10811 - Morphology of a most spectactular Spitzer selected galaxy

Cycle: 15, 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) MIPSJ142824.0+352619	WFPC2	4	17-Jan-2008 14:40:47.0	yes
02	(1) MIPSJ142824.0+352619	NIC2	1	17-Jan-2008 14:40:54.0	yes

5 Total Orbits Used

ABSTRACT

By using ground based sub-millimeter observations to followup Spitzer-selected galaxies, we have discovered a starburst dominated hyperluminous infrared galaxy. A mid-infrared spectrum obtained with Spitzer-IRS provides a redshift of z=1.325, which has been subsequently confirmed using both NIR spectroscopy at Keck, and sub-mm spectroscopy with IRAM and the CSO. By combining the Spitzer and ground based sub-mm data, we

measure an integrated IR luminosity of 4 x 10^13 Lsun. This is the only such object found in the 9 square degree NDWFS survey, and hence is incredibly rare. The only other dusty galaxies this bright show strong evidence of AGN activity, but this source does not. One reason this object could be so bright is due to lensing, and indeed a foreground source spectroscopically confirmed at z=1.034 seems directly aligned with the target. However it is unlikely that the geometry of this galaxy-galaxy lensing system could support an amplification more than a factor of a few. Our IRAC images reveal very faint and red satellite systems near our target, hence another possibility is that the galaxy is so luminous because of merging induced star-formation activity. Morphology is the best way to discriminate between these hypotheses, and hence HST observations are essential since the scales on which the merging or lensing are occuring are much smaller than what can be resolved from the ground.

OBSERVING DESCRIPTION

Simple 2 orbit observation (1 with ACS, one with NICMOS) to investigate the morphology of a unique, luminous, Spitzer selected galaxy. Based on previous experience with high-redshift IR luminous galaxies, we request LOWSKY conditions, and want to avoid the SAA. There is no constraint between when the ACS and NICMOS orbits are scheduled.

ACS observations: We use a simple 4 point dither pattern (BOX). The object is centered in the middle of one the two ACS chips to ensure we get it and its immediate environment well away from the interchip gap. Since the 4 points should be sufficient to remove cosmic-rays, we set CR-SPLIT to "no". 4x437s exposures are used to fill the available time while avoiding the low-sky cutoff.

NICMOS observations: We use the NIC2 aperture and a standard spiral dither pattern, with a spacing of 0.6375 arcseconds (8.5 pixels). We found that by setting NSAMP=6 and SAMP-SEQ=SPARS128, we could fill up most of the orbit while still avoiding the low-sky limit. We note that NSAMP=19,SPARS32 would result in 120 extra seconds of exposure time, but at the expense of potentially higher noise given the increased readout frequency.

To avoid the SAA, we used (on advice from STSCI), the "GS ACQ SCENARIO: BASE1TNS" setting.

ADDITIONAL COMMENTS

Note: The nearest GSC2.2 guidestar (N13322216746) to the object we are studying does not overlap with our most recent I-band imaging. Likely proper motion is to blame.

Although perhaps difficult to manage, the scientific impact of these observations would be strongest if made during the early June 2006 window, rather than waiting until February 2007 when it opens again. This would allow us to immediately publish it and other followup data we have collected using ground-based telescopes this past semester.

Visit

Proposal 10811, Visit 01, pi Thu Jan 17 19:40:58 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: (none)

Comments: This updated phase II converts the ACS observation originally planned for this target into a WFPC2 observation. We choose the PC camera for resolution, and apply a standard box-dither pattern. Each of the four orbits are identical except for modest (11 pixel on the PC CCD) shift to further mitigate bad pixel issues. Orientation is not a concern since we are concerned with the circular area within 15 arcsec of the target. Also, the PC coverage is more than sufficient to cover the NICMOS image already obtained as part of this project.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFPC2-BOX	Coordinate Frame=POS-TARG		(1), (2), (3), (4)
	Purpose=DITHER	Pattern Orientation=26.56505		
	Number Of Points=4	Angle Between Sides=143.1301		
	Point Spacing=0.559017	Center Pattern=false		
	Line Spacing=0.559017			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MIPSJ142824.0+352619	RA: 14 28 24.0700 (217.1002917d)	Redshift: 1.325	V=24	Reference Frame: ICRS
	Alt Name1: BOOTES59	Dec: +35 26 19.40 (35.43872d)		I=21,	
	Alt Name2: SHARC59	Equinox: J2000		K=17 (Vega)	

