1)	1200 Secs (9538 Secs)	
								[==>1553.0 Secs (Pattern 1)] *[==>1553.0 Secs (Pattern 2)]*	***[1]***
								[==>1608.0 Secs (Pattern 3)] *[==>1608.0 Secs (Pattern 4)]*	***[2]***
								[==>1608.0 Secs (Pattern 5)] *[==>1608.0 Secs (Pattern 6)]*	***[3]***

Orbit Structure



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GS Reacq
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Pointing Maneuver
Overhead
Exp. 1
Overhead
Unused Visibility = 1
Occultation
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5500
sec