



10397 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

Cycle: 13, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Michael J. West (PI)	University of Hawaii at Hilo	west@bohr.uhh.hawaii.edu
Dr. Michael Gregg (CoI)	University of California - Davis	gregg@igpp.llnl.gov

VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) CENTAURUS-CLUSTER-PLUME	ACS/WFC WFPC2	4	08-Jun-2005 14:59:40.0	yes
02	(2) COMA-CLUSTER-PLUME-POS1	ACS/WFC WFPC2	4	08-Jun-2005 14:59:56.0	yes
03	(4) COMA-CLUSTER-PLUME-POS3 ANY	ACS/WFC WFPC2	4	08-Jun-2005 15:00:07.0	yes
52	(3) COMA-CLUSTER-PLUME-POS2 ANY	ACS/WFC WFPC2	4	08-Jun-2005 15:00:17.0	yes

16 Total Orbits Used

ABSTRACT

Intergalactic stellar populations and tidal debris are now recognized as important components of galaxy clusters. This project examines the interrelated processes of galaxy destruction, recycling of tidal debris, and creation of dwarf galaxies and intergalactic star clusters, all of which are part of the grand scheme of cluster formation. We propose deep multicolor imaging of two examples of newly created tidal debris, the spectacular plumes in the Centaurus and Coma clusters. The Centaurus observations will extend our earlier work, which demonstrated the existence of tidal debris dwarf galaxies and star cluster in the body of the Centaurus plume. Deep ACS/WFC observations can determine rough ages and cluster membership, better characterizing the new debris. The Coma observations will reproduce this work for a second plume feature, in the quintessential rich cluster of galaxies. Parallel WFPC2 observations will investigate the central intracluster spaces at the bottom of the each cluster's potential, where older debris is thickest.

OBSERVING DESCRIPTION

We propose similar primary and parallel observations in each of two clusters, Centaurus and Coma, each of which is dominated by a pair of large ellipticals. ACS/WFC will be placed on the tidal plume in each cluster. For Centaurus, with the proper spacecraft orient, WFPC2 can be used in parallel to observe the other end of the tidal plume. For Coma, WFPC2 parallel time can be used to image the outskirts of the cluster cD galaxy, NGC4874, where tidal debris is presently accumulating. We will use the wide \$BVI\$ filters for both instruments to facilitate comparison of objects in each region and with earlier HST studies of extragalactic globular cluster populations.

We will subpixel dither our images to allow for CR removal and optimal drizzling.

In Centaurus, deep ACS/WFC imaging in \$BVI\$ (F435W/F606W/F814W)

Proposal 10397 - Overview

will extend our previous work with WFPC2 by providing better image quality while going deeper in three filters. Two orbits will be spent in B, one each in V and I. We adopt $m-M = 33.3$ (45~Mpc) and $A_V = 0.4$ for Centaurus. With 4 dither steps these 4500/2200s total exposures will achieve optimal S/N $\approx 9, 13$, and 10 in B, V, and I respectively for an assumed G2 point source (approximating a moderate abundance globular cluster) with $V=27.3$ according to the ACS ETC. This is about 1 magnitude below the globular cluster luminosity function peak at $M_V = -7.4$, allowing confident identification and measurement of cluster candidates. The images will also probe deep enough to explore the morphologies and possible lower surface brightness connections of any dwarf galaxies to the smoother plume stellar debris in which they are embedded. At this level, we will also be sensitive to red and blue supergiants, indicative of recent star formation, with absolute magnitudes of -7 and brighter.

By doubling the exposure times in Coma, ACS/WFC can reach comparable S/N, (7, 10, 8) in these filters at 0.5 magnitudes below the peak of the globulars. This is still quite adequate for our science and the target is all the more interesting for being a proxy for more distant rich clusters. Also, because Coma is farther away, the plus side trade-off is that the field of view casts a wider net, bringing in more bright objects.

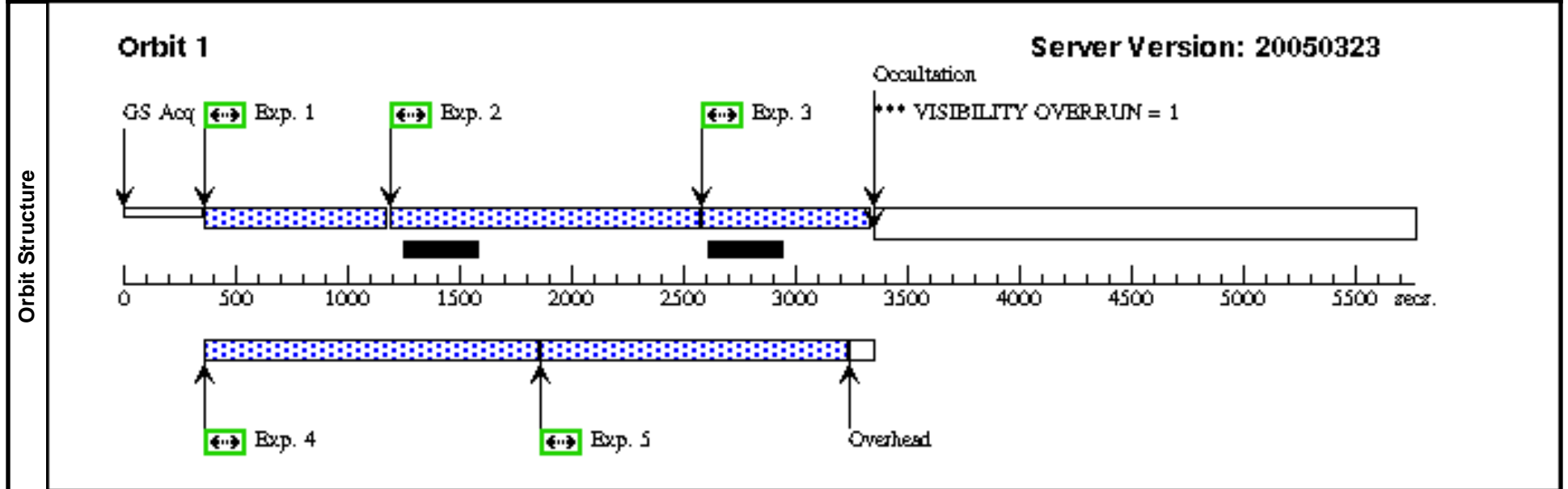
Proposal 10397 - Visit 01 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

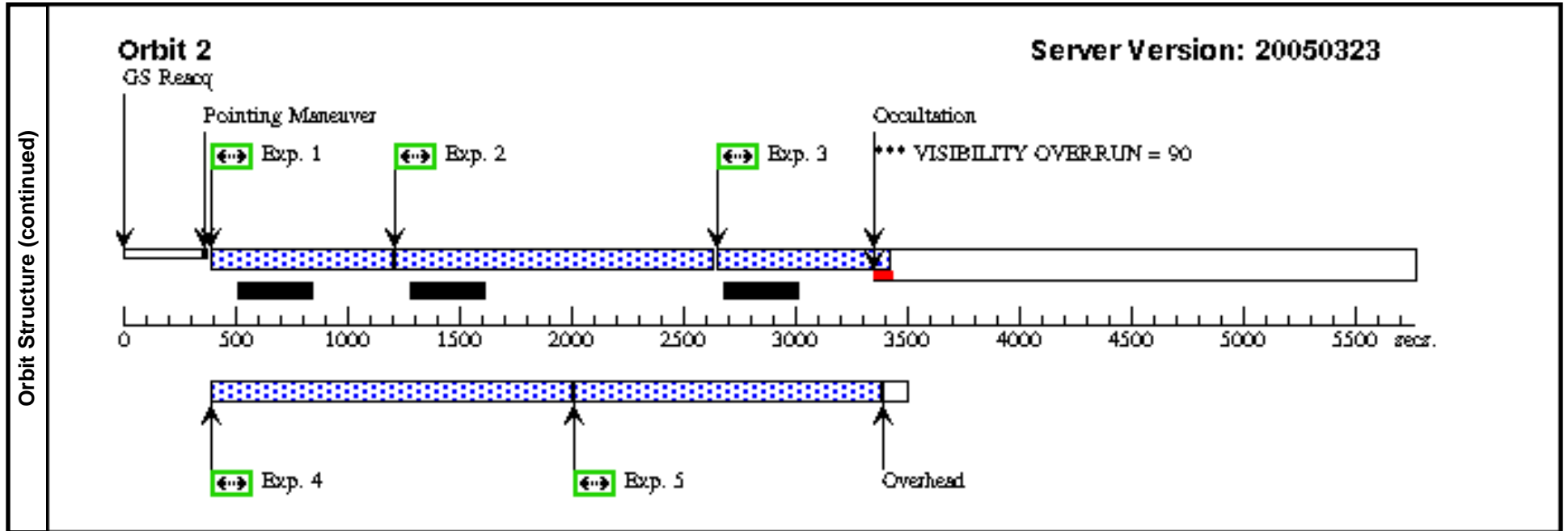
Wed Jun 08 19:00:20 GMT 2005

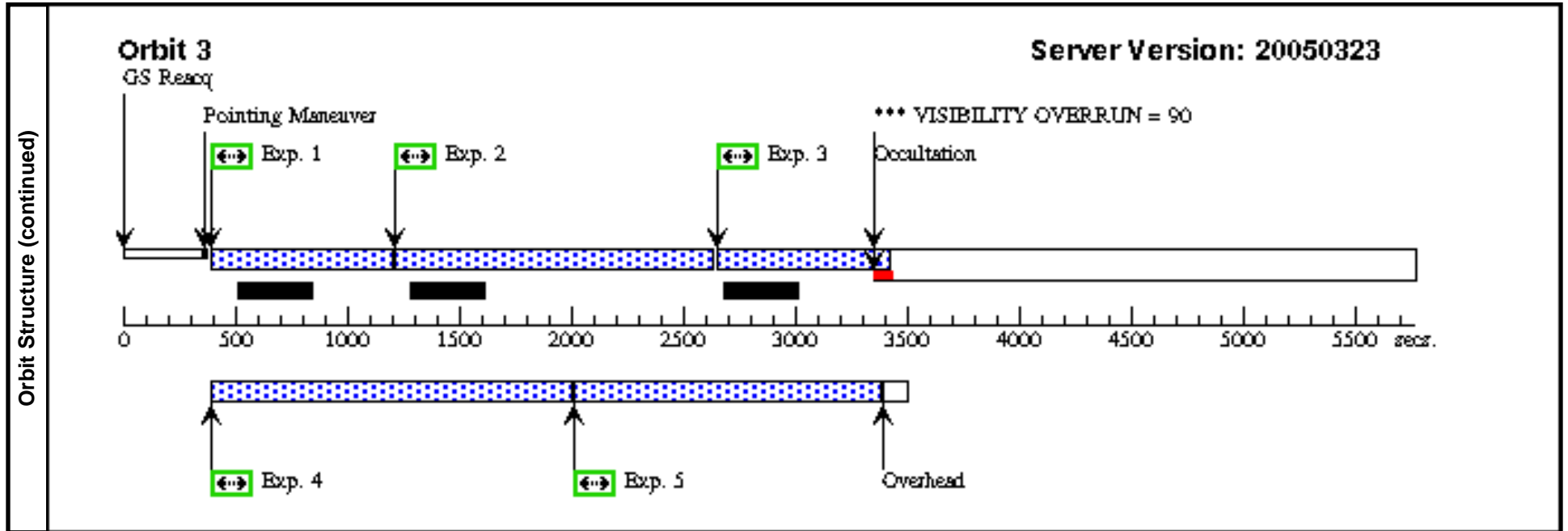
Visit	Proposal 10397, Visit 01 Diagnostic Status: Warning Scientific Instruments: ACS/WFC, WFPC2 Special Requirements: ORIENT 72.0D TO 72.0 D										
	(Visit 01) Warning: VISIBILITY OVERRUN (Visit 01) Warning: VISIBILITY OVERRUN (Visit 01) Warning: VISIBILITY OVERRUN (Visit 01) Warning: VISIBILITY OVERRUN										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=4 Point Spacing=4.25 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=315 Angle Between Sides= Center Pattern=false				(1-5)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(1)	CENTAURUS- CLUSTER-PLUME	RA: 12 49 47.0900 (192.4462083d) Dec: -41 24 53.00 (-41.41472d) Equinox: J2000 Plate Id: (?)				V=27.3	Coordinate Source: GSC_SURVEY_PLATE			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1		(1) CENTAURUS-C LUSTER-PLUME	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO		Pattern 1-5 (1) Prime + Parallel Gro up 1-5	630.0 Secs		
									[==>605.0 Secs (Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
									[==>(Pattern 3)]		[3]
									[==>(Pattern 4)]		[4]
	2		(1) CENTAURUS-C LUSTER-PLUME	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 1-5 (1) Prime + Parallel Gro up 1-5	1240.0 Secs		
									[==>1200.0 Secs (Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
									[==>(Pattern 3)]		[3]
									[==>(Pattern 4)]		[4]
	3		(1) CENTAURUS-C LUSTER-PLUME	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO		Pattern 1-5 (1) Prime + Parallel Gro up 1-5	630.0 Secs		
									[==>605.0 Secs (Pattern 1)]		[1]
								[==>(Pattern 2)]		[2]	
								[==>(Pattern 3)]		[3]	
								[==>(Pattern 4)]		[4]	

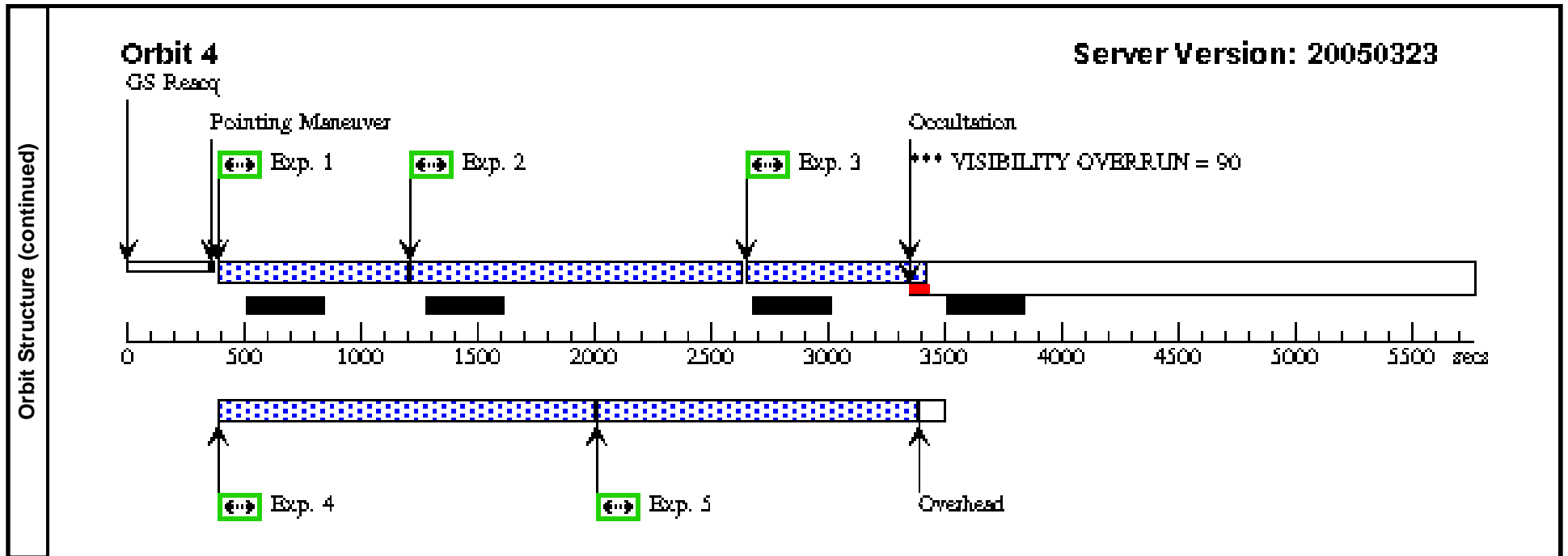
Proposal 10397 - Visit 01 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4		(1) CENTAURUS-C LUSTER-PLUME	WFPC2, IMAGE, WFALL-FIX	F606W	CR-SPLIT=NO; CLOCKS=YES		Pattern 1-5 (1) Prime + Parallel Gro up 1-5	1400.0 Secs	
								[==>1300.0 Secs (Pattern 1)]	[1]
								[==>(Pattern 2)]	[2]
								[==>(Pattern 3)]	[3]
5		(1) CENTAURUS-C LUSTER-PLUME	WFPC2, IMAGE, WFALL-FIX	F450W	CR-SPLIT=NO; CLOCKS=YES		Pattern 1-5 (1) Prime + Parallel Gro up 1-5	1300.0 Secs	
								[==>1300.0 Secs (Pattern 1)]	[1]
								[==>(Pattern 2)]	[2]
								[==>(Pattern 3)]	[3]
							[==>(Pattern 4)]	[4]	









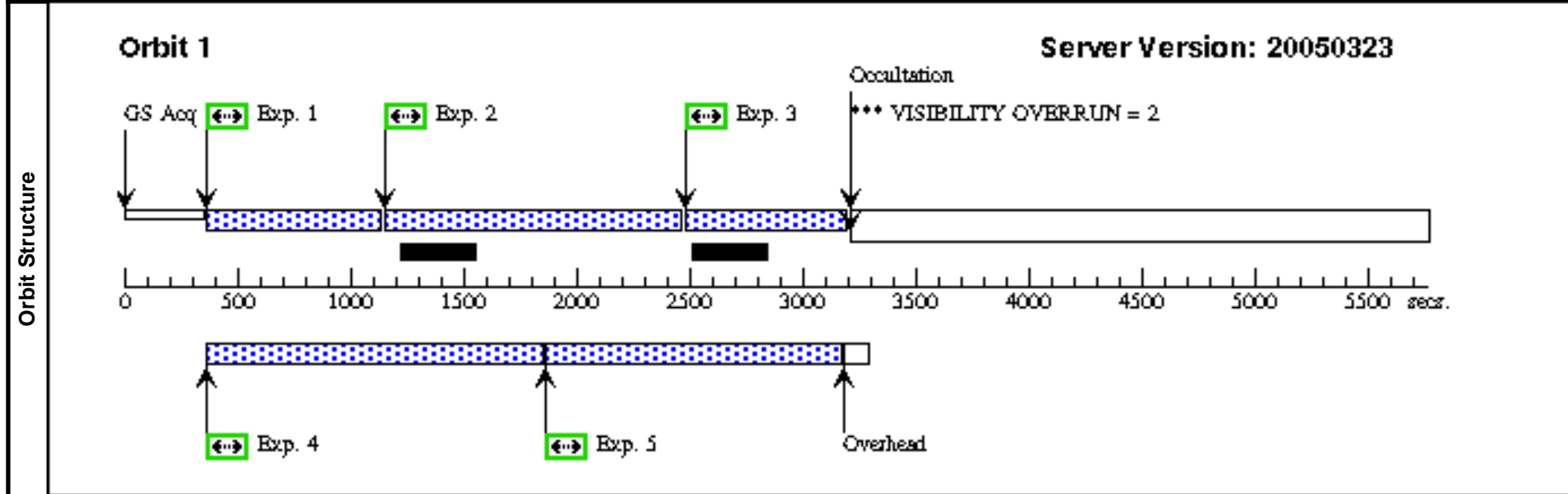
Proposal 10397 - Visit 02 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

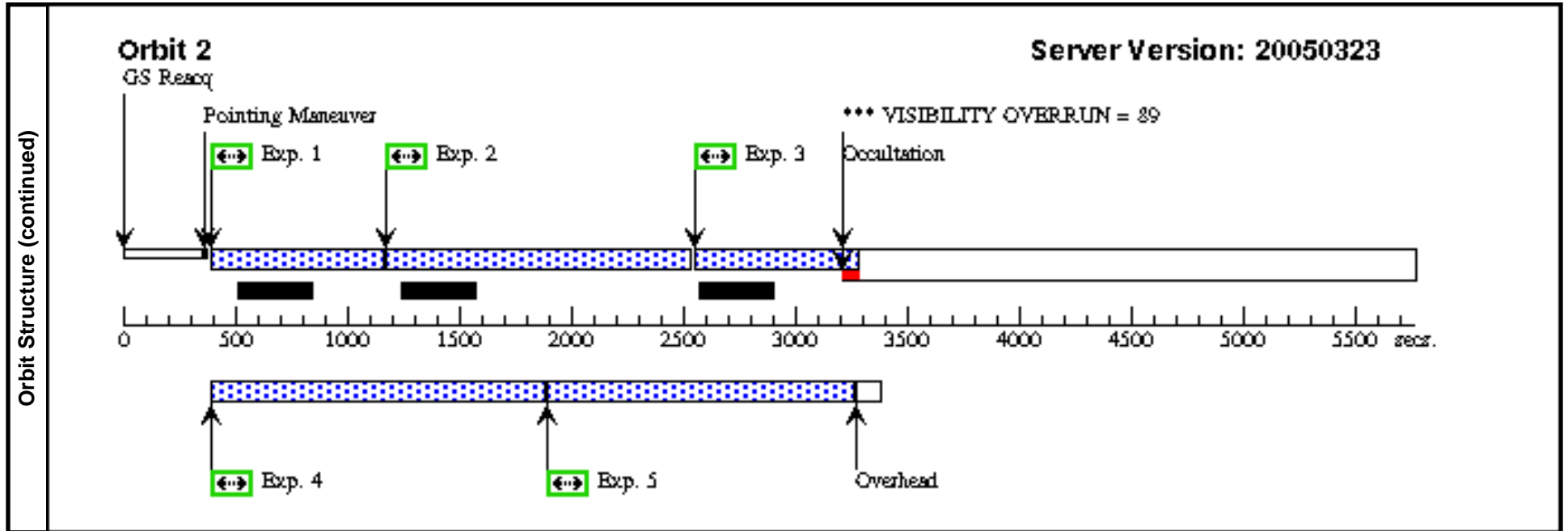
Wed Jun 08 19:00:22 GMT 2005

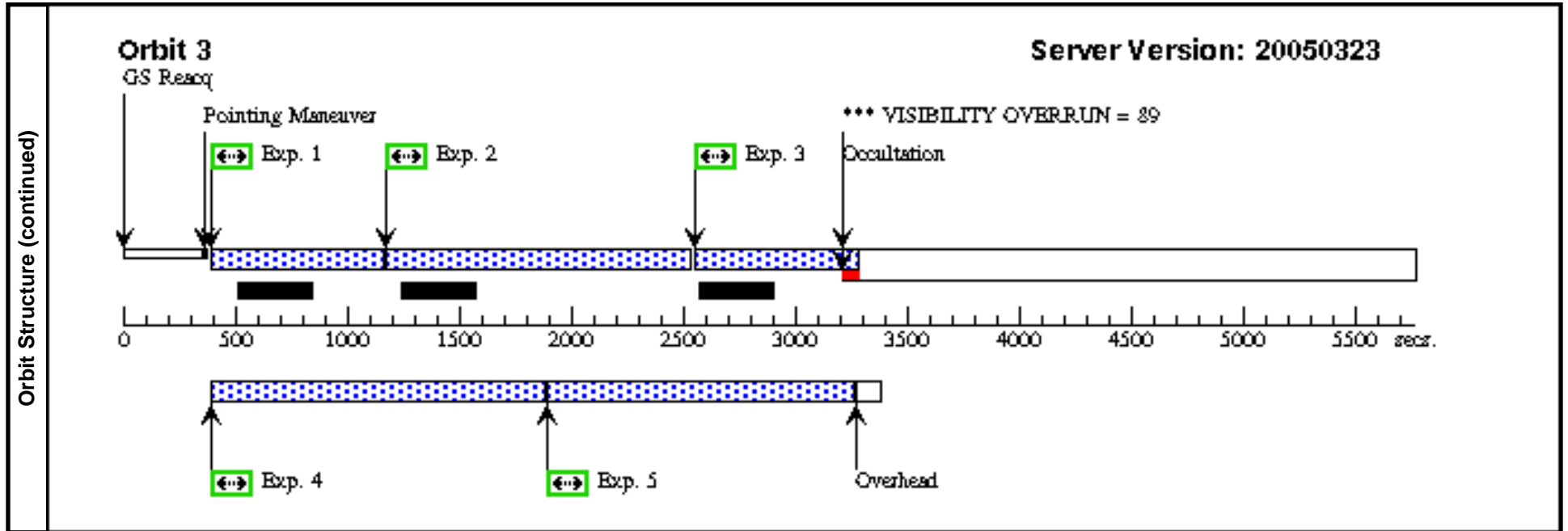
Visit	Proposal 10397, Visit 02 Diagnostic Status: Warning Scientific Instruments: ACS/WFC, WFPC2 Special Requirements: SCHED 50%; ORIENT 115.0D TO 125.0 D										
	(Visit 02) Warning: VISIBILITY OVERRUN (Visit 02) Warning: VISIBILITY OVERRUN (Visit 02) Warning: VISIBILITY OVERRUN (Visit 02) Warning: VISIBILITY OVERRUN										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(2)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=4 Point Spacing=3.011 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=85.3 Angle Between Sides= Center Pattern=false				(1-5)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(2)	COMA-CLUSTER- PLUME-POS1	RA: 12 59 26.4694 (194.8602892d) Dec: +27 59 55.68 (27.99880d) Equinox: J2000 Plate Id: (?)				V=28.0	Coordinate Source: GSC_SURVEY_PLATE			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1		(2) COMA-CLUSTE R-PLUME-POS1	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO		Pattern 1-5 (2) Prime + Parallel Gro up 1-5	590.0 Secs		
									[==>570.0 Secs (Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
									[==>(Pattern 3)]		[3]
									[==>(Pattern 4)]		[4]
	2		(2) COMA-CLUSTE R-PLUME-POS1	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 1-5 (2) Prime + Parallel Gro up 1-5	1180.0 Secs		
									[==>1130.0 Secs (Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
									[==>(Pattern 3)]		[3]
									[==>(Pattern 4)]		[4]
	3		(2) COMA-CLUSTE R-PLUME-POS1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO		Pattern 1-5 (2) Prime + Parallel Gro up 1-5	590.0 Secs		
									[==>570.0 Secs (Pattern 1)]		[1]
								[==>(Pattern 2)]		[2]	
								[==>(Pattern 3)]		[3]	
								[==>(Pattern 4)]		[4]	

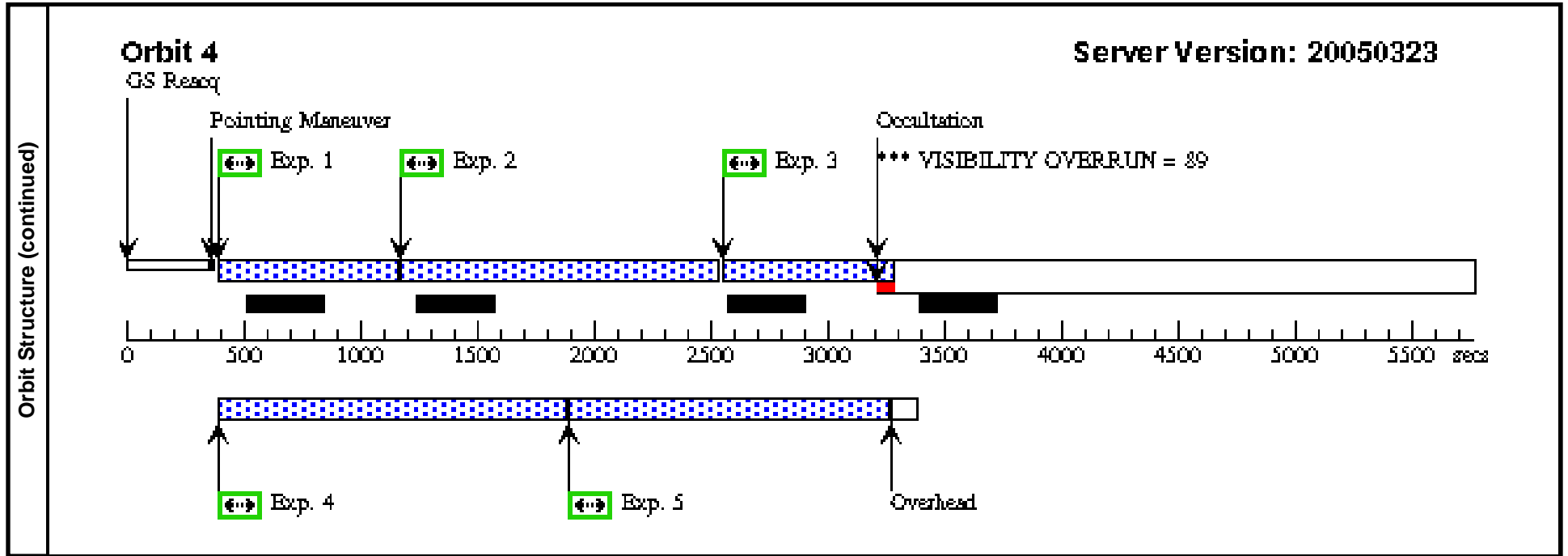
Proposal 10397 - Visit 02 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4		(2) COMA-CLUSTE R-PLUME-POS1	WFPC2, IMAGE, WFALL-FIX	F606W	CR-SPLIT=NO; CLOCKS=YES		Pattern 1-5 (2) Prime + Parallel Gro up 1-5	1300.0 Secs	[1]
								[=>(Pattern 1)]	[2]
								[=>(Pattern 2)]	[3]
								[=>(Pattern 3)]	[4]
5		(2) COMA-CLUSTE R-PLUME-POS1	WFPC2, IMAGE, WFALL-FIX	F814W	CR-SPLIT=NO; CLOCKS=YES		Pattern 1-5 (2) Prime + Parallel Gro up 1-5	1300.0 Secs	[1]
								[=>1200.0 Secs (Pattern 1)]	[2]
								[=>(Pattern 2)]	[3]
								[=>(Pattern 3)]	[4]









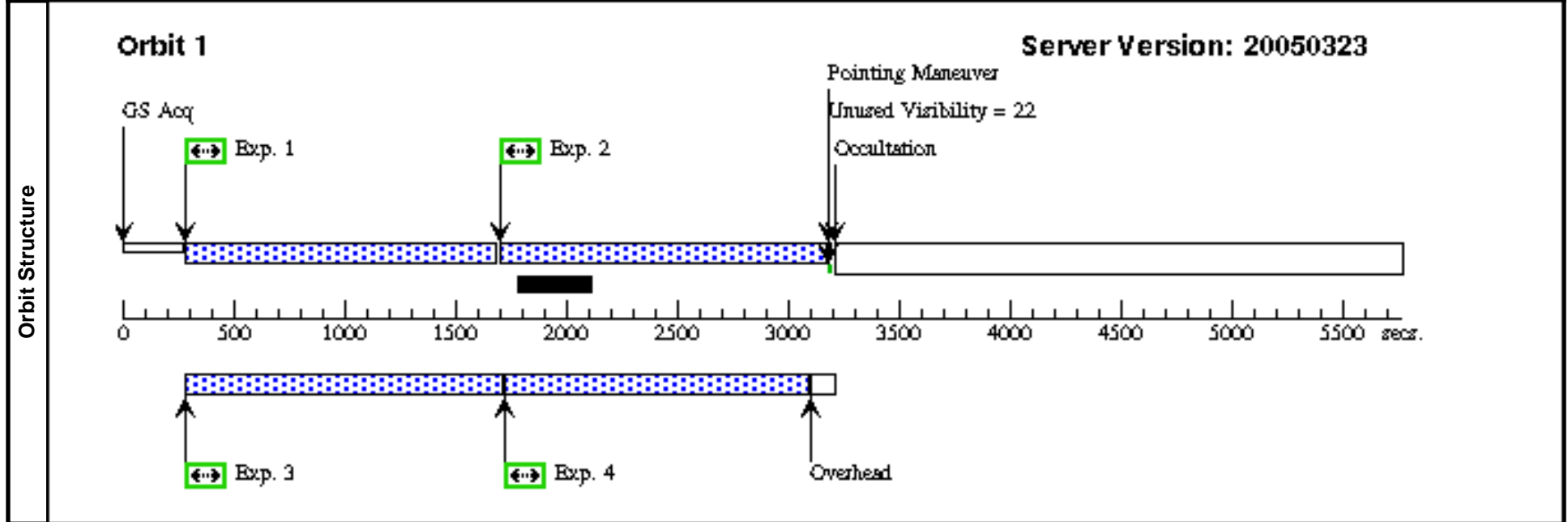
Proposal 10397 - Visit 03 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

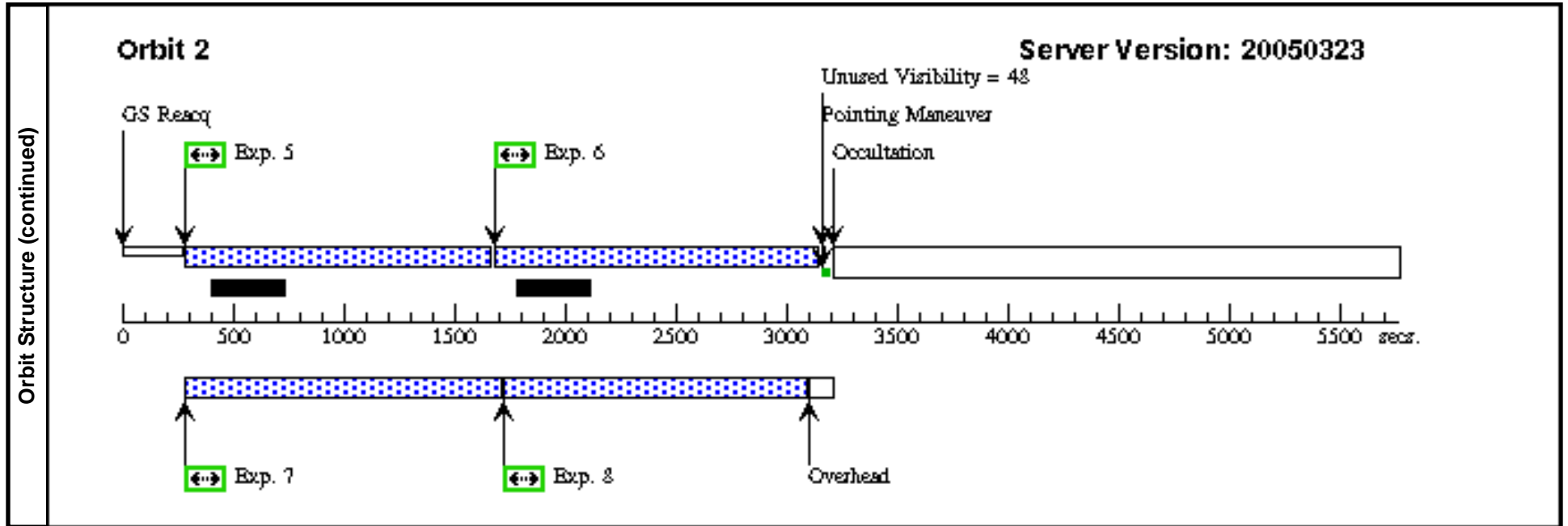
Wed Jun 08 19:00:24 GMT 2005

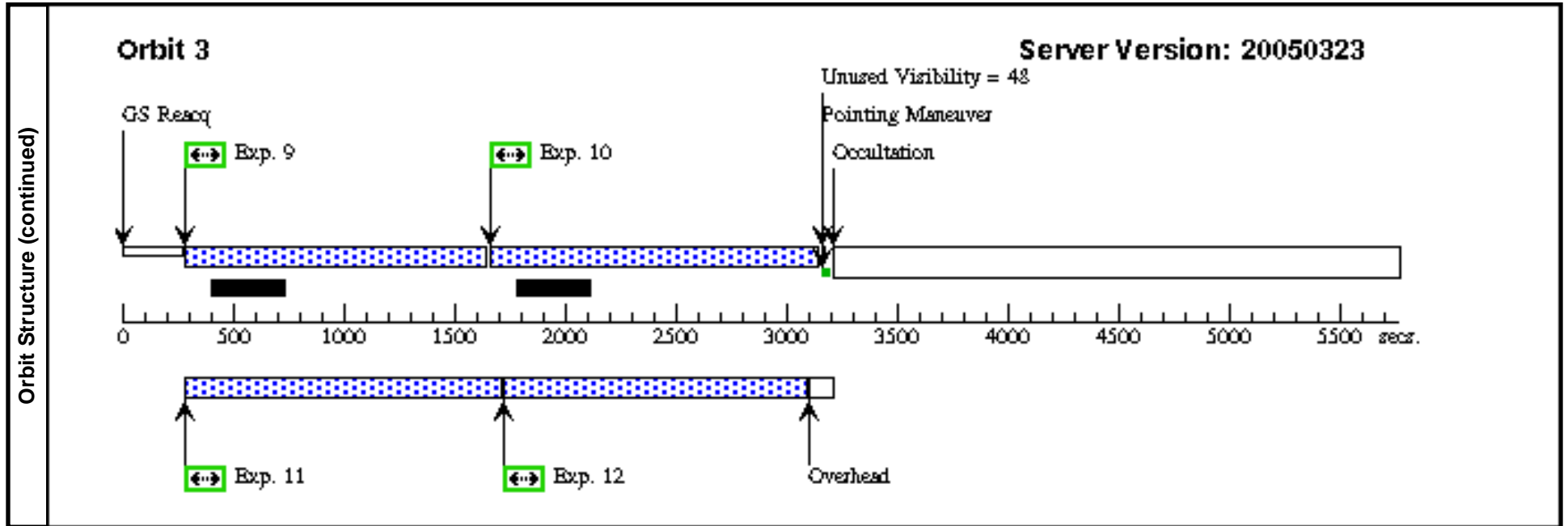
Visit	Proposal 10397, Visit 03 Diagnostic Status: Warning Scientific Instruments: ACS/WFC, WFPC2 Special Requirements: SCHED 50%; ORIENT 118.0D TO 118.0 D									
	(Visit 03) Warning: GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(4)	COMA-CLUSTER-PLUME-POS3	RA: 12 59 26.9840 (194.8624333d) Dec: +27 59 54.52 (27.99848d) Equinox: J2000 Plate Id: (?)		V=28.0	Coordinate Source: GSC_SURVEY_PLATE			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0,0; GS ACQ SCENARIO ONEB1	Prime + Parallel Group 1-4	1200.0 Secs [=>1200.0 Secs]	[1]
	2		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0,0	Prime + Parallel Group 1-4	1280.0 Secs [=>1282.0 Secs]	[1]
	3		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 1-4	1200.0 Secs [=>1200.0 Secs]	[1]
	4		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 1-4	1300.0 Secs [=>1300.0 Secs]	[1]
	5		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0.46,3.0 09	Prime + Parallel Group 5-8	1200.0 Secs [=>1200.0 Secs]	[2]
	6		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.46,3.0 09	Prime + Parallel Group 5-8	1280.0 Secs [=>1319.0 Secs]	[2]
	7		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 5-8	1200.0 Secs [=>1200.0 Secs]	[2]
	8		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 5-8	1300.0 Secs [=>1300.0 Secs]	[2]
	9		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0.92,6.0 18	Prime + Parallel Group 9-12	1200.0 Secs [=>1220.0 Secs]	[3]
	10		(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.92,6.0 18	Prime + Parallel Group 9-12	1280.0 Secs [=>1300.0 Secs]	[3]
11		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 9-12	1200.0 Secs [=>1200.0 Secs]	[3]	

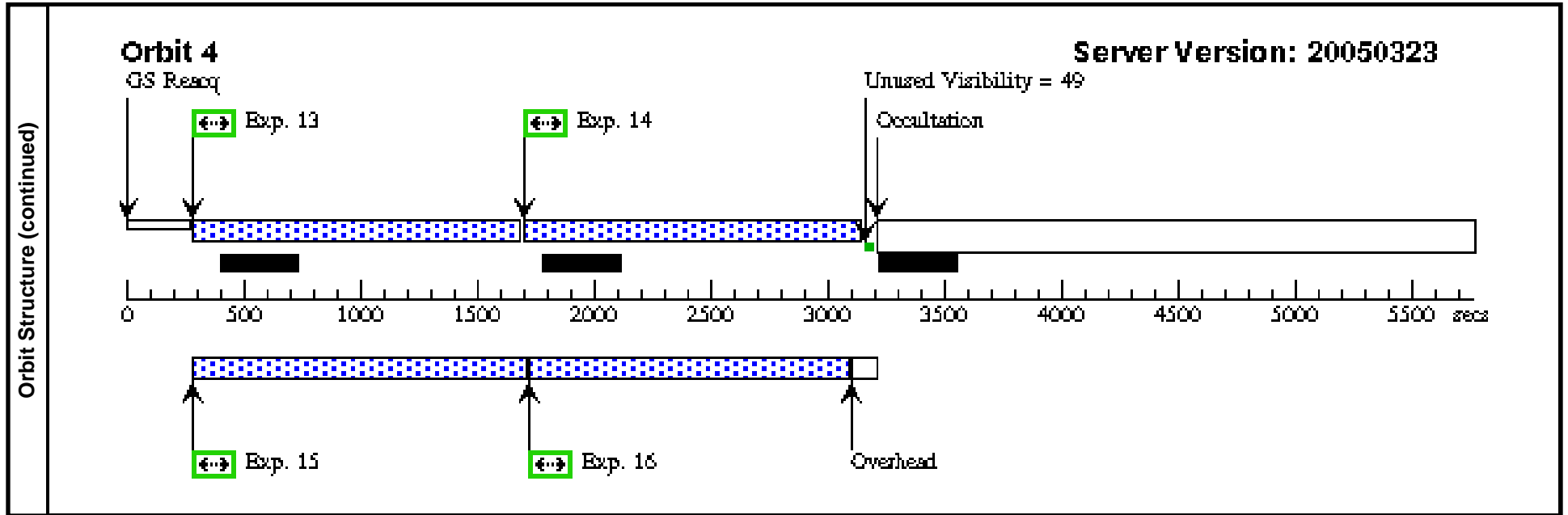
Proposal 10397 - Visit 03 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
12		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 9-12	1300.0 Secs [=>1300.0 Secs]	[3]
13	(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 1.38,9.0 27		Prime + Parallel Group 13-16	1200.0 Secs [=>1219.0 Secs]	[4]
14	(4) COMA-CLUSTER-PLUME-POS3	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 1.38,9.0 27		Prime + Parallel Group 13-16	1280.0 Secs [=>1299.0 Secs]	[4]
15		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 13-16	1200.0 Secs [=>1200.0 Secs]	[4]
16		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 13-16	1300.0 Secs [=>1300.0 Secs]	[4]









Proposal 10397 - Visit 52 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

Wed Jun 08 19:00:25 GMT 2005

Visit	Proposal 10397, Visit 52 Diagnostic Status: Warning Scientific Instruments: ACS/WFC, WFPC2 Special Requirements: SCHED 50%; ORIENT 118.0D TO 118.0 D									
	(Visit 52) Warning: GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
		(3)	COMA-CLUSTER-PLUME-POS2	RA: 12 59 26.0150 (194.8583958d) Dec: +27 59 56.60 (27.99906d) Equinox: J2000 Plate Id: (?)		V=28.0	Coordinate Source: GSC_SURVEY_PLATE			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0,0; GS ACQ SCENARIO ONEB1	Prime + Parallel Group 1-4	1200.0 Secs [=>1200.0 Secs]	[1]
	2		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0,0	Prime + Parallel Group 1-4	1280.0 Secs [=>1282.0 Secs]	[1]
	3		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 1-4	1200.0 Secs [=>1200.0 Secs]	[1]
	4		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 1-4	1300.0 Secs [=>1300.0 Secs]	[1]
	5		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0.46,3.0 09	Prime + Parallel Group 5-8	1200.0 Secs [=>1200.0 Secs]	[2]
	6		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.46,3.0 09	Prime + Parallel Group 5-8	1280.0 Secs [=>1319.0 Secs]	[2]
	7		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 5-8	1200.0 Secs [=>1200.0 Secs]	[2]
	8		ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 5-8	1300.0 Secs [=>1300.0 Secs]	[2]
	9		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 0.92,6.0 18	Prime + Parallel Group 9-12	1200.0 Secs [=>1220.0 Secs]	[3]
	10		(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.92,6.0 18	Prime + Parallel Group 9-12	1280.0 Secs [=>1300.0 Secs]	[3]
11		ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 9-12	1200.0 Secs [=>1200.0 Secs]	[3]	

Proposal 10397 - Visit 52 - The Ghosts of Galaxies: Tidal Debris and the Formation of Clusters

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures (continued)	12	ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 9-12	1300.0 Secs [=>1300.0 Secs]	[3]
	13	(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO	POS TARG 1.38,9.0 27	Prime + Parallel Group 13-16	1200.0 Secs [=>1219.0 Secs]	[4]
	14	(3) COMA-CLUSTER-PLUME-POS2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 1.38,9.0 27	Prime + Parallel Group 13-16	1280.0 Secs [=>1299.0 Secs]	[4]
	15	ANY	WFPC2, IMAGE, WF3	F606W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 13-16	1200.0 Secs [=>1200.0 Secs]	[4]
	16	ANY	WFPC2, IMAGE, WF3	F814W	CR-SPLIT=NO; CLOCKS=YES		Prime + Parallel Group 13-16	1300.0 Secs [=>1300.0 Secs]	[4]