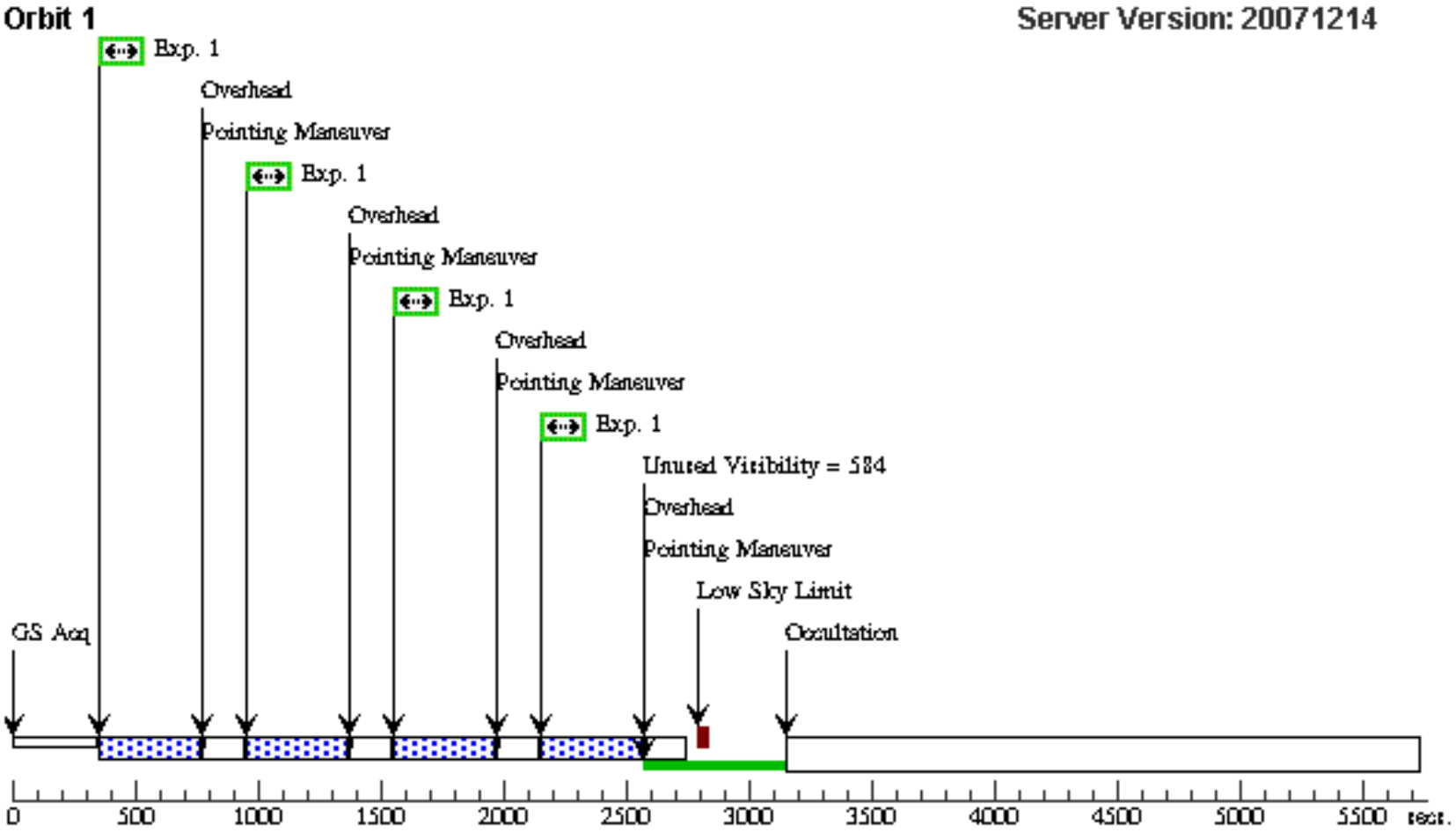
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	boo59_wfpc2_1	(1) MIPSJ142824.0+352619	WFPC2, IMAGE, PC1	F814W		LOW-SKY	Pattern 1-1 (1)	260.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
2	boo59_wfpc2_2	(1) MIPSJ142824.0+352619	WFPC2, IMAGE, PC1	F814W		POS TARG 0.498,0.0; LOW-SKY	Pattern 2-2 (1)	260.0 Secs	
								[==>(Pattern 1)]	***[2]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
3	boo59_wfpc2_3	(1) MIPSJ142824.0+352619	WFPC2, IMAGE, PC1	F814W		POS TARG 0.498,0.498; LOW-SKY	Pattern 3-3 (1)	260.0 Secs	
								[==>(Pattern 1)]	***[3]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	

