10498 - Detecting the progenitors of core-collapse supernovae

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(5) SN2005CS	ACS/HRC	1	27-Jul-2006 21:00:58.0	yes
02	(2) SN2006BC	ACS/WFC	2	27-Jul-2006 21:01:08.0	yes
03	(6) SN2005CZ	ACS/WFC	2	27-Jul-2006 21:01:19.0	yes
04	(4) SN2006ZZ	ACS/HRC	1	27-Jul-2006 21:01:22.0	yes

6 Total Orbits Used

ABSTRACT

Modern supernovae searches in the nearby Universe are discovering large numbers of SNe which have massive star progenitors (Types II, Ib and Ic). The extensive HST image archives within ~20Mpc enables their indvidual bright stellar content to be resolved. As massive, evolved stars are the most luminous single objects in a galaxy, the progenitos of core-collapse SNe should be directly detectable on pre-explosion images. Two recent highlights of our ongoing HST programme are that we have detected the first red supergiant progenitor of a normal type II supernova and shown that SN1993J came from a binary system by detecting the companion star at the position of the SN. We have detected a further two progenitor stars of normal type II-P supernovae, set mass limits on a further 7 and suggest that faint type II supernovae are unlikely to come from the collapse of very massive stars which form black holes. These discoveries are providing strong constraints on theoretical models of pre-supernova evolution and the origin of the supernova types. We request time to continue this successful project and require ACS observations of future SNe which are discovered in galaxies closer than 20Mpc which have pre-explosion HST archive images available. This will allow the SNe to be precisely positioned on the pre-explosion images. We have set a final goal for this project of determining masses and types, or setting restrictive mass-limits for 30 supernovae, before the demise of HST.

OBSERVING DESCRIPTION

We will image future nearby supernovae with ACS, using either the HRC or the WFC. Supernovae will only be observed if there is pre-explosion HST imaging in more than one filter available, and if the supernova is a core-collapse, and if it is within approximately 20Mpc.

The goal of the programme is to identify the massive star progenitors of supernovae in HST archive images. To do this we need precise differential astrometry between the before and after. The images in this proposal will provide the astrometry of the supernova for comparison with pre-explosion images.

This is a ToO programme, in which we cannot specify targets for the Phase II deadline, but will trigger on suitable objects as the Cycle progresses. Generally we can plan well in advance, and not disrupt the HST schedule.

Visit

Proposal 10498, Visit 01 Fri Jul 28 01:01:24 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: BEFORE 31-AUG-2005:00:00:00

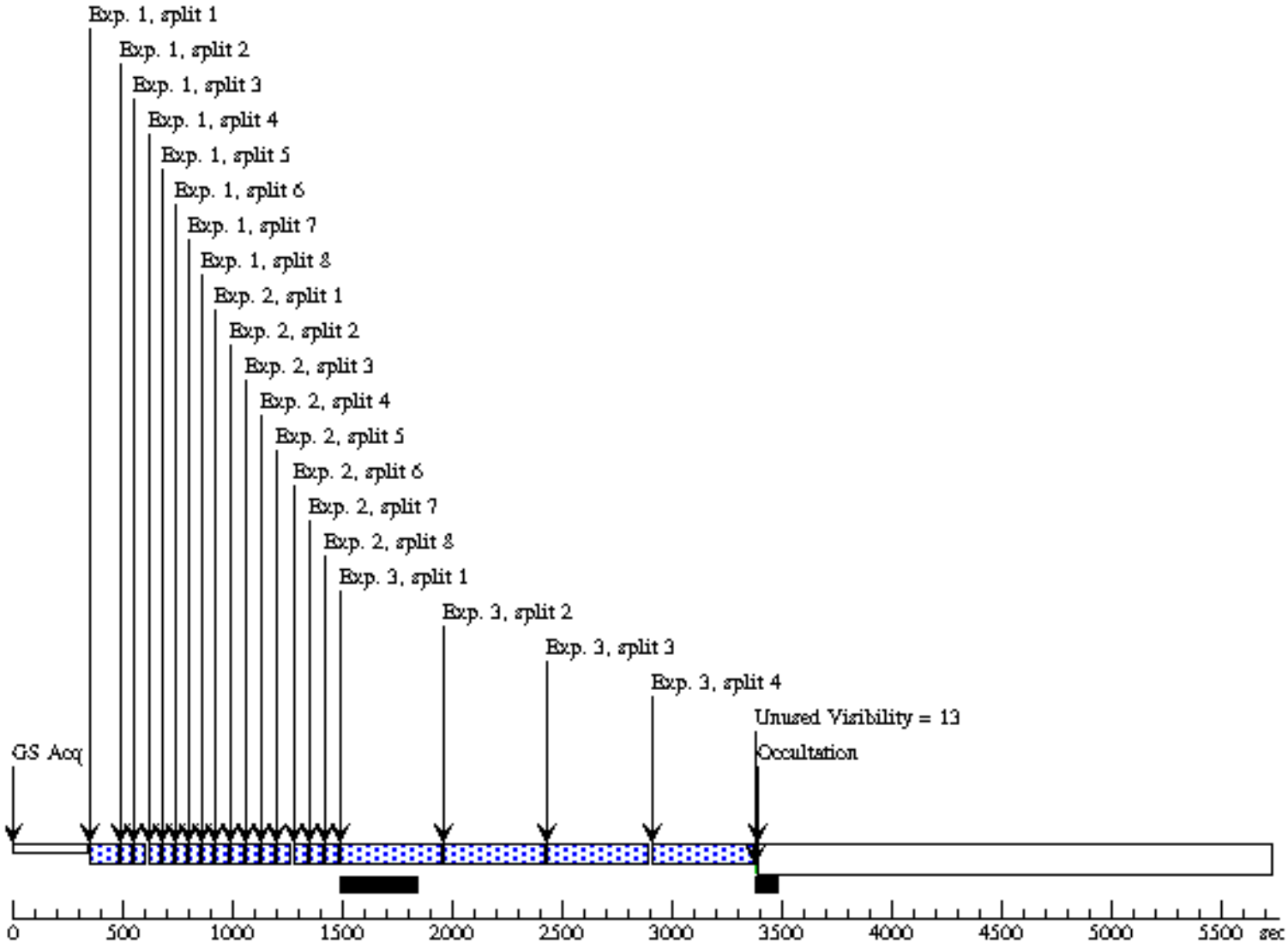
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SN2005CS	RA: 13 29 53.3700 (202.4723750d) Dec: +47 10 28.20 (47.17450d) Equinox: J2000		V=14.0	Coordinate Source: SIMBAD

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	SN2005CS	(5) SN2005CS	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=8			80.0 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
2		(5) SN2005CS	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=8			160.0 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]* *[==>(Split 5)]* *[==>(Split 6)]* *[==>(Split 7)]* *[==>(Split 8)]*	***[1]***
3		(5) SN2005CS	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=4			1704.0 Secs	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***

Orbit Structure



Visit

Proposal 10498, Visit 02 Fri Jul 28 01:01:25 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: BETWEEN 30-JUL-2006:00:00:00 AND 21-DEC-2006:00:00:00

Comments: ToO Trigger

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.2 Angle Between Sides= Center Pattern=false		(1), (2), (3)

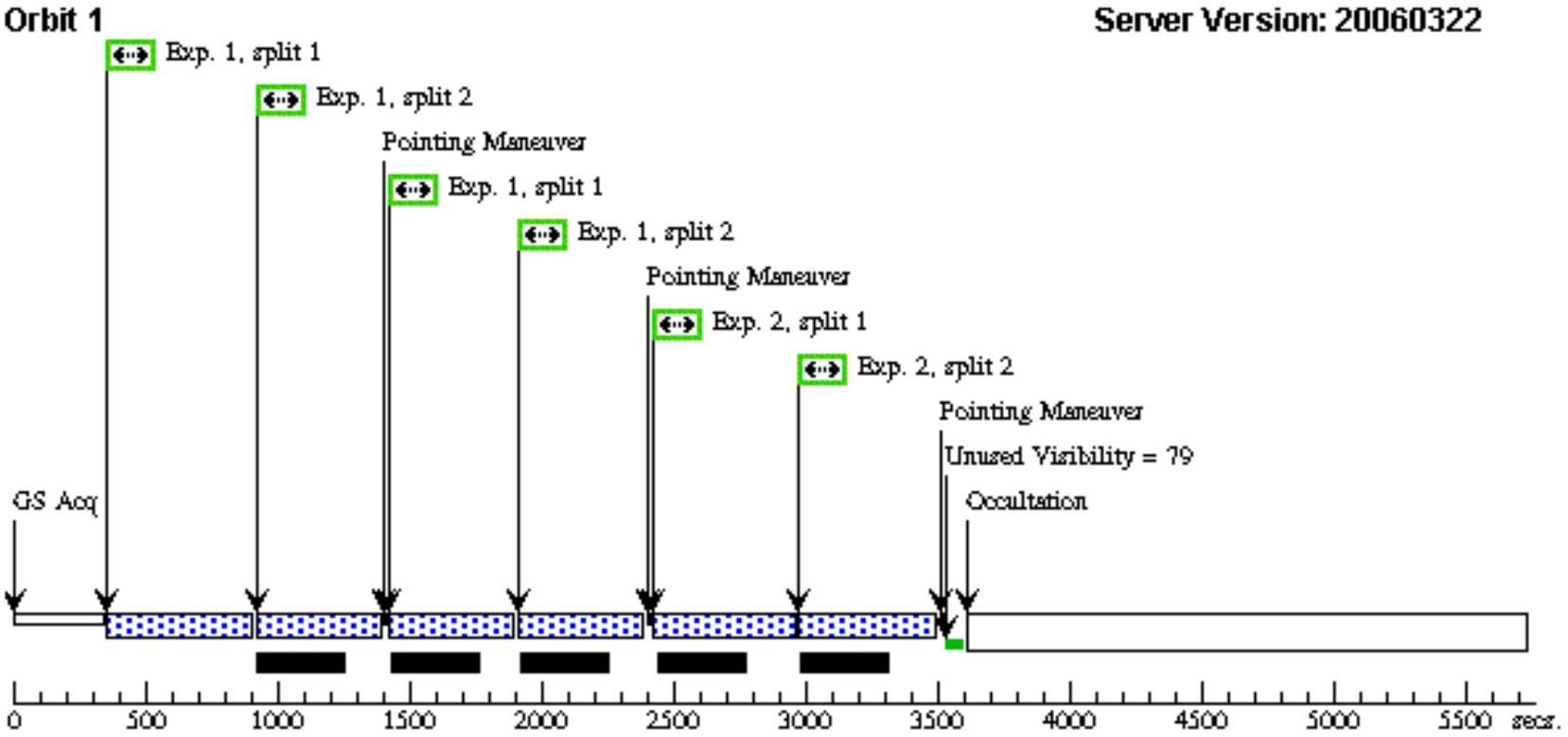
Fixed Targets

