11582 - The spatial distribution of radiation in the complex ISM of distant ultraluminous galaxies

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Andrew Blain (PI)	**California Institute of Technology**	**awb@astro.caltech.edu**
Dr. Scott C. Chapman (CoI) (ESA Member)	University of Cambridge	schapman@ast.cam.ac.uk
Dr. Ian R. Smail (CoI) (ESA Member)	University of Durham	ian.smail@durham.ac.uk
Dr. Rob Ivison (CoI) (ESA Member)	University College London	R.Ivison@roe.ac.uk
Dr. Colin J.K. Borys (CoI)	California Institute of Technology	borys@caltech.edu
Dr. Mark Swinbank (CoI) (ESA Member)	University of Durham	a.m.swinbank@durham.ac.uk
Ms. Karin Menendez-Delmestre (CoI)	California Institute of Technology	km@astro.caltech.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SMMJ163650.43+405734.5	ACS/WFC	5	21-Oct-2009 21:02:16.0	yes
02	(2) SMMJ02399-0136	ACS/WFC	5	21-Oct-2009 21:02:24.0	yes
03	(5) SMMJ221726+0013	ACS/WFC	5	21-Oct-2009 21:02:33.0	yes
04	(4) SMMJ105155.5+572313	ACS/WFC	5	21-Oct-2009 21:02:40.0	yes

20 Total Orbits Used

ABSTRACT

A significant fraction of energy emitted by galaxies at redshifts when their stars were forming most vigorously, and when their blackholes were growing most powerfully emerges at far-infrared (IR) wavelengths. The fraction of this energy generated by the most extreme and luminous objects is also much larger than the equivalent fraction at optical wavelengths. Many of the most luminous far-IR sources have been located precisely and unambiguously using deep radio, Spitzer and optical observations, and have spectroscopic identifications using the largest ground-based telescopes. Surprisingly, however, the spectra of most of these heavily dust-enshrouded galaxies show prominent Lyman-alpha emission. We propose to observe five of the brightest examples at z~2-3 in re-activated ACS ramp filters, to resolve the spatial distribution of this line emission on fine kpc scales, in order to contrast and compare with the underlying ultraviolet (UV) continuum. Precise spectroscopic redshifts and the unique rest-UV resolution of HST are both essential to reveal the escape and generation of Lyman-alpha photons in the dusty ISM of these extreme galaxies. There is no other way to trace the detailed spatial distirbution of the most excited gas in a galactic wind, along with emission from less-massive star-forming galaxies in associated groups. The targets have available HST-resolution ground-based near-IR AO imaging and arcsec-scale images in CO from ground-based mm-wave interferometers, which provide context for spatial structure of evolved stars and the ISM. The interplay between restframe UV emission and the ISM in these galaxies has important consequences for understanding the origin of the prodigous luminosity of these systems, and for future observations with JWST and ALMA.

OBSERVING DESCRIPTION

Narrow-band ramp-filter imaging of redshifted Lyman alpha emission from ultraluminous, but heavily-obscured galaxies. Corresponding broad band images in overlapping filters will also be taken for the 5 target galaxies.

REAL TIME JUSTIFICATION

None

CALIBRATION JUSTIFICATION

None

ADDITIONAL COMMENTS

None

Visit

Proposal 11582, Visit 01, implementation Thu Oct 22 01:02:45 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: PCS MODE FINE; SCHED 30%

Diagnostics

(Exposure 2 (Pattern 1, Exps 2-2)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS/WFPC2 ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SMMJ163650.43+405734.5	RA: 16 36 50.4300 (249.2101250d) Dec: +40 57 34.50 (40.95958d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SMMJ163650.43+405734.5	ACS/WFC, ACCUM, WFC	F435W	CR-SPLIT=3	LOW-SKY		2250 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(1) SMMJ163650.43 +405734.5	ACS/WFC, ACCUM, WFC1-IRAMPQ	FR423N 4115 A	CR-SPLIT=3		Pattern 1, Exps 2-2 (1)	2250 Secs	
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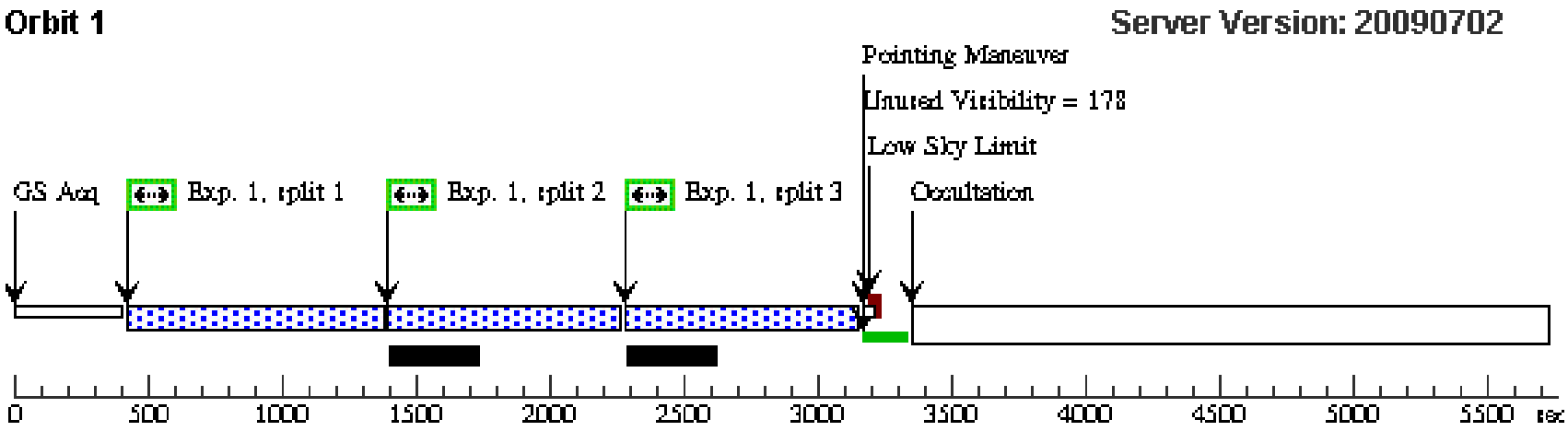
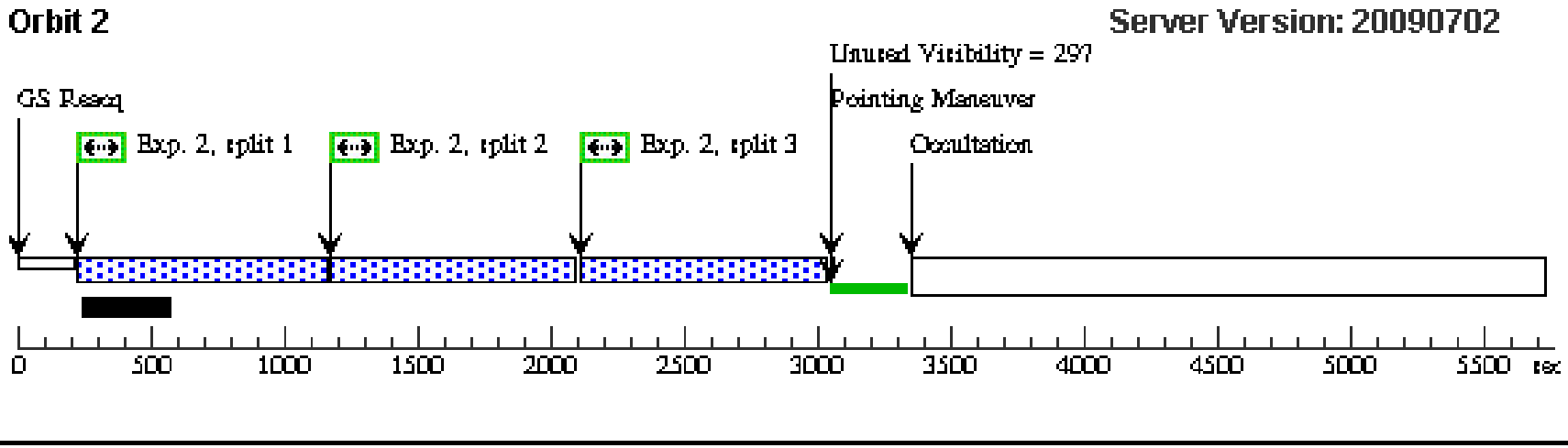
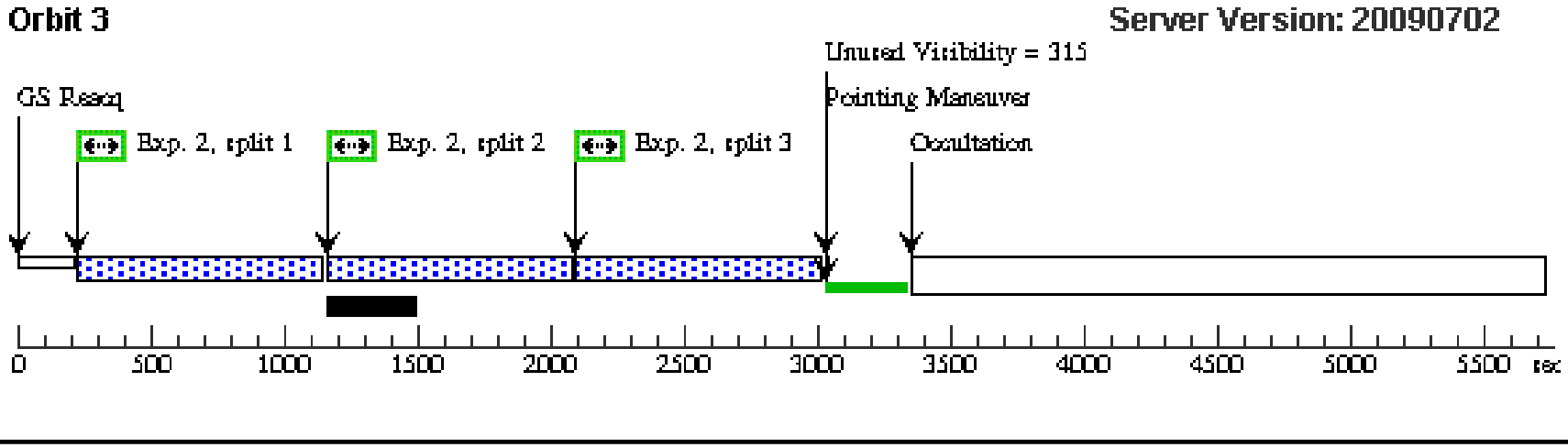
								[==>(Pattern 1, Split 2)]	***[2]***
								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
								[==>(Pattern 4, Split 1)]	
								[==>(Pattern 4, Split 2)]	***[5]***
								[==>(Pattern 4, Split 3)]	

Orbit Structure



Orbit Structure (continued)





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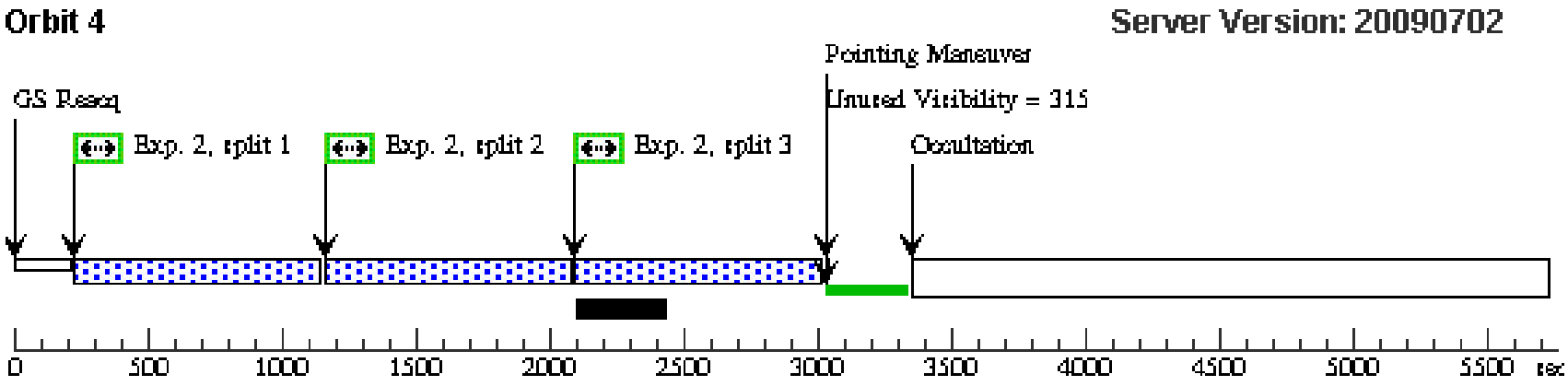

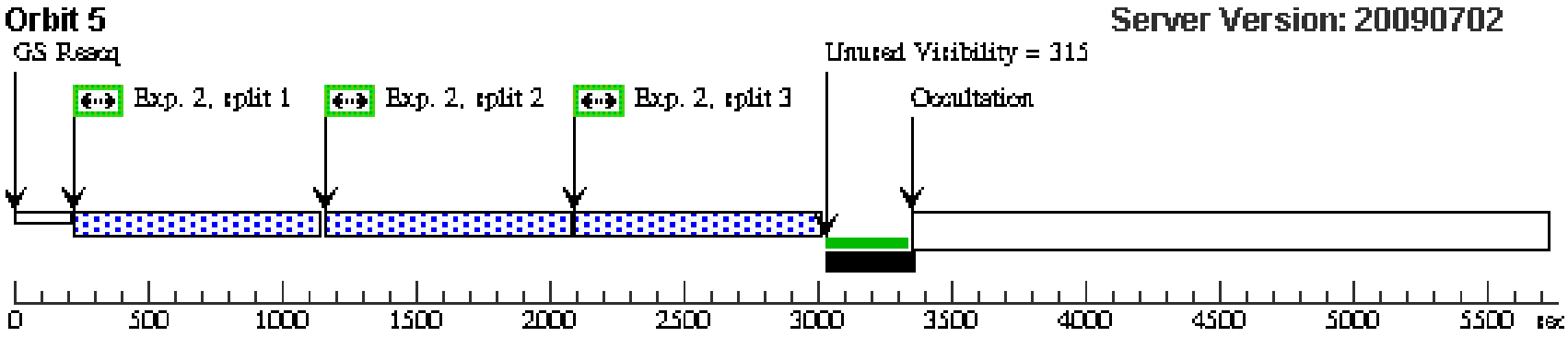

Visit

Proposal 11582, Visit 02, implementation Thu Oct 22 01:02:46 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(Exposure 2 (Pattern 1, Exps 2-2)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS/WFPC2 ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SMMJ02399-0136	RA: 02 39 52.0000 (39.9666667d) Dec: -01 35 57.50 (-1.59931d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) SMMJ02399-0136	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=3	LOW-SKY		2250 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(2) SMMJ02399-0136	ACS/WFC, ACCUM, WFC2-ORAMPQ	FR462N 4625 A	CR-SPLIT=3		Pattern 1, Exps 2-2 (1)	2250 Secs	
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								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
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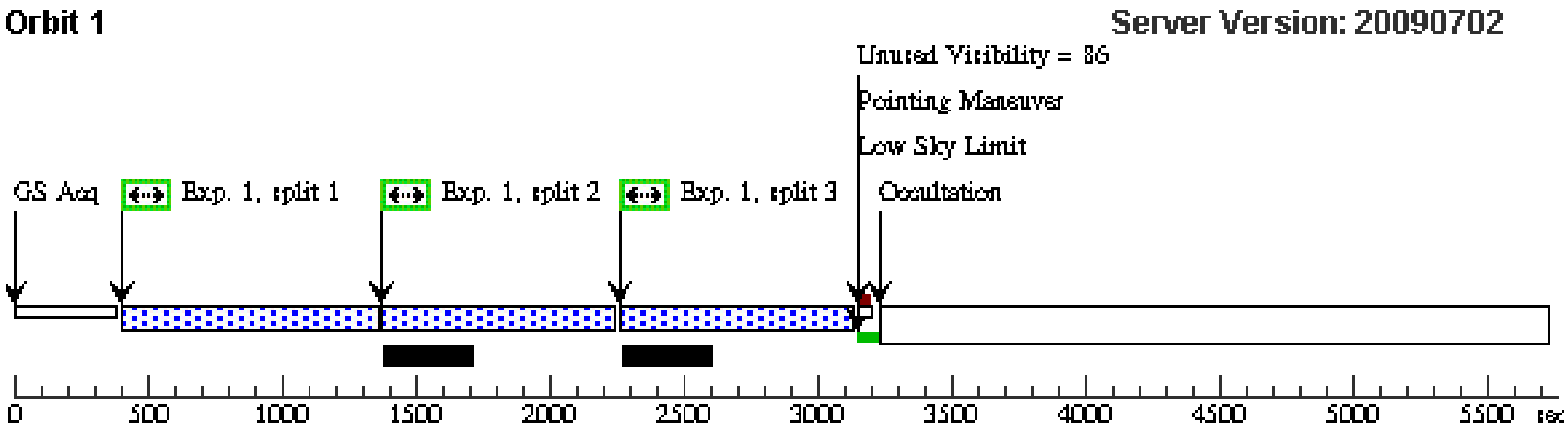
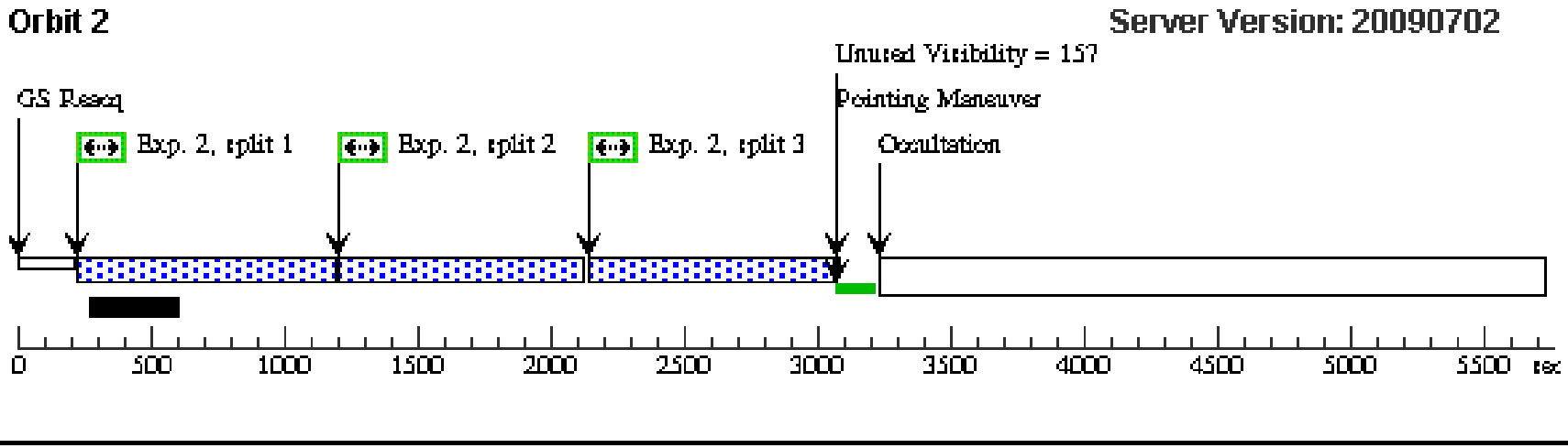
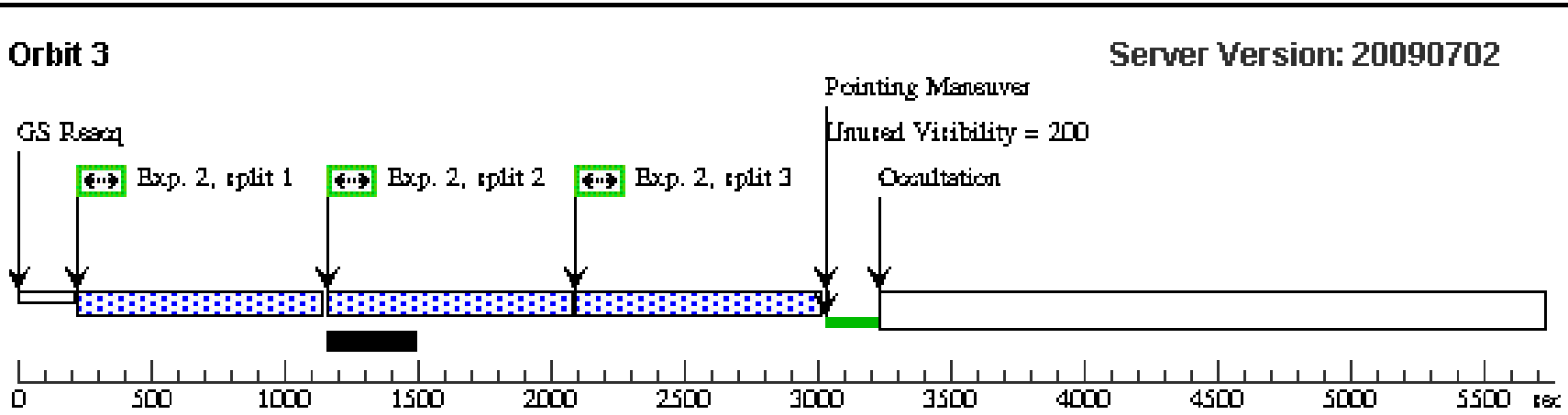
								[==>(Pattern 4, Split 3)]	

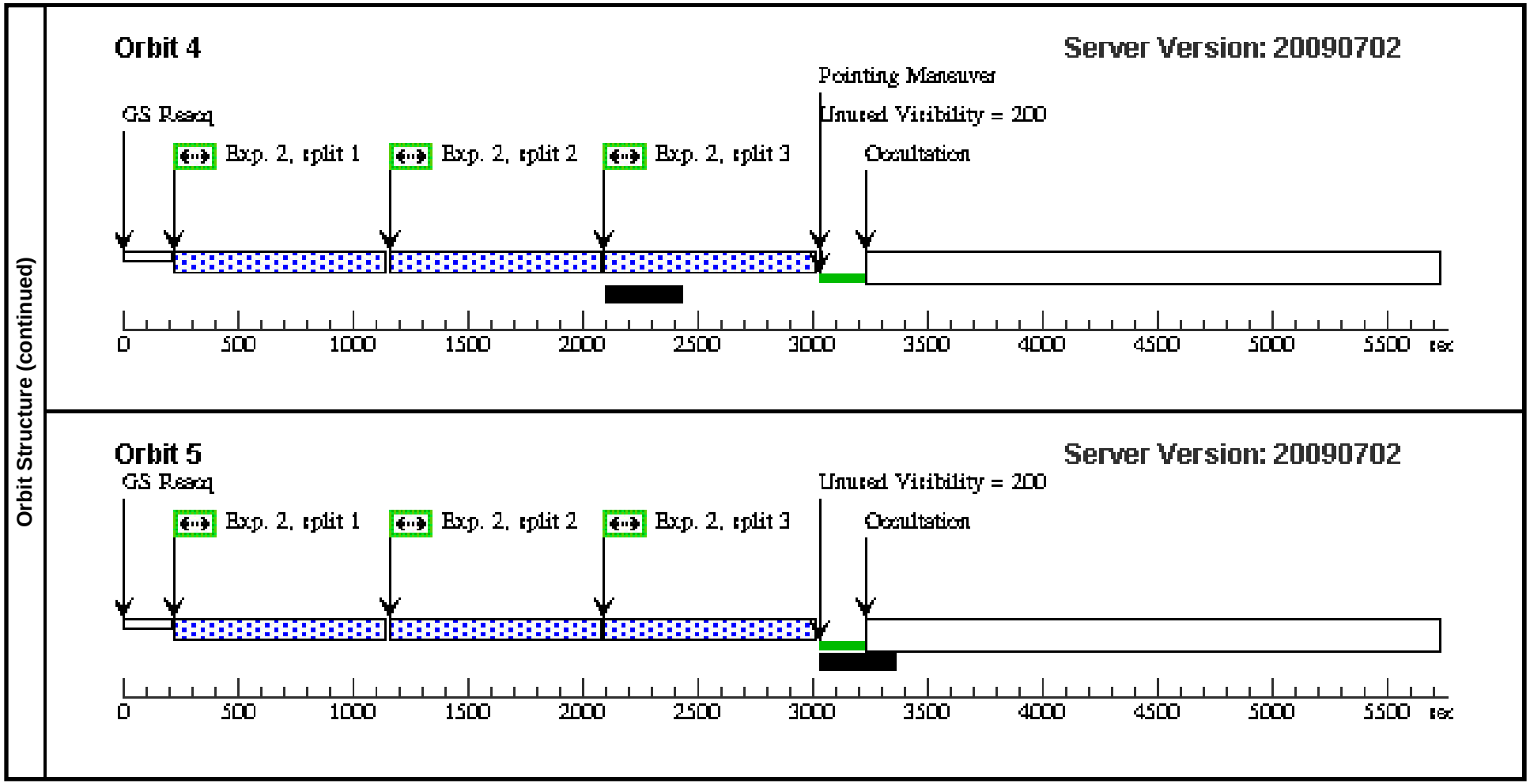
Orbit Structure



Orbit Structure (continued)






Orbit Structure (continued)
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Pointing Maneuver
GS Reacq
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Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Occultation
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 5
Server Version: 20090702
GS Reacq
Unused Visibility = 200
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 11582, Visit 03, implementation Thu Oct 22 01:02:47 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(Exposure 2 (Pattern 1, Exps 2-2)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS/WFPC2 ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SMMJ221726+0013	RA: 22 17 26.1000 (334.3587500d) Dec: +00 12 39.00 (.21083d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(5) SMMJ221726+0013	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=3	LOW-SKY		2250 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(5) SMMJ221726+0013	ACS/WFC, ACCUM, WFC1-MRAMPQ	FR505N 4973 A	CR-SPLIT=3		Pattern 1, Exps 2-2 (1)	2250 Secs	
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								[==>(Pattern 1, Split 3)]	
								[==>(Pattern 2, Split 1)]	
								[==>(Pattern 2, Split 2)]	***[3]***
								[==>(Pattern 2, Split 3)]	
								[==>(Pattern 3, Split 1)]	
								[==>(Pattern 3, Split 2)]	***[4]***
								[==>(Pattern 3, Split 3)]	
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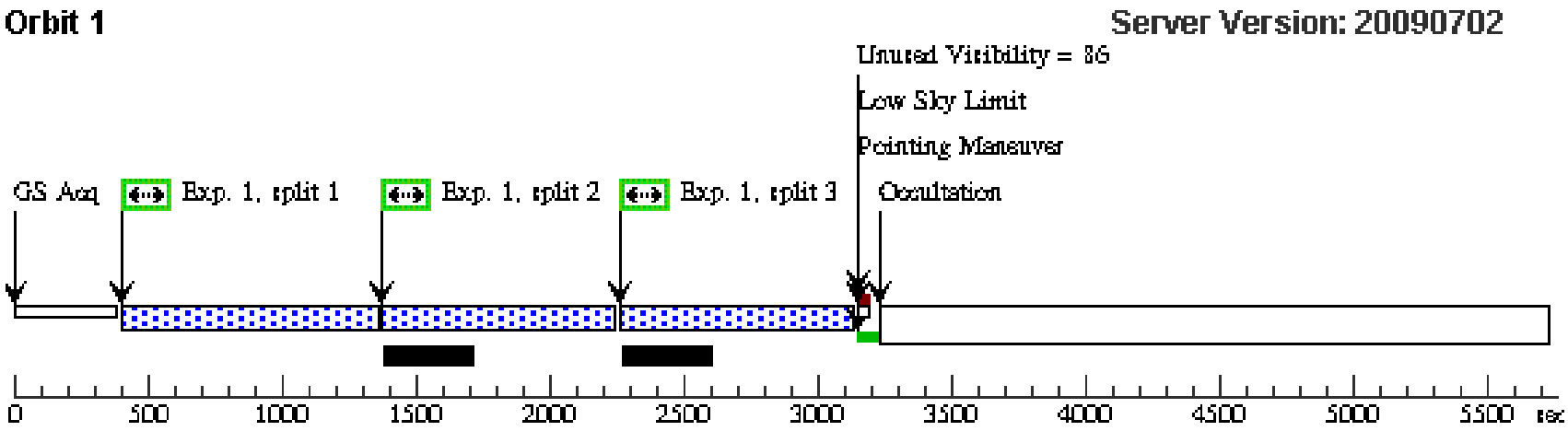
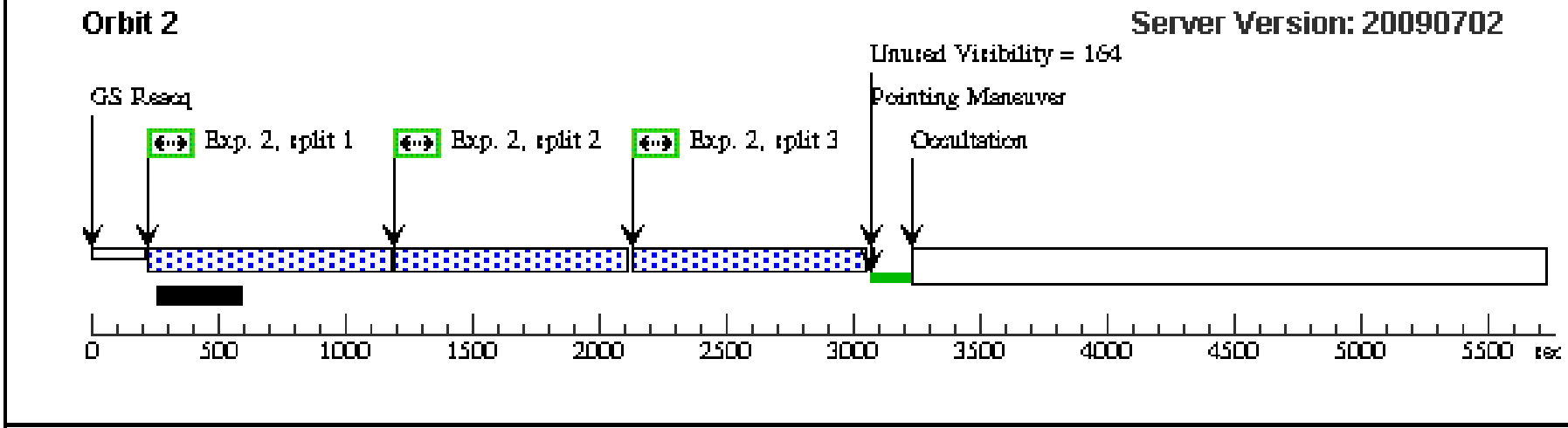
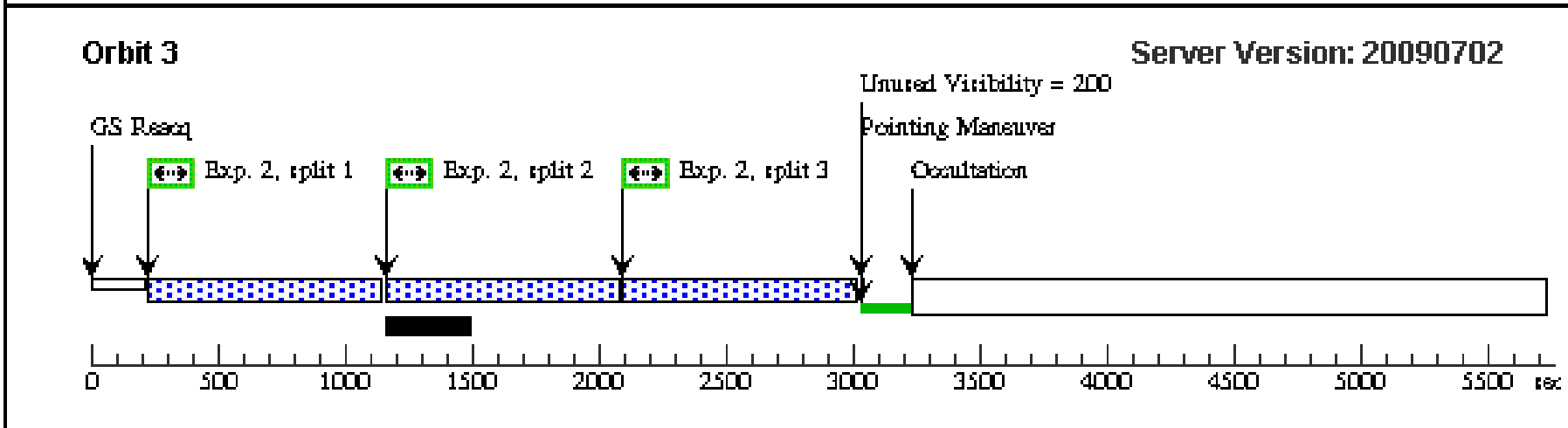
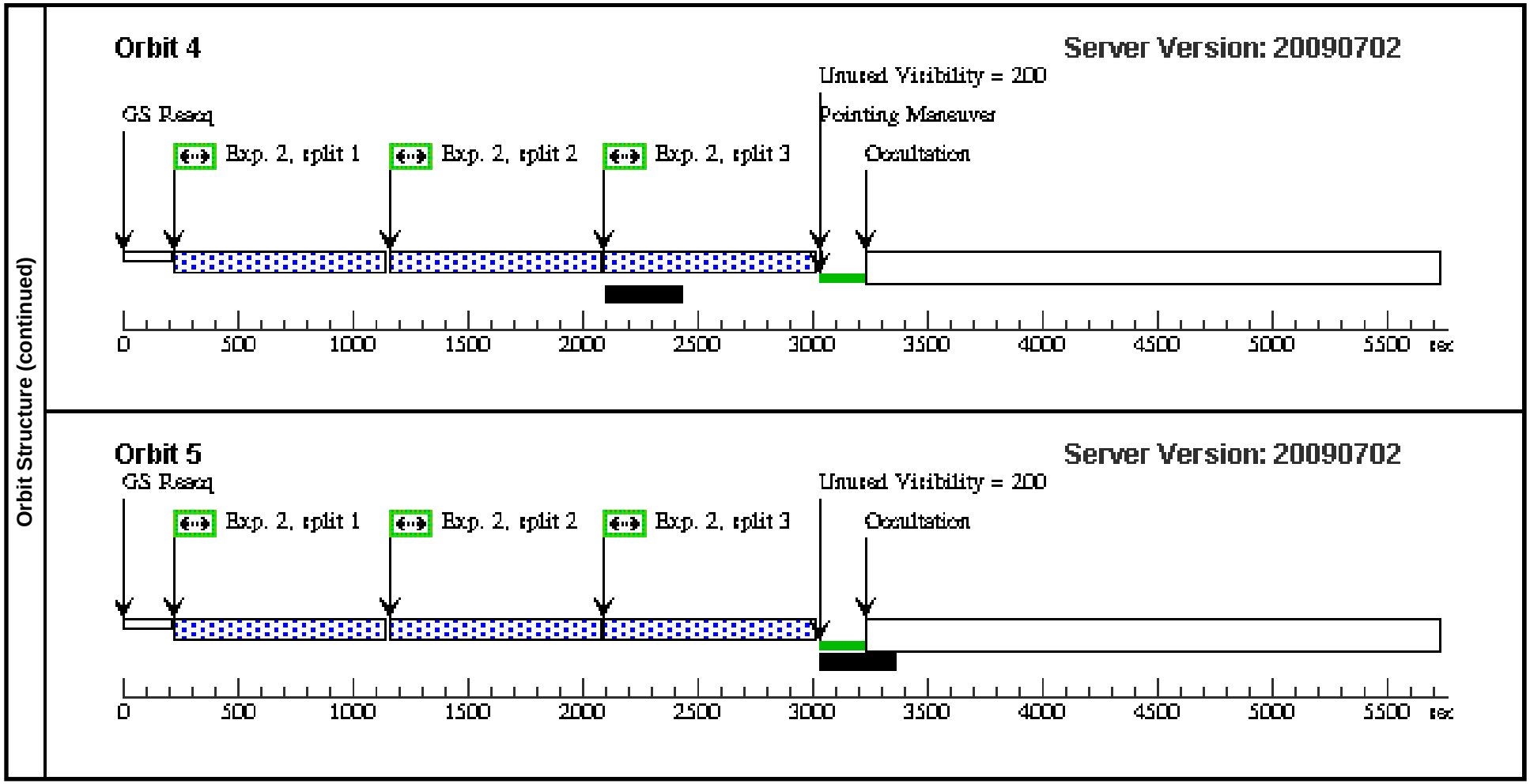
Orbit Structure



Orbit Structure (continued)



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Unused Visibility = 200
GS Reacq
Pointing Maneuver
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Exp. 2, split 2
Exp. 2, split 3
Occultation
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1500
2000
2500
3000
3500
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4500
5000
5500
sec
Orbit 5
Server Version: 20090702
Unused Visibility = 200
GS Reacq
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Occultation
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500
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2000
2500
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3500
4000
4500
5000
5500
sec

Visit

Proposal 11582, Visit 04, implementation Thu Oct 22 01:02:48 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(Exposure 2 (Pattern 1, Exps 2-2)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS/WFPC2 ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SMMJ105155.5+572313	RA: 10 51 55.5000 (162.9812500d) Dec: +57 23 13.00 (57.38694d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) SMMJ105155.5+572313	ACS/WFC, ACCUM, WFC	F435W	CR-SPLIT=3	LOW-SKY		2100 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(4) SMMJ105155.5+572313	ACS/WFC, ACCUM, WFC2-ORAMPQ	FR462N 4487 A	CR-SPLIT=3		Pattern 1, Exps 2-2 (1)	2100 Secs	
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								[==>(Pattern 2, Split 1)] *[==>(Pattern 2, Split 2)]* *[==>(Pattern 2, Split 3)]*	***[3]***
								[==>(Pattern 3, Split 1)] *[==>(Pattern 3, Split 2)]* *[==>(Pattern 3, Split 3)]*	***[4]***
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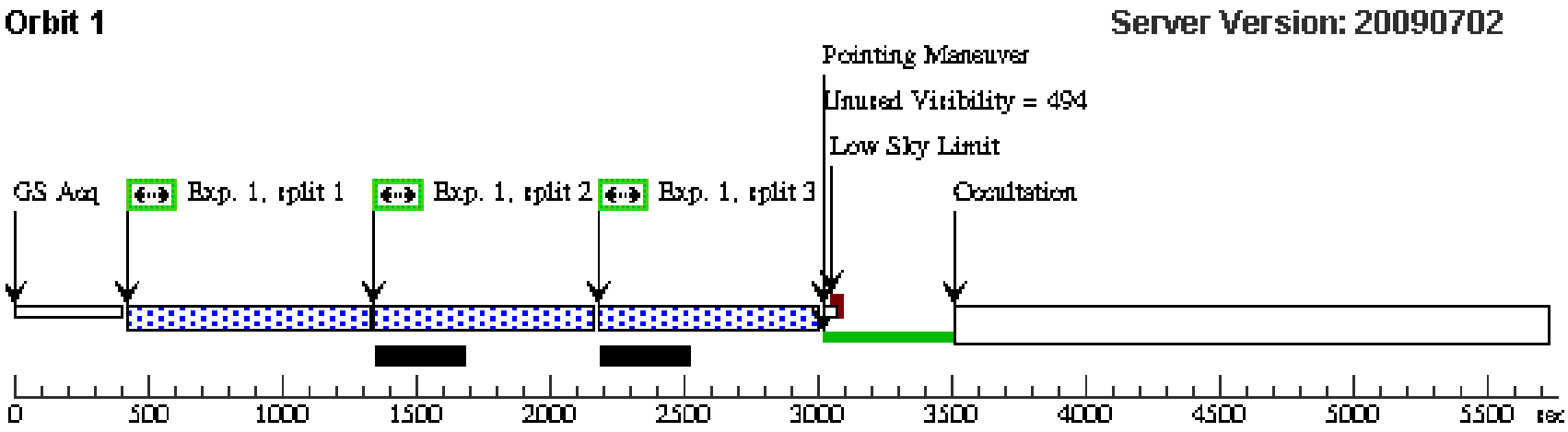
Orbit Structure



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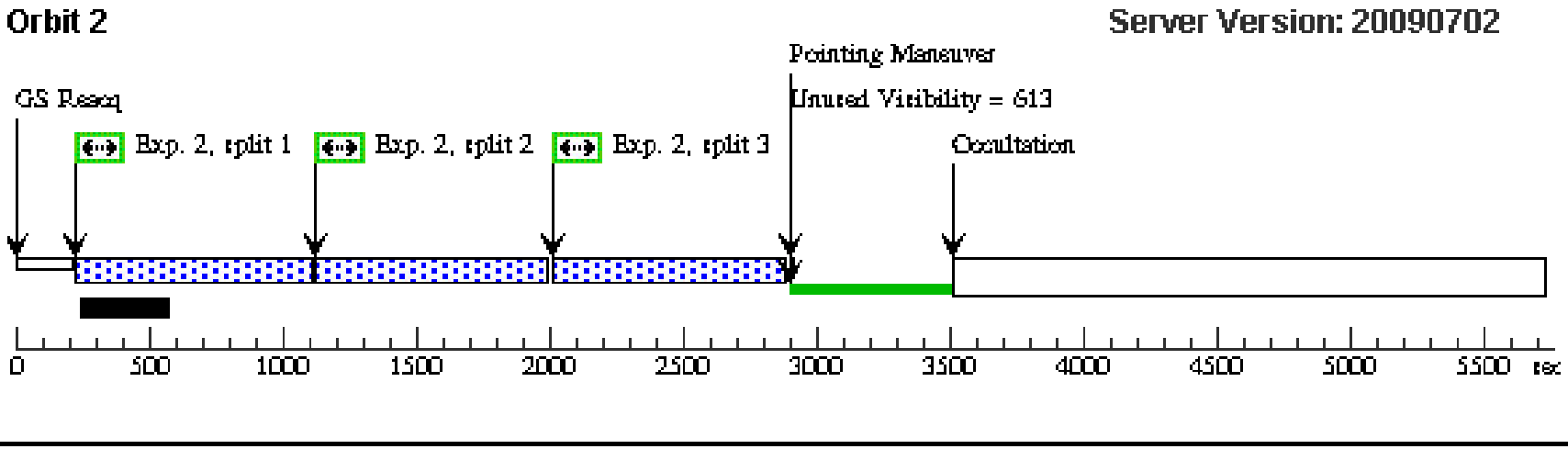

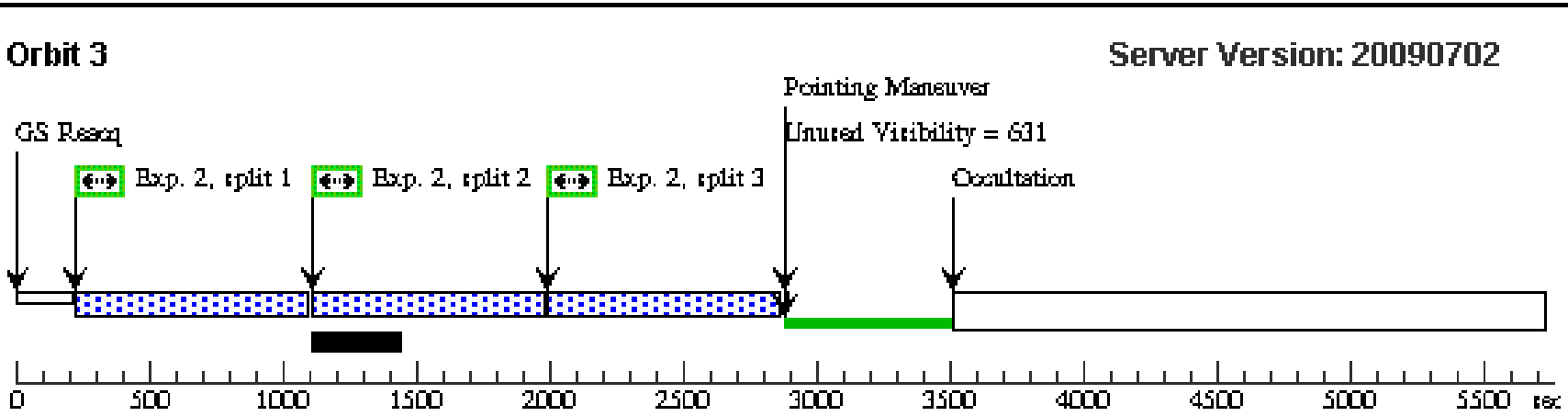

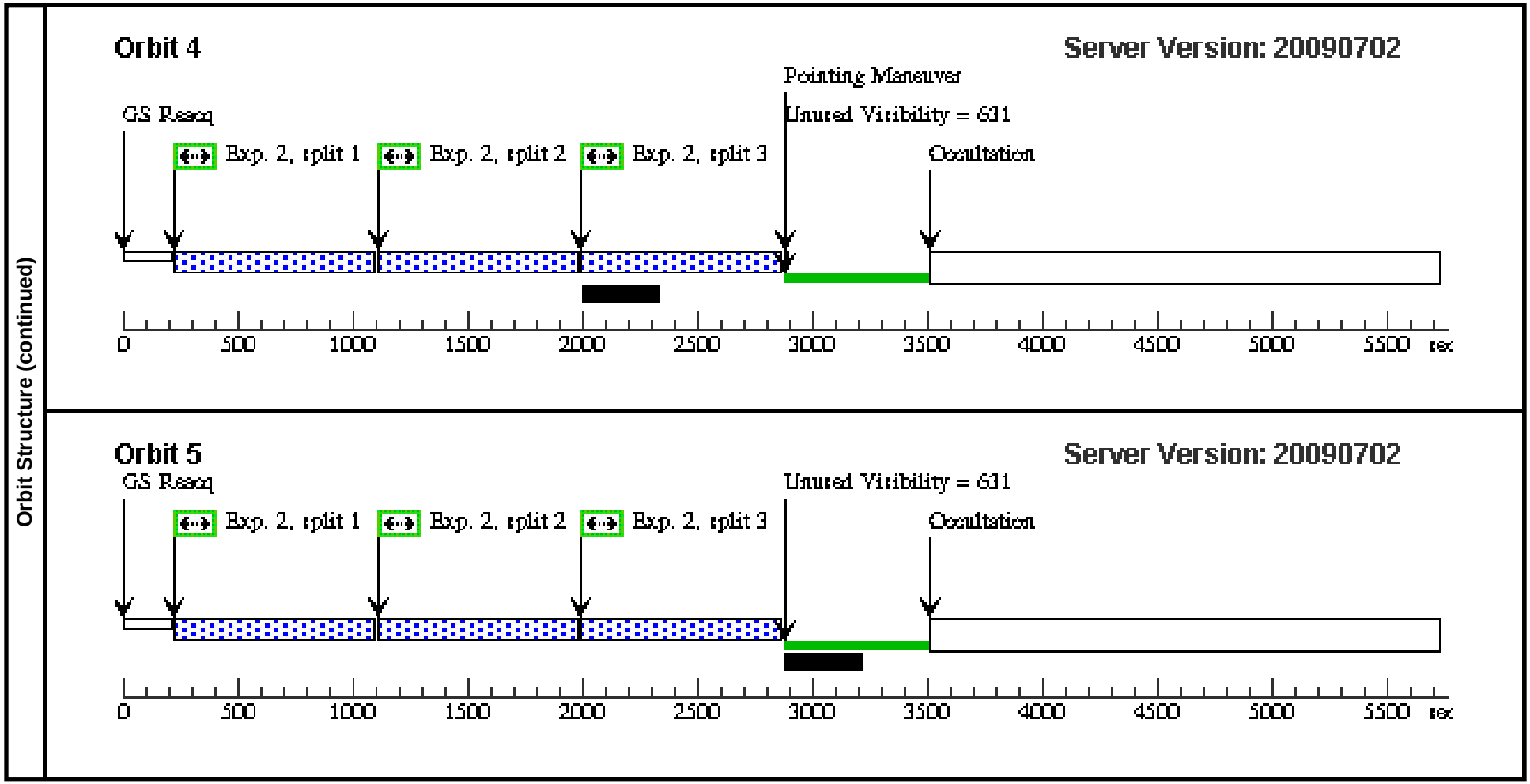
Orbit Structure (continued)
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Pointing Maneuver
GS Reacq
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Exp. 2, split 3
Occultation
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5000
5500
sec
Orbit 5
Server Version: 20090702
GS Reacq
Unused Visibility = 631
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec