



10585 - NGC 4449: a Testbed for Starbursts in the Low- and High-Redshift Universe

Cycle: 14, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

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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	ANY (1) NGC4449-POSA	ACS/WFC WFPC2	4	20-Jun-2005 11:07:47.0	yes
02	ANY (2) NGC4449-POSB	ACS/WFC WFPC2	4	20-Jun-2005 11:08:04.0	yes
03	(3) NGC4449-POSC	ACS/WFC	1	20-Jun-2005 11:08:10.0	yes

9 Total Orbits Used

ABSTRACT

We will obtain deep ACS/WFC broad-band imaging in F435W, F555W, and F814W of the Magellanic irregular galaxy NGC 4449 in order to infer the properties of the resolved (young and old) stellar population, compare the current strong star-formation activity to that at earlier epochs, trace the major episodes of star formation over cosmic time, and relate them to the past history of interaction/merging of this galaxy. NGC 4449 is one of the closest (< 5 Mpc) global starbursts with a widespread star-formation activity that could have been triggered by interaction or accretion. It is, therefore, the perfect laboratory where to address issues related to star formation in extreme environments and investigate processes connected to the formation and evolution of galaxies in the early universe. At a distance of 4.2 Mpc, the stellar content in NGC 4449 can easily be resolved with HST. Yet, up to date no comprehensive dataset has been collected that is suited to infer a global star-formation history of the galaxy and to better understand its evolution. ACS/WFC provides the angular resolution and sensitivity to easily reach magnitude limits necessary for the detection of individual stars at the tip of the red giant branch (i.e., with ages from 1 Gyr up to 12 Gyr) with the required accuracy. A mosaic of 2 pointings along the major axis will give a good coverage of the galaxy and will allow us to infer a star-formation history unbiased by local properties of peculiar regions. Narrow-band imaging in F658N (H α) will provide a map of the ionized gas. Finally, WFPC2 parallel observations in F555W and F814W will allow to search deep in the HI halo of NGC 4449 for evidence of stars belonging to tidal streams. Our investigation of NGC 4449 will benefit from the wealth of observations already available over almost the whole electromagnetic spectrum and will be crucial in better understanding how starbursts can be influenced by merging phenomena in both the low- and high-redshift universe.

OBSERVING DESCRIPTION

We will use ACS/WFC to study the resolved stellar population of NGC 4449. We will perform a mosaic with 2 different pointings in a rectangle shape along the major axis of the galaxy. Our expertise suggests that the V and I filters are best suited for this type of investigation. We will thus observe in the two broad-band filters F555W and F814W. F555W is preferred to F606W because it is a more standard filter for HST stellar population studies and it is much less contaminated by nebular emission (F606W includes H α). We will infer the ancient star formation history of NGC 4449 from simulations tailored to reproduce the observed I vs. V-I CMD. We also require broad-band imaging in F435W in order to better characterize the hot young stars and correct each single star for intrinsic differential reddening along the line of sight with multi-band photometry. And finally, we will also do narrow-band imaging in F658N to map the distribution of the ionized gas through H α emission. At each of the two

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major axis pointings we will observe for 4 orbits in one visit. The exposure times for the different filters were chosen to reach at least one magnitude fainter than the TRGB ($I = 24.1$) with a photometric error below 0.1 mag ($S/N > 10$) in the broad-band filters. The exposures in each filter will be executed with a standard primary+secondary dithering pattern suitable to get rid of cosmic rays, remove hot/bad pixels, fill the gap between the two CCDs of the ACS/WFC, and improve the PSF sampling. Finally, parallel WFPC2 observations for each ACS pointing will be taken in F606W and F814W. It will be possible to allocate about 2 orbits per WFPC2 filter, per pointing.

The goal to properly mosaic the galaxy along its major axis restricts the ORIENT of the observations. We want the CCD edges perpendicular to the major axis, which limits the ORIENT to 50 degrees, modulo 90. In addition, we want the most important parts of the galaxy to fall on WFC2, which has the smallest PSF variations over the field. We also want the chip gap to be away from the most interesting parts of the galaxy. And finally, the observations must of course be schedulable. These considerations leave ORIENT=320 degrees as the only available option. To provide sufficient flexibility for scheduling in two-gyro mode, we allow a ± 10 degree range around this value. We also increase SCHED to 60% from its default value of 30%. This provides increased opportunities for scheduling, but with a slightly reduced visibility time (2.5 minutes) per orbit. The visit planner shows that the observations can schedule for a full 6 weeks in Oct-Dec 2005. This should provide sufficient flexibility for scheduling.

The single orbit in visit 3 allows for additional deeper imaging in H α and F814W at a slightly different pointing.

REAL TIME JUSTIFICATION

N/A

CALIBRATION JUSTIFICATION

N/A

ADDITIONAL COMMENTS

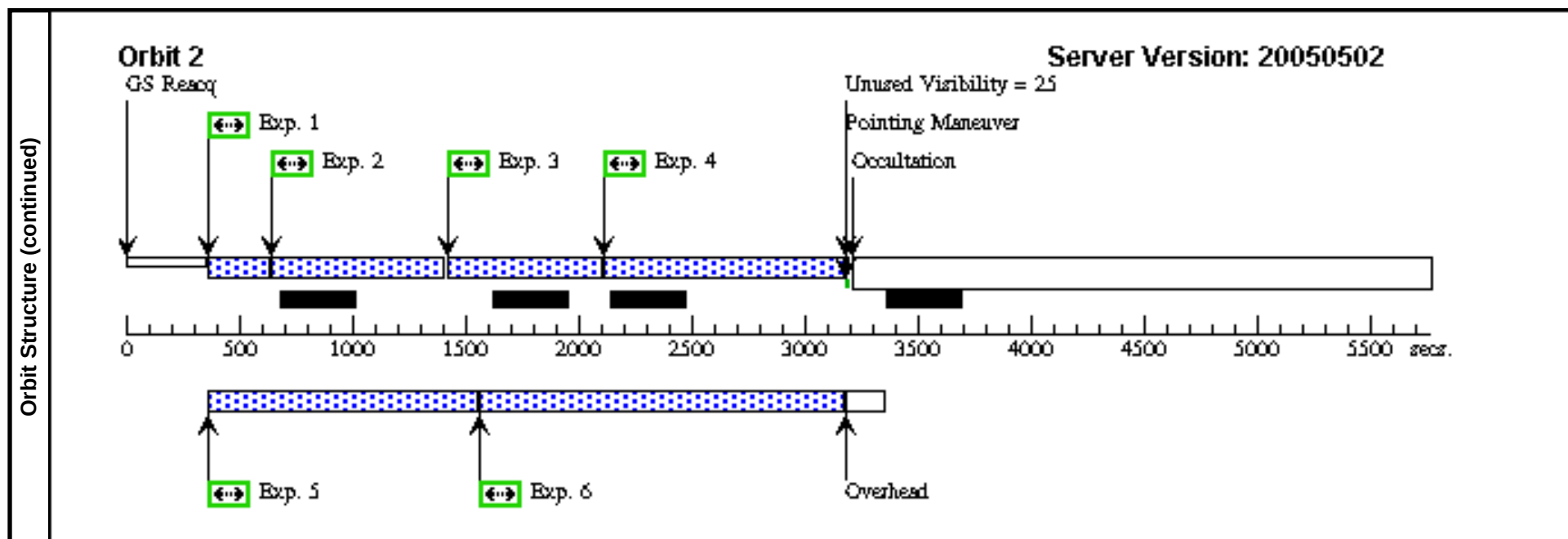
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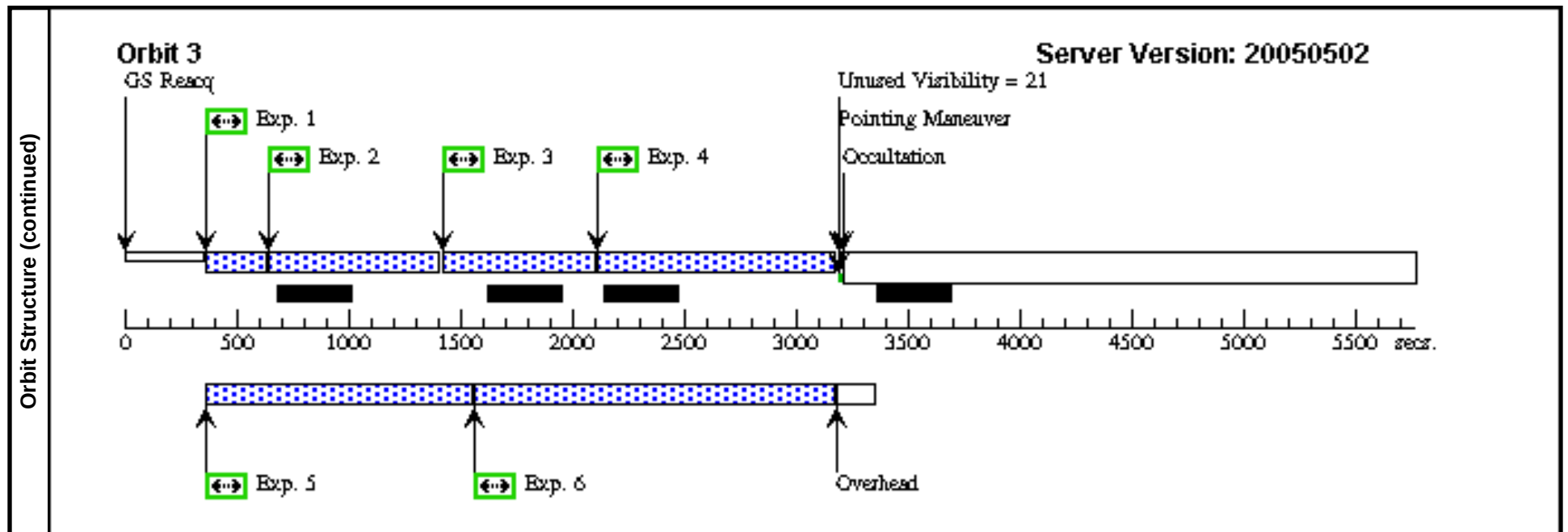
Proposal 10585 - Visit 01 - NGC 4449: a Testbed for Starbursts in the Low- and High-Redshift Universe

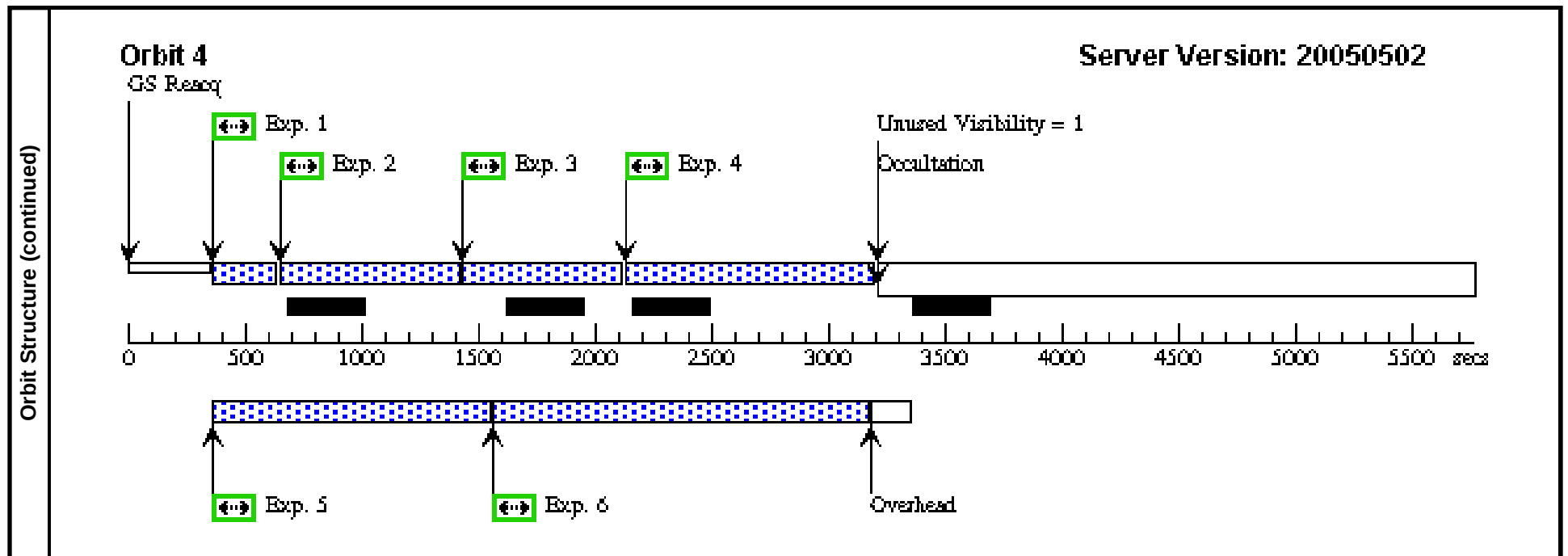
Visit	Proposal 10585, Visit 01										Mon Jun 20 15:08:11 GMT 2005	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: ACS/WFC, WFPC2											
	Special Requirements: PCS MODE FINE; SCHED 60%; ORIENT 310.0D TO 330.0 D											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=2.994 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=85.3 Angle Between Sides= Center Pattern=false		Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.149 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=34.2 Angle Between Sides= Center Pattern=false		(1-6)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	NGC4449-POSA	RA: 12 28 15.7467 (187.0656113d) Dec: +44 06 53.28 (44.11480d) Equinox: J2000 Plate Id: (?)				V=9.7+/-0.6		Coordinate Source: GUIDE_STAR_CATALOG			
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	HPOSA	(1) NGC4449-POSA	ACS/WFC, ACCUM, WFCENTER		F658N	CR-SPLIT=NO		Pattern 1-6 (1) Prime + Parallel Gro up 1-6	75.0 Secs		
										[==>83.0 Secs (Pattern 1,1)]	[1]	
										[==>90.0 Secs (Pattern 1,2)]	[2]	
										[==>91.0 Secs (Pattern 2,1)]	[3]	
										[==>96.0 Secs (Pattern 2,2)]	[4]	
	2	VPOSA	(1) NGC4449-POSA	ACS/WFC, ACCUM, WFCENTER		F555W	CR-SPLIT=NO		Pattern 1-6 (1) Prime + Parallel Gro up 1-6	600.0 Secs		
										[==>608.0 Secs (Pattern 1,1)]	[1]	
										[==>615.0 Secs (Pattern 1,2)]	[2]	
										[==>616.0 Secs (Pattern 2,1)]	[3]	
										[==>621.0 Secs (Pattern 2,2)]	[4]	
	3	IPOSA	(1) NGC4449-POSA	ACS/WFC, ACCUM, WFCENTER		F814W	CR-SPLIT=NO		Pattern 1-6 (1) Prime + Parallel Gro up 1-6	500.0 Secs		
										[==>508.0 Secs (Pattern 1,1)]	[1]	
										[==>515.0 Secs (Pattern 1,2)]	[2]	
										[==>516.0 Secs (Pattern 2,1)]	[3]	
										[==>521.0 Secs (Pattern 2,2)]	[4]	
	4	BPOSA	(1) NGC4449-POSA	ACS/WFC, ACCUM, WFCENTER		F435W	CR-SPLIT=NO		Pattern 1-6 (1) Prime + Parallel Gro up 1-6	900.0 Secs		
										[==>908.0 Secs (Pattern 1,1)]	[1]	
										[==>915.0 Secs (Pattern 1,2)]	[2]	
										[==>916.0 Secs (Pattern 2,1)]	[3]	
										[==>921.0 Secs (Pattern 2,2)]	[4]	

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Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	5	VPARA	ANY	WFPC2, IMAGE, WFALL	F606W	CR-SPLIT=NO		Pattern 1-6 (1)	800.0 Secs	
								Prime + Parallel Group 1-6	[=>900.0 Secs (Pattern 1,1)]	[1]
									[=>900.0 Secs (Pattern 1,2)]	[2]
									[=>900.0 Secs (Pattern 2,1)]	[3]
									[=>900.0 Secs (Pattern 2,2)]	[4]
	6	IPARA	ANY	WFPC2, IMAGE, WFALL	F814W	CR-SPLIT=NO		Pattern 1-6 (1)	1400.0 Secs	
								Prime + Parallel Group 1-6	[=>1500.0 Secs (Pattern 1,1)]	[1]
									[=>1500.0 Secs (Pattern 1,2)]	[2]
									[=>1500.0 Secs (Pattern 2,1)]	[3]
									[=>1500.0 Secs (Pattern 2,2)]	[4]
Orbit Structure	Orbit 1 Server Version: 20050502 Unused Visibility = 22 GS Acq Exp. 1 Exp. 2 Exp. 3 Exp. 4 Pointing Maneuver Occultation Exp. 5 Exp. 6 Overhead 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec.									





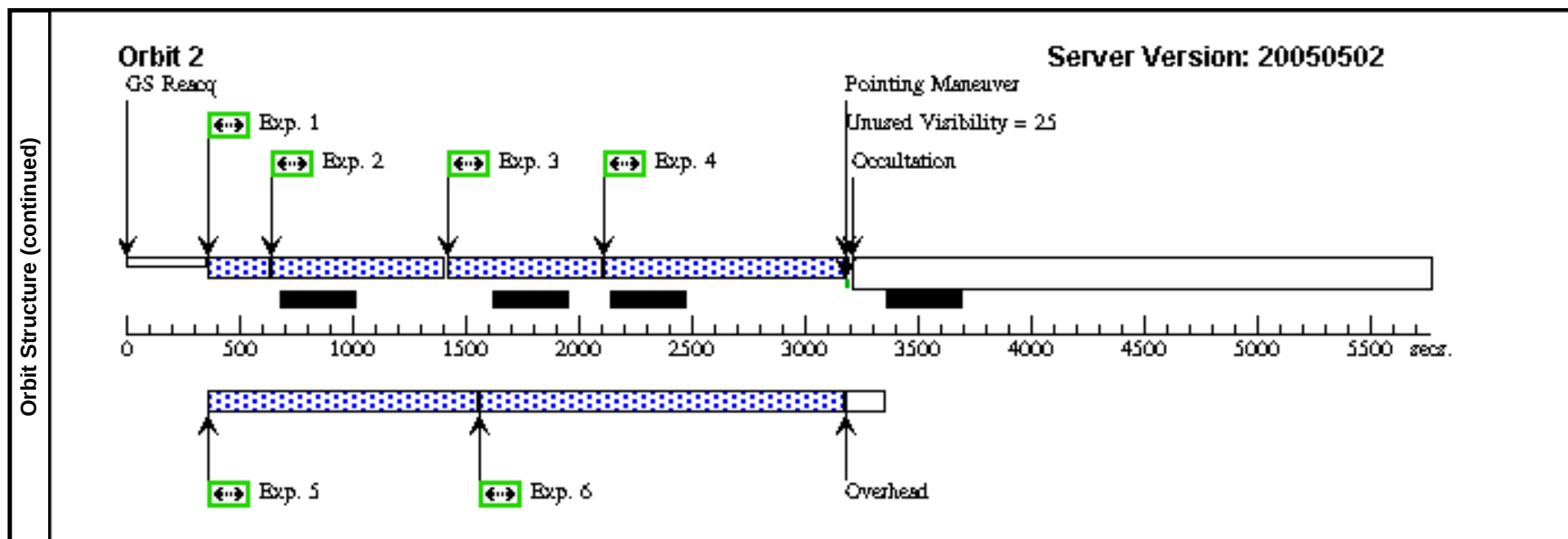


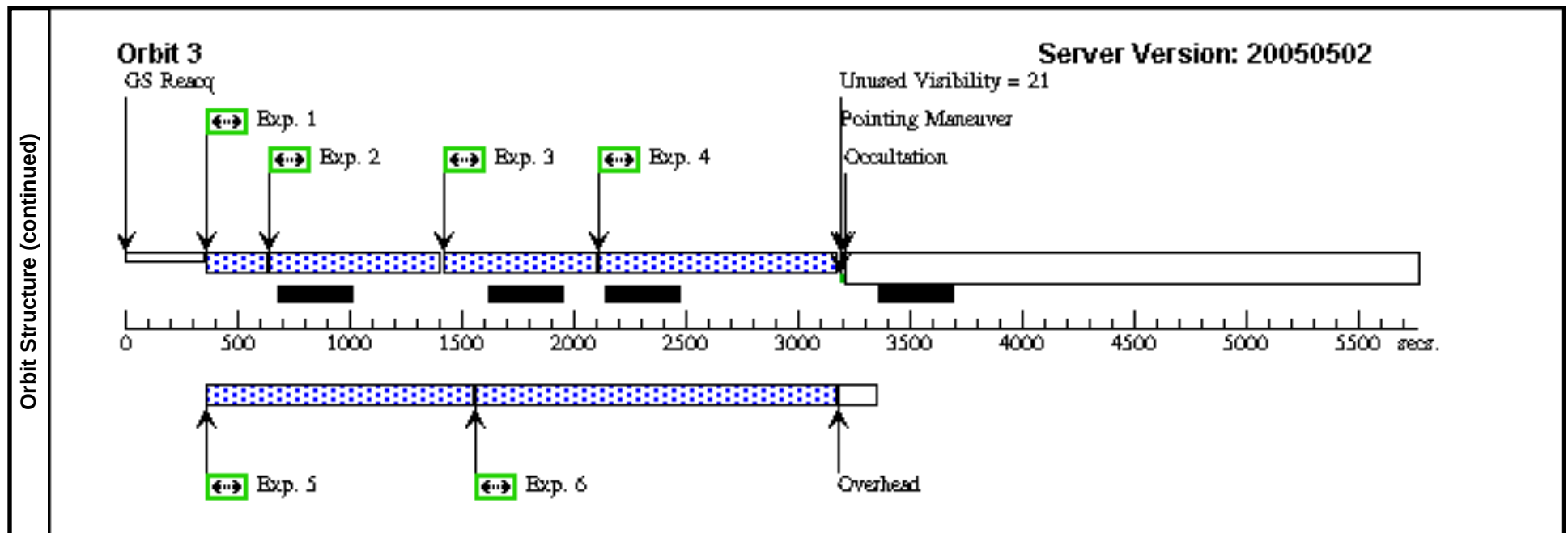
Proposal 10585 - Visit 02 - NGC 4449: a Testbed for Starbursts in the Low- and High-Redshift Universe

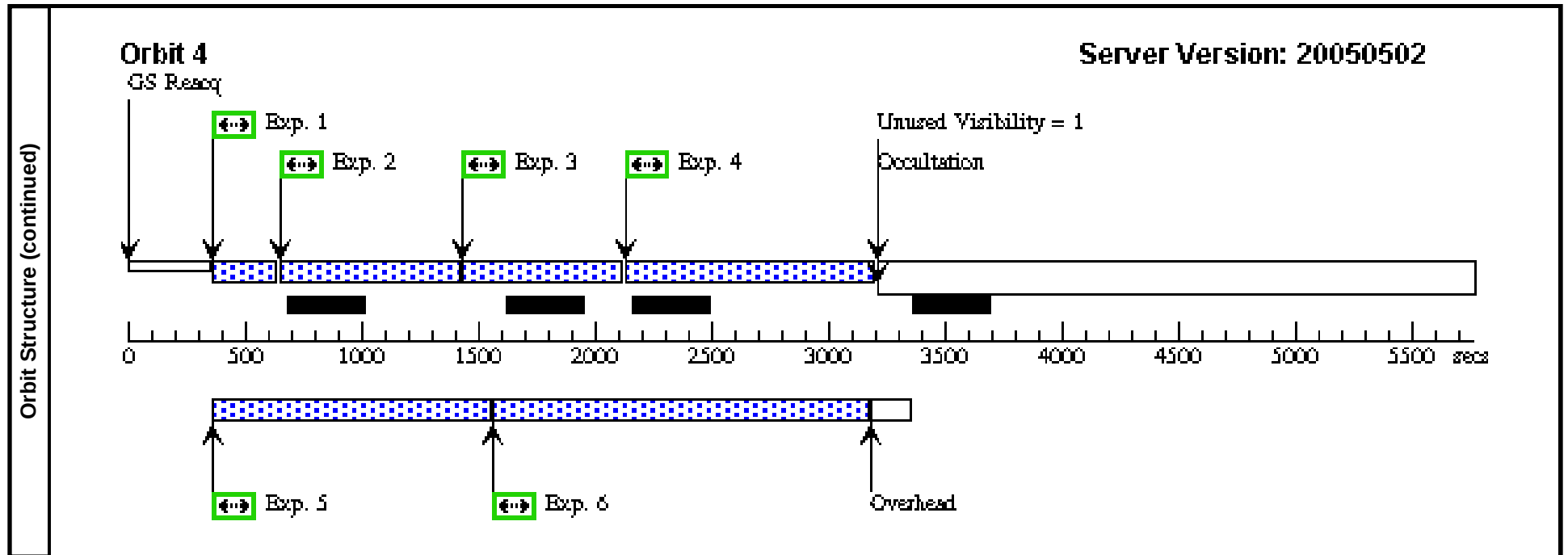
Visit	Proposal 10585, Visit 02 Mon Jun 20 15:08:15 GMT 2005									
	Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC, WFPC2 Special Requirements: PCS MODE FINE; SCHED 60%; SAME ORIENT AS 01; AFTER 01									
Patterns	#	Primary Pattern				Secondary Pattern				Exposures
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=2.994 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.3 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.149 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=34.2 Angle Between Sides= Center Pattern=false	(1-6)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	NGC4449-POSB	RA: 12 28 3.0627 (187.0127612d) Dec: +44 05 7.37 (44.08538d) Equinox: J2000 Plate Id: (?)		V=9.7+/-0.6	Coordinate Source: GUIDE_STAR_CATALOG				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	HPOSB	(2) NGC4449-POSB	ACS/WFC, ACCUM, WFCENTER	F658N	CR-SPLIT=NO		Pattern 1-6 (1)	75.0 Secs	
								Prime + Parallel Group 1-6	[==>83.0 Secs (Pattern 1,1)]	[1]
									[==>90.0 Secs (Pattern 1,2)]	[2]
									[==>91.0 Secs (Pattern 2,1)]	[3]
									[==>96.0 Secs (Pattern 2,2)]	[4]
	2	VPOSB	(2) NGC4449-POSB	ACS/WFC, ACCUM, WFCENTER	F555W	CR-SPLIT=NO		Pattern 1-6 (1)	600.0 Secs	
								Prime + Parallel Group 1-6	[==>608.0 Secs (Pattern 1,1)]	[1]
									[==>615.0 Secs (Pattern 1,2)]	[2]
									[==>616.0 Secs (Pattern 2,1)]	[3]
									[==>621.0 Secs (Pattern 2,2)]	[4]
	3	IPOSB	(2) NGC4449-POSB	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO		Pattern 1-6 (1)	500.0 Secs	
								Prime + Parallel Group 1-6	[==>508.0 Secs (Pattern 1,1)]	[1]
									[==>515.0 Secs (Pattern 1,2)]	[2]
									[==>516.0 Secs (Pattern 2,1)]	[3]
									[==>521.0 Secs (Pattern 2,2)]	[4]
	4	BPOSB	(2) NGC4449-POSB	ACS/WFC, ACCUM, WFCENTER	F435W	CR-SPLIT=NO		Pattern 1-6 (1)	900.0 Secs	
								Prime + Parallel Group 1-6	[==>908.0 Secs (Pattern 1,1)]	[1]
									[==>915.0 Secs (Pattern 1,2)]	[2]
									[==>916.0 Secs (Pattern 2,1)]	[3]
									[==>921.0 Secs (Pattern 2,2)]	[4]

Proposal 10585 - Visit 02 - NGC 4449: a Testbed for Starbursts in the Low- and High-Redshift Universe

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	5	VPARB	ANY	WFPC2, IMAGE, WFALL	F606W	CR-SPLIT=NO		Pattern 1-6 (1)	800.0 Secs	
								Prime + Parallel Group 1-6	[=>900.0 Secs (Pattern 1,1)]	[1]
									[=>900.0 Secs (Pattern 1,2)]	[2]
									[=>900.0 Secs (Pattern 2,1)]	[3]
									[=>900.0 Secs (Pattern 2,2)]	[4]
	6	IPARB	ANY	WFPC2, IMAGE, WFALL	F814W	CR-SPLIT=NO		Pattern 1-6 (1)	1400.0 Secs	
								Prime + Parallel Group 1-6	[=>1500.0 Secs (Pattern 1,1)]	[1]
									[=>1500.0 Secs (Pattern 1,2)]	[2]
									[=>1500.0 Secs (Pattern 2,1)]	[3]
									[=>1500.0 Secs (Pattern 2,2)]	[4]
Orbit Structure	Orbit 1 Server Version: 20050502 Pointing Maneuver Unused Visibility = 22 Occultation GS Acq Exp. 1 Exp. 2 Exp. 3 Exp. 4 Exp. 5 Exp. 6 Overhead 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec.									







Proposal 10585 - Visit 03 - NGC 4449: a Testbed for Starbursts in the Low- and High-Redshift Universe

Visit	Proposal 10585, Visit 03										Mon Jun 20 15:08:19 GMT 2005			
	Diagnostic Status: No Diagnostics													
	Scientific Instruments: ACS/WFC													
	Special Requirements: ORIENT 310.0D TO 325.0 D; AFTER 02													
Patterns	#	Primary Pattern					Secondary Pattern					Exposures		
	(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=			Coordinate Frame=POS-TARG Pattern Orientation=85.3 Angle Between Sides= Center Pattern=false								(3)	
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes			Miscellaneous		
	(3)	NGC4449-POSC	RA: 12 28 12.1516 (187.0506317d)			Radial Velocity: 207.0 km/sec			V=9.99			Coordinate Source: GSC_SURVEY_PLATE		
		Alt Name1: UGC7592	Dec: +44 05 45.40 (44.09594d)											
			Equinox: J2000 Plate Id: 00XX											
Comments: Position adjusted to fit low-surface brightness narrow-line emitting regions surrounding the main visible body of the galaxy in the FOV.														
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups		Exp. Time/[Actual Dur.]			Orbit
	1		(3) NGC4449-POSC	ACS/WFC, ACCUM, WFCENTER		F814W	CR-SPLIT=NO				200.0 Secs			
											[==>]			[1]
	2		(3) NGC4449-POSC	ACS/WFC, ACCUM, WFCENTER		F814W	CR-SPLIT=NO	POS TARG -0.25,3			340.0 Secs			
											[==>]			[1]
	3		(3) NGC4449-POSC	ACS/WFC, ACCUM, WFCENTER		F658N	CR-SPLIT=NO	POS TARG -0.24,-3	Pattern 3-3 (2)		513.0 Secs			
											[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]			[1]

