11711 - A Definitive Distance to the Coma Core Ellipticals

Cycle: 17, 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) NGC-4874 ANY	ACS/WFC WFC3/UVIS	5	18-Feb-2010 21:01:50.0	yes
02	(2) NGC-4889 ANY	ACS/WFC WFC3/IR	5	18-Feb-2010 21:02:13.0	yes
03	(2) NGC-4889 ANY	ACS/WFC WFC3/IR	1	18-Feb-2010 21:02:23.0	yes

11 Total Orbits Used

ABSTRACT

As the richest galaxy cluster in the local universe (cz < 10,000 km/s), the Coma cluster continues to serve as the standard of comparison for numerous studies of galaxy properties and scaling relations in clusters. The central importance of Coma has been recognized with two recent HST large programs: a Treasury survey to study the dwarf galaxy population by imaging 82 different ACS/WFC pointings, and a program to measure Cepheid distances to two spiral galaxies projected within the Coma core region. An accurate distance to the Coma core is essential for comparing the galaxy luminosities and sizes to nearby galaxies in Virgo and Fornax, while an accurate peculiar velocity is needed for correctly tying to more distant clusters. However, experience dictates that Cepheid distances to clusters must be carefully verified against accurate measurements to the dominant early-type population, especially for such an unprecedented effort as the Coma Cepheid search (the completion of which remains uncertain). We propose to measure highly accurate (3-4% internal error per galaxy) SBF distances to the two giant Coma core ellipticals. The reliability of the SBF method with the ACS/WFC has been repeatedly demonstrated, and it is so efficient that it requires only 3% of the number of orbits dedicated to the two current large Coma programs. The precise ACS SBF Coma core distance will also provide a good constraint on the Coma peculiar velocity, thus improving the accuracy of comparisons to distant clusters. Finally, our program will answer some longstanding puzzles surrounding the rich globular cluster population in the core of this archetypal galaxy cluster.

OBSERVING DESCRIPTION

We will target the two giant galaxies, NGC4874 and NGC4889, that define the core of the Coma cluster and measure their distances using the SBF method in the F814W bandpass of the ACS/WFC. S/N calculations show that we need at least four orbits in F814W to measure a reliable SBF signal. In addition, calibration of the SBF measurement to an absolute scale requires an accurate galaxy color. We will use F475W for the second bandpass, and thus calibrate the F814W SBF magnitude using F475W-F814W. To measure an accurate color for the SBF calibration requires one additional orbit with F475W, or five orbits in total per galaxy for the SBF observations. Another goal of our program is to obtain an accurate census of the globular cluster population and its color distribution. To obtain reasonably accurate colors at the peak of the GCLF requires at least 2 orbits of F475W integration, in addition to the deep F814W observations dictated by the SBF requirements. Thus, the total requirement to carry out our science program is four orbits in F814W and two orbits in F475W per galaxy. We can use one orbit's worth of archival ACS/WFC F475W data on NGC4874 for our purposes, reducing our total program to 11 orbits.

We also have coordinated parallels with WFC3. For the NGC4889 observations (visits 2 and 3), we will place the WFC3/IR aperture on NGC4874 and image the latter galaxy in parallel in the F110W and F160W bandpasses. For the NGC4874 primary observations (visit 1), we will image a random parallel field with the F475X and F600LP bandpasses of WFC3/UVIS (it is not possible to image NGC4889 in parallel because the necessary orientation cannot be scheduled).

Visit

Proposal 11711, Visit 01, scheduling Fri Feb 19 02:02:26 GMT 2010

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 143D TO 157 D; ORIENT 216D TO 248.0 D

Diagnostics

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false			(1-2)
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=0.275 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=0.0 Angle Between Sides= Center Pattern=false	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	(3-4)

Fixed Targets

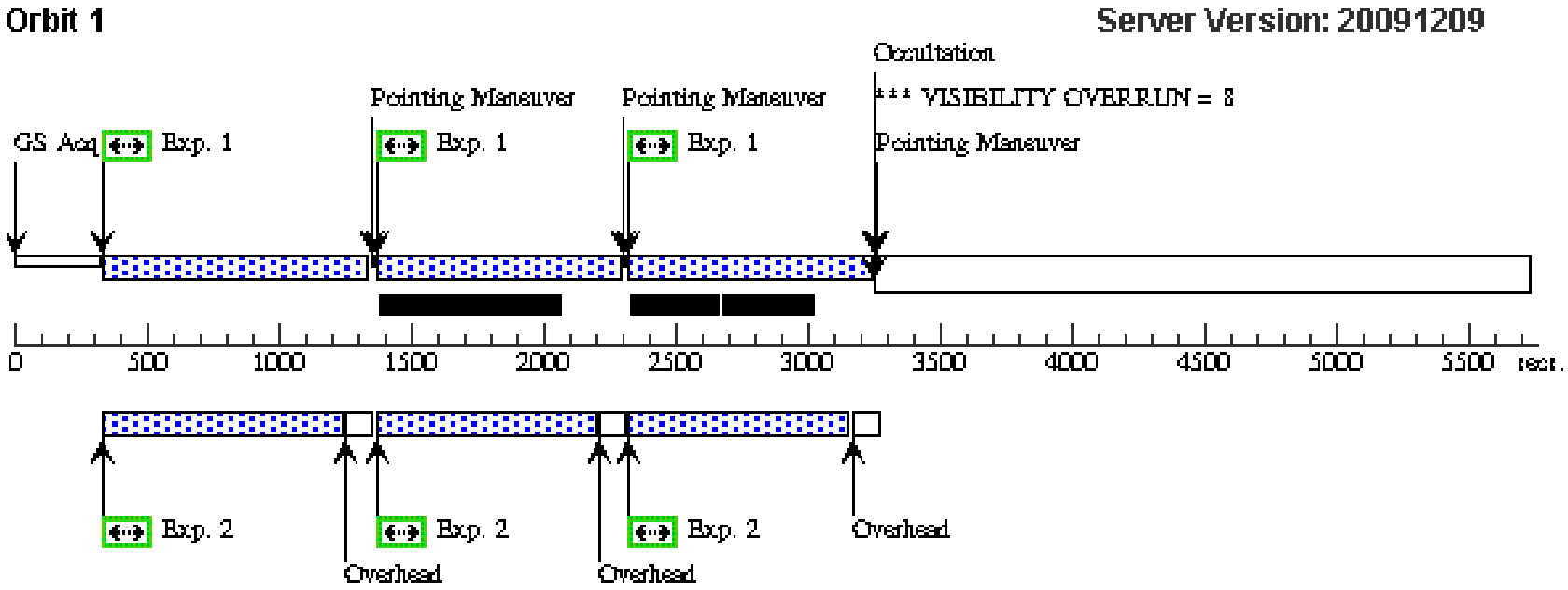
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-4874	RA: 12 59 36.1120 (194.9004667d) Dec: +27 57 41.11 (27.96142d) Equinox: J2000		V=11.6+/-0.3	Reference Frame: NED

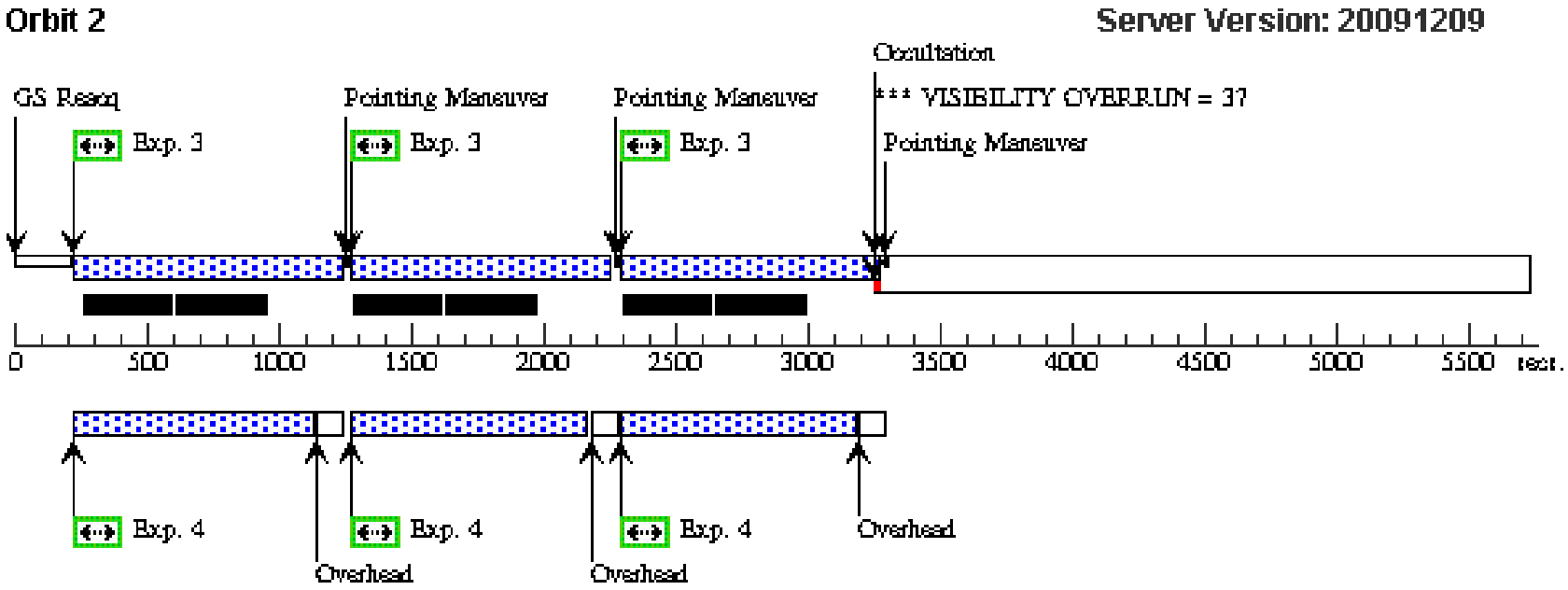
Comments: This object was generated by the targetselector and retrieved from the NED database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) NGC-4874	ACS/WFC, ACCUM, WFCENTER	F475W			Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	60 Secs	
								[==>798.0 Secs (Pattern 1)] *[==>798.0 Secs (Pattern 2)]* *[==>798.0 Secs (Pattern 3)]*	***[1]***
2		(1) NGC-4874	WFC3/UVIS, ACCUM, UVIS	F475X	CR-SPLIT=NO		Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	838 Secs	
								[==>879.0 Secs (Pattern 1)] *[==>829.0 Secs (Pattern 2)]* *[==>829.0 Secs (Pattern 3)]*	***[1]***
3		(1) NGC-4874	ACS/WFC, ACCUM, WFCENTER	F814W			Pattern 2, Exps 3-4 (2) Prime + Parallel Group 3-4	60 Secs	
								[==>859.0 Secs (Pattern 1,1)] *[==>859.0 Secs (Pattern 1,2)]* *[==>859.0 Secs (Pattern 1,3)]*	***[2]***
								[==>872.0 Secs (Pattern 2,1)] *[==>872.0 Secs (Pattern 2,2)]* *[==>872.0 Secs (Pattern 2,3)]*	***[3]***
								[==>872.0 Secs (Pattern 3,1)] *[==>872.0 Secs (Pattern 3,2)]* *[==>872.0 Secs (Pattern 3,3)]*	***[4]***
								[==>872.0 Secs (Pattern 4,1)] *[==>872.0 Secs (Pattern 4,2)]* *[==>872.0 Secs (Pattern 4,3)]*	***[5]***
4		ANY	WFC3/UVIS, ACCUM, UVIS	F600LP	CR-SPLIT=NO		Pattern 2, Exps 3-4 (2) Prime + Parallel Group 3-4	700 Secs	
								[==>890.0 Secs (Pattern 1,1)] *[==>890.0 Secs (Pattern 1,2)]* *[==>890.0 Secs (Pattern 1,3)]*	***[2]***
								[==>890.0 Secs (Pattern 2,1)] *[==>890.0 Secs (Pattern 2,2)]* *[==>890.0 Secs (Pattern 2,3)]*	***[3]***
								[==>890.0 Secs (Pattern 3,1)] *[==>890.0 Secs (Pattern 3,2)]* *[==>890.0 Secs (Pattern 3,3)]*	***[4]***
								[==>890.0 Secs (Pattern 4,1)] *[==>890.0 Secs (Pattern 4,2)]* *[==>890.0 Secs (Pattern 4,3)]*	***[5]***

Orbit Structure

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Occultation
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Pointing Maneuver
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500
1000
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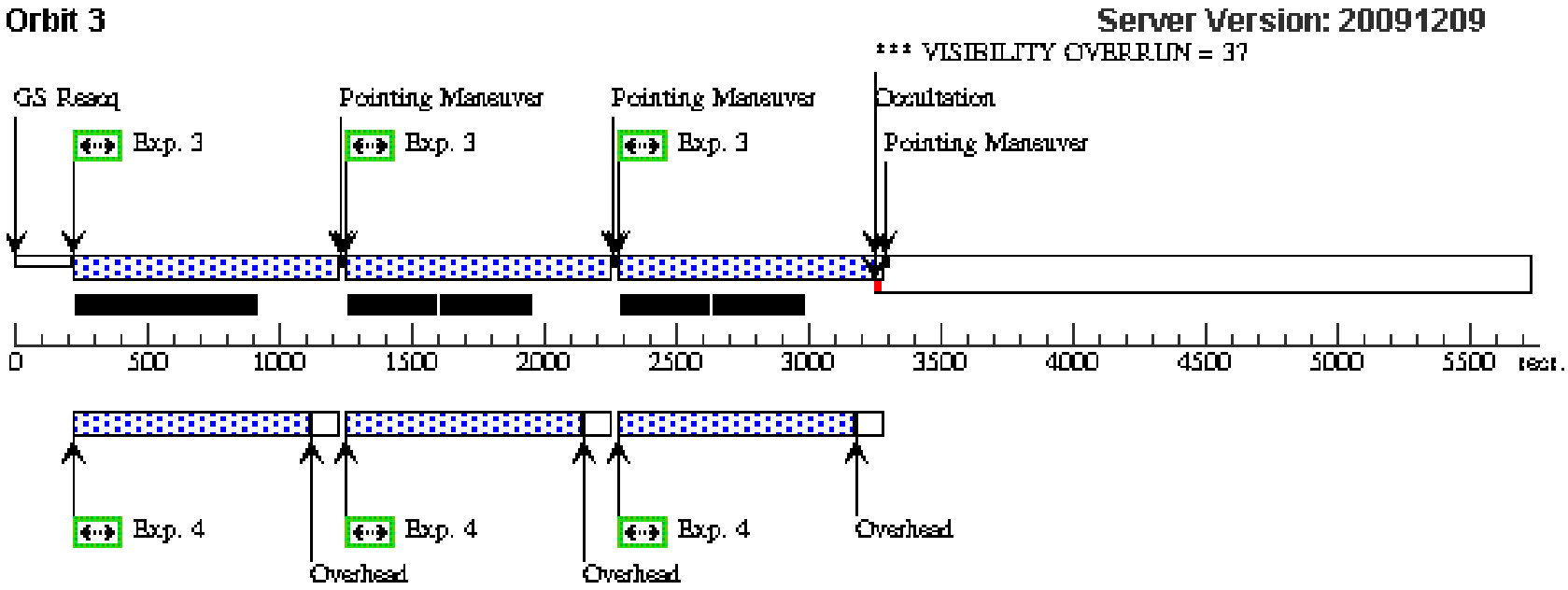
sec.
Exp. 4
Exp. 4
Exp. 4
Overhead
Overhead
Overhead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Server Version: 20091209
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Exp. 3
Pointing Maneuver
Exp. 3
Occultation
Pointing Maneuver
0
500
1000
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4500
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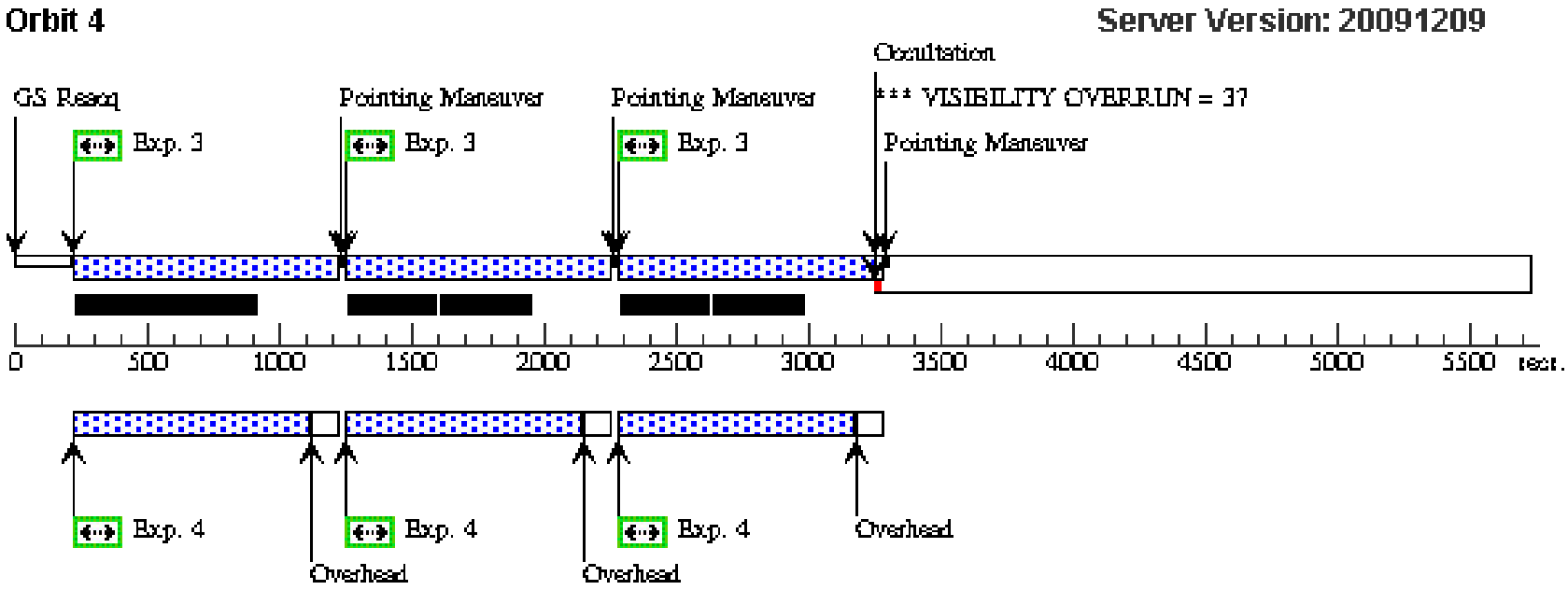
5500
sec.
Exp. 4
Overhead
Exp. 4
Overhead
Exp. 4
Overhead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Pointing Maneuver
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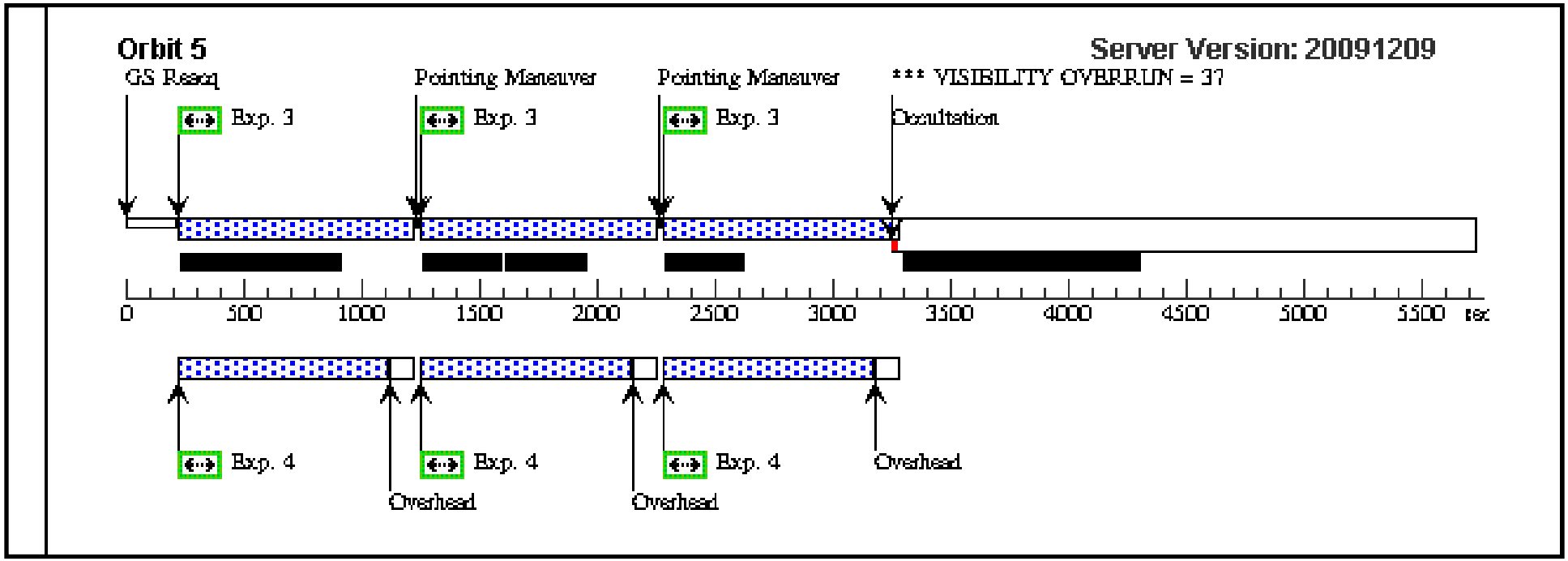
sec.
Exp. 4
Exp. 4
Exp. 4
Overhead
Overhead
Overhead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Server Version: 20091209
GS Reacq
Pointing Maneuver
Pointing Maneuver
*** VISIBILITY OVERRUN = 37
Exp. 3
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4500
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sec
Exp. 4
Exp. 4
Exp. 4
Overhead
Overhead
Overhead

Visit

Proposal 11711, Visit 02, scheduling Fri Feb 19 02:02:29 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: ORIENT 216.2D TO 226.4 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false			(1-2)
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=0.275 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=0.0 Angle Between Sides= Center Pattern=false	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	(3-4)

Fixed Targets

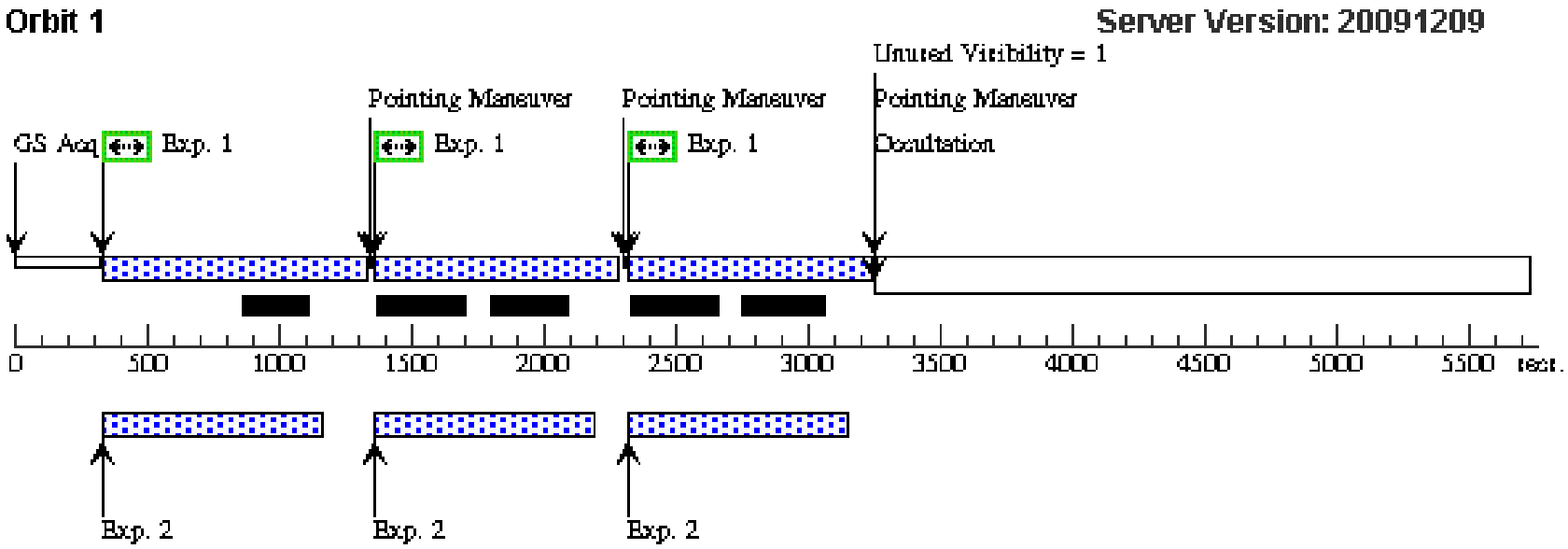
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC-4889	RA: 13 00 7.7954 (195.0324808d) Dec: +27 58 36.96 (27.97693d) Equinox: J2000		V=11.5+/-0.3	Reference Frame: NED

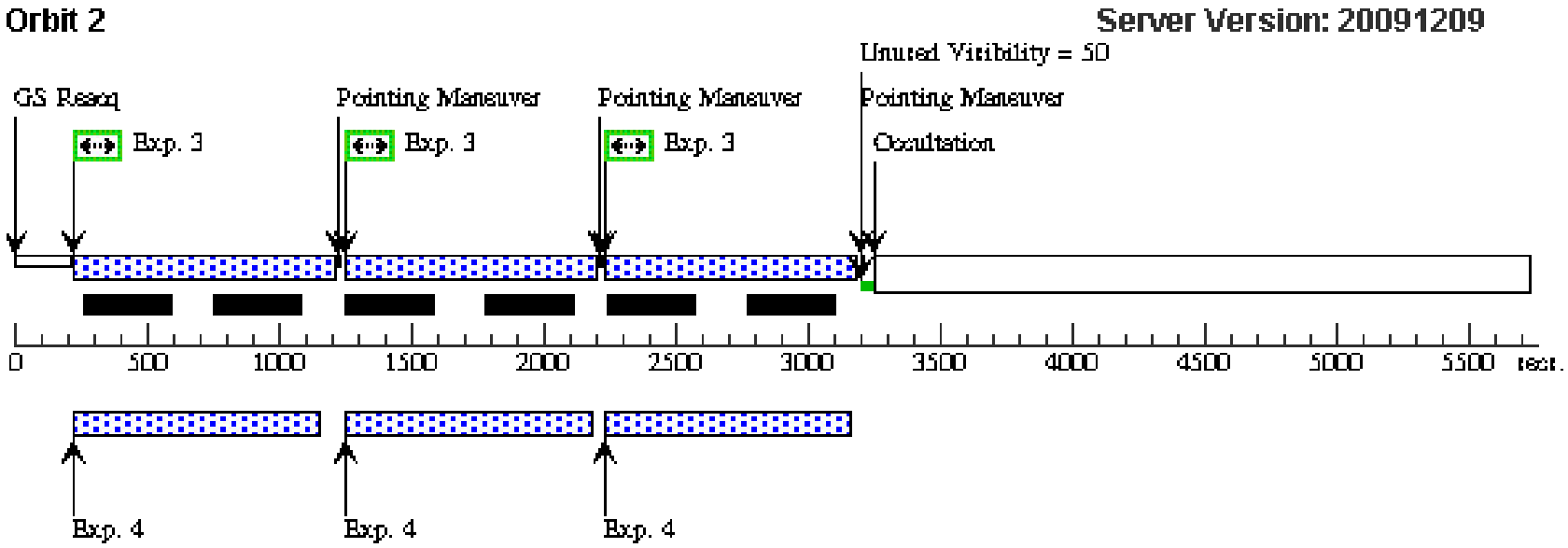
Comments: This object was generated by the targetselector and retrieved from the NED database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) NGC-4889	ACS/WFC, ACCUM, WFC2	F475W			Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	795 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2		ANY	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP100		Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	*[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
3		(2) NGC-4889	ACS/WFC, ACCUM, WFC2	F814W			Pattern 2, Exps 3-4 (2) Prime + Parallel Group 3-4	830 Secs	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]*	***[2]***
								[==>(Pattern 2,1)] *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]*	***[3]***
								[==>(Pattern 3,1)] *[==>(Pattern 3,2)]* *[==>(Pattern 3,3)]*	***[4]***
								[==>(Pattern 4,1)] *[==>(Pattern 4,2)]* *[==>(Pattern 4,3)]*	***[5]***
4		ANY	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP100		Pattern 2, Exps 3-4 (2) Prime + Parallel Group 3-4		
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]*	***[2]***
								[==>(Pattern 2,1)] *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]*	***[3]***
								[==>(Pattern 3,1)] *[==>(Pattern 3,2)]* *[==>(Pattern 3,3)]*	***[4]***
								[==>(Pattern 4,1)] *[==>(Pattern 4,2)]* *[==>(Pattern 4,3)]*	***[5]***

Orbit Structure

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Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Occultation
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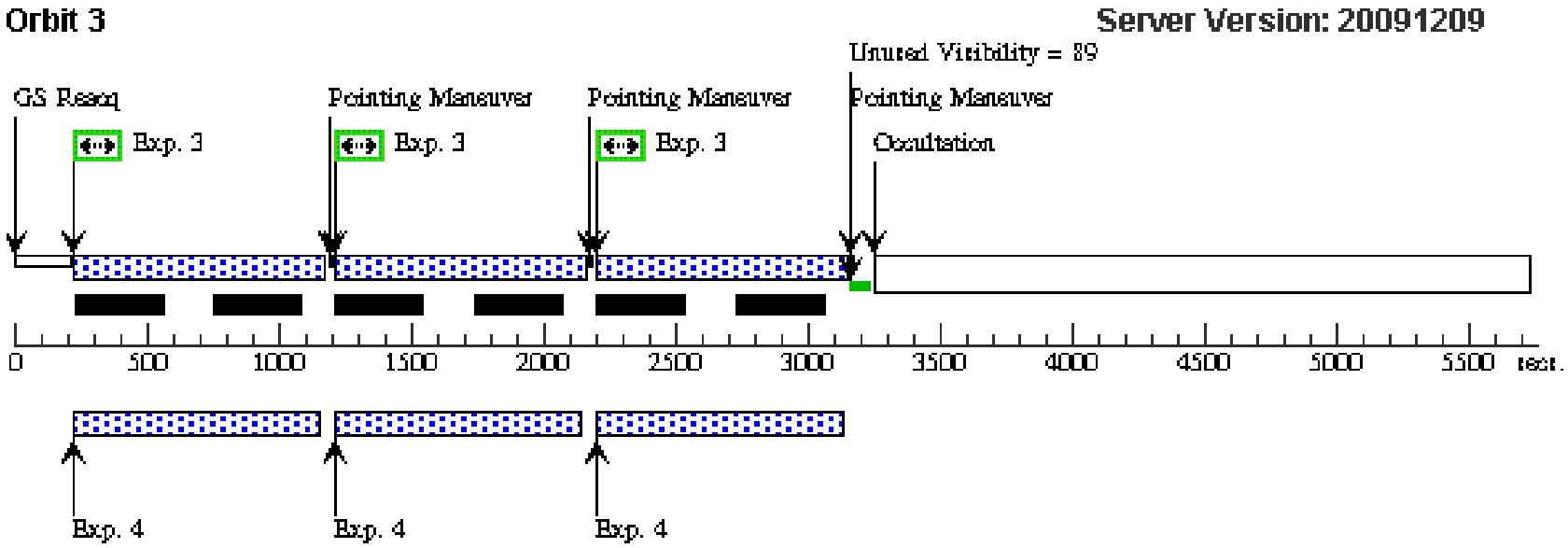
sec.
Exp. 4
Exp. 4
Exp. 4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Exp. 3
Pointing Maneuver
Exp. 3
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Occultation
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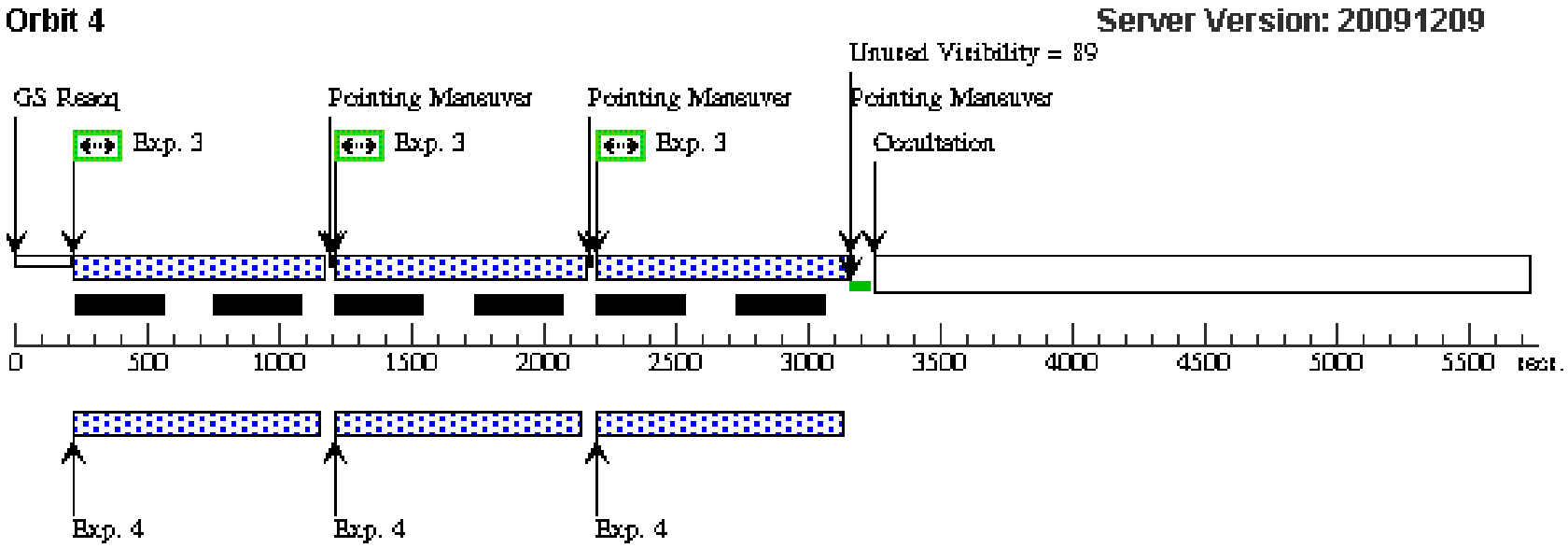
Exp. 4
Exp. 4
Exp. 4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Unused Visibility = 89
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Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Occultation
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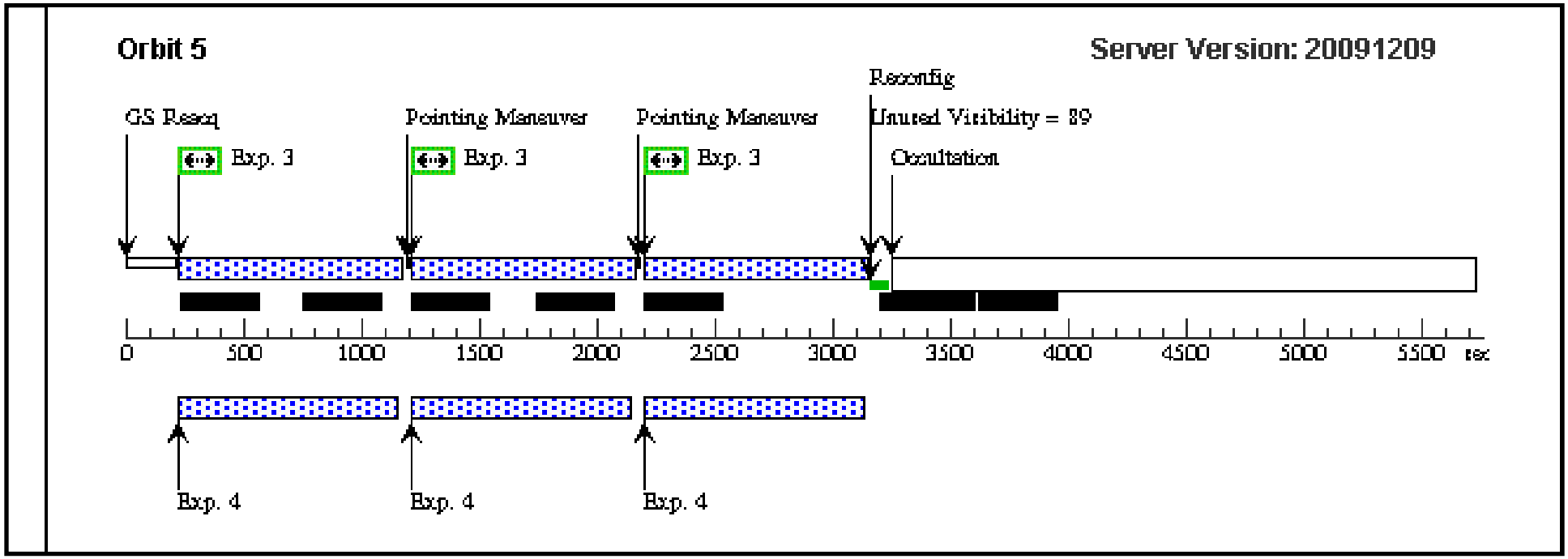
sec.
Exp. 4
Exp. 4
Exp. 4


Orbit 5
Server Version: 20091209
Reconfig
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Pointing Maneuver
Pointing Maneuver
Unused Visibility = 89
Exp. 3
Exp. 3
Exp. 3
Occultation
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sec
Exp. 4
Exp. 4
Exp. 4

Visit

Proposal 11711, Visit 03, scheduling Fri Feb 19 02:02:30 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, ACS/WFC

Special Requirements: SAME ORIENT AS 02

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.5 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1-2)

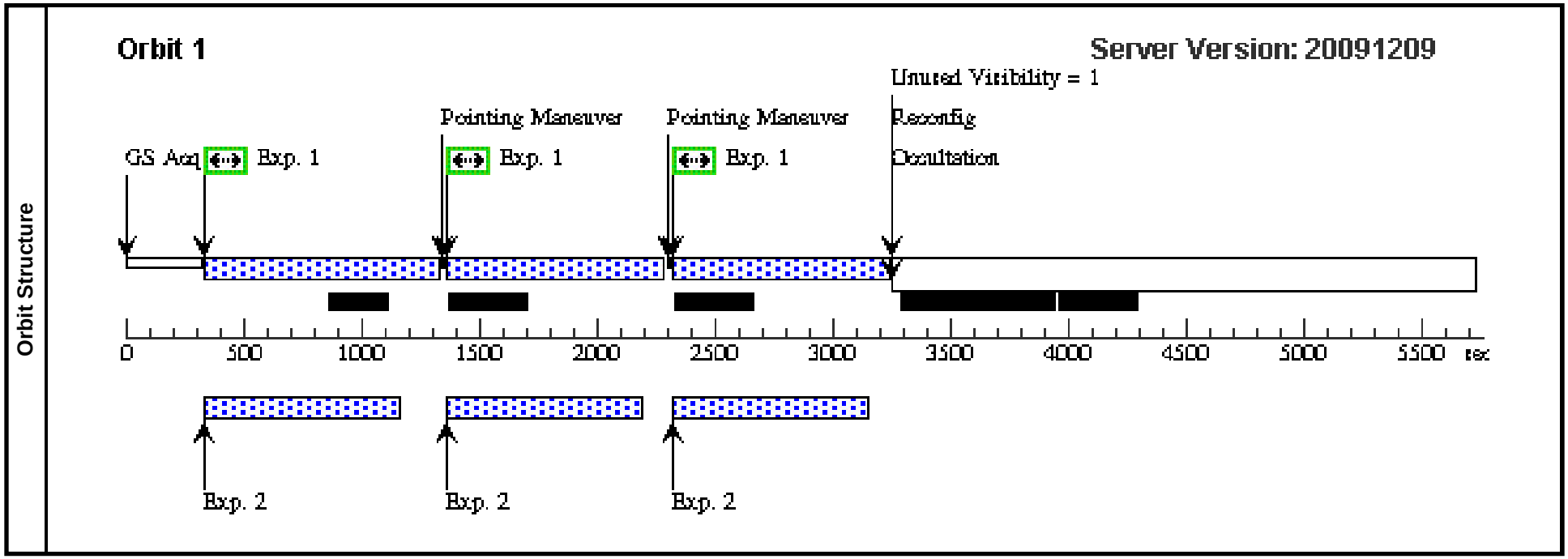
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	NGC-4889	RA: 13 00 7.7954 (195.0324808d) Dec: +27 58 36.96 (27.97693d) Equinox: J2000		V=11.5+/-0.3	Reference Frame: NED

Comments: This object was generated by the targetselector and retrieved from the NED database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) NGC-4889	ACS/WFC, ACCUM, WFC2	F475W			Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	795 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2		ANY	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP100		Pattern 1, Exps 1-2 (1) Prime + Parallel Group 1-2	*[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***


Orbit Structure
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GS Acq
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
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sec
Exp. 2
Exp. 2
Exp. 2