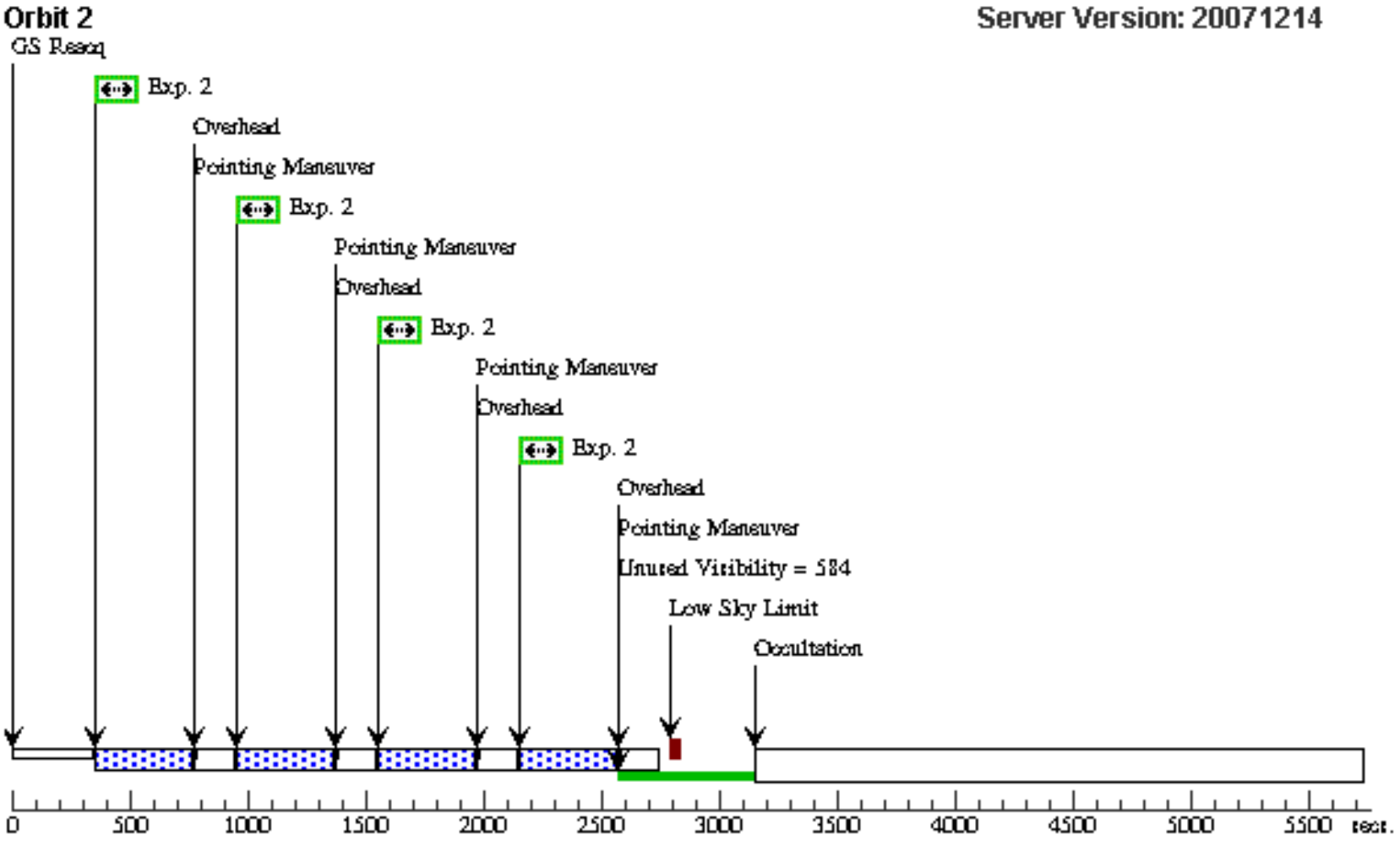
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
4	boo59_wfpc2_4	(1) MIPSJ142824.0+352619	WFPC2, IMAGE, PC1	F814W		POS TARG 0.0,0.498	Pattern 4-4 (1)	260.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[4]***

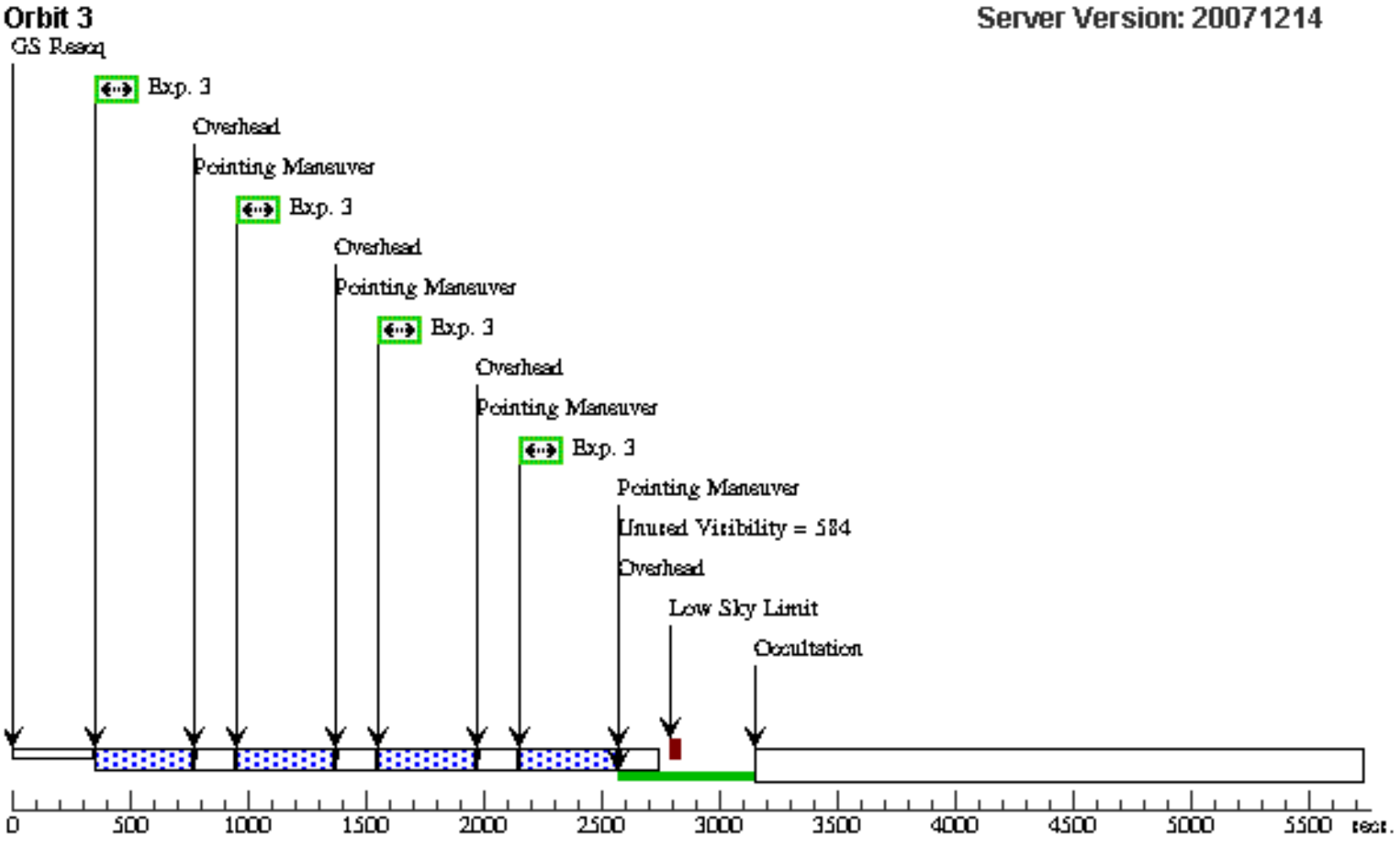
Orbit Structure

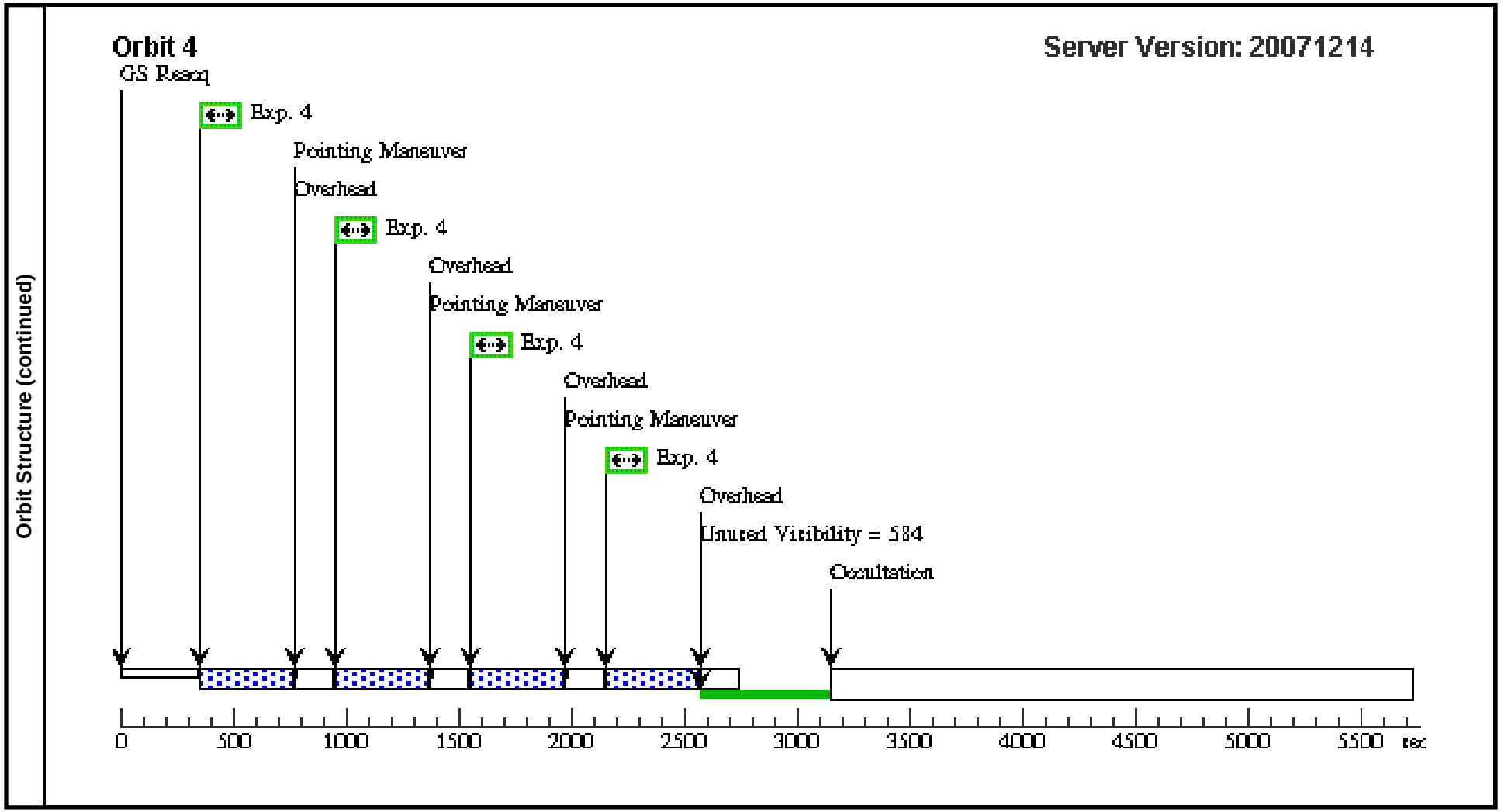


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20071214
GS Reacq
Exp. 4
Pointing Maneuver
Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Overhead
Unused Visibility = 584
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10811, Visit 02, completed Thu Jan 17 19:40:59 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: NIC2

Special Requirements: (none)

Patterns

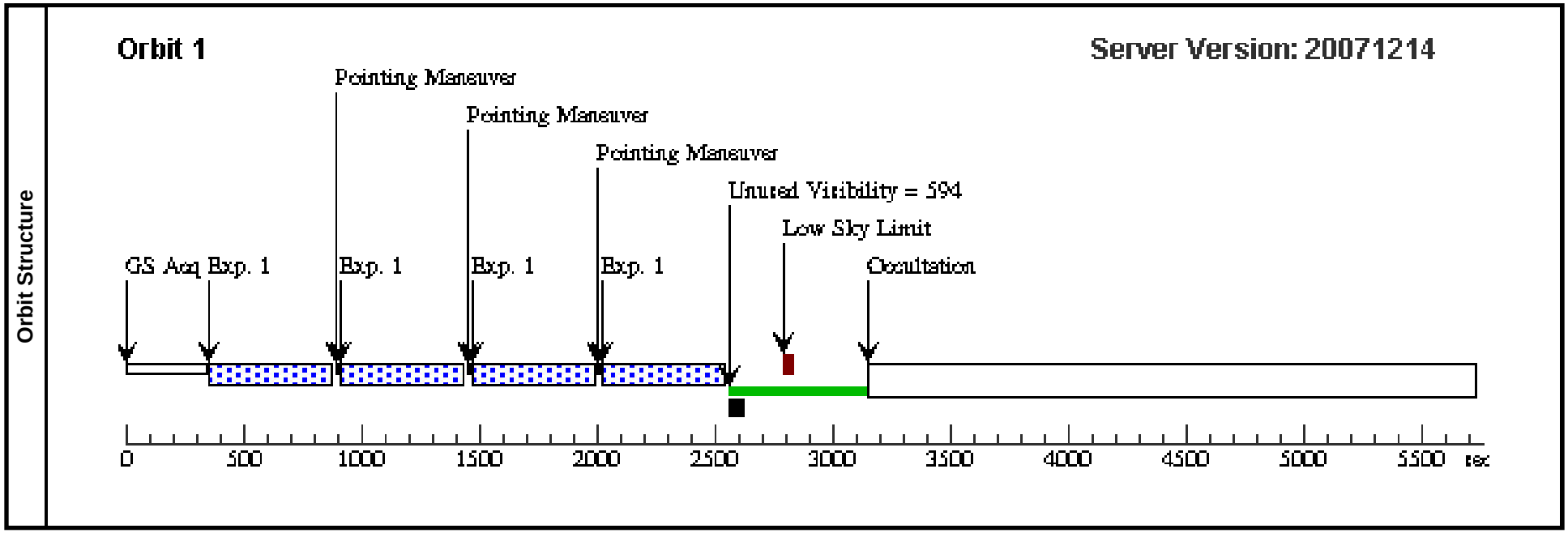
#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=NIC-SPIRAL-DITH	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=0.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.6735	Center Pattern=true		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MIPSJ142824.0+352619	RA: 14 28 24.0700 (217.1002917d)	Redshift: 1.325	V=24	Reference Frame: ICRS
	Alt Name1: BOOTES59	Dec: +35 26 19.40 (35.43872d)		I=21,	
	Alt Name2: SHARC59	Equinox: J2000		K=17 (Vega)	

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	boo59_nic	(1) MIPSJ142824.0+352619	NIC2, MULTIACCUM, NIC2	F160W	NSAMP=6; SAMP-SEQ=SPARS128	LOW-SKY; GS ACQ SCENARIO BASE1TNS	Pattern 1-1 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20071214
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Visibility = 594
Low Sky Limit
Occultation
GS Acq
Exp. 1
Exp. 1
Exp. 1
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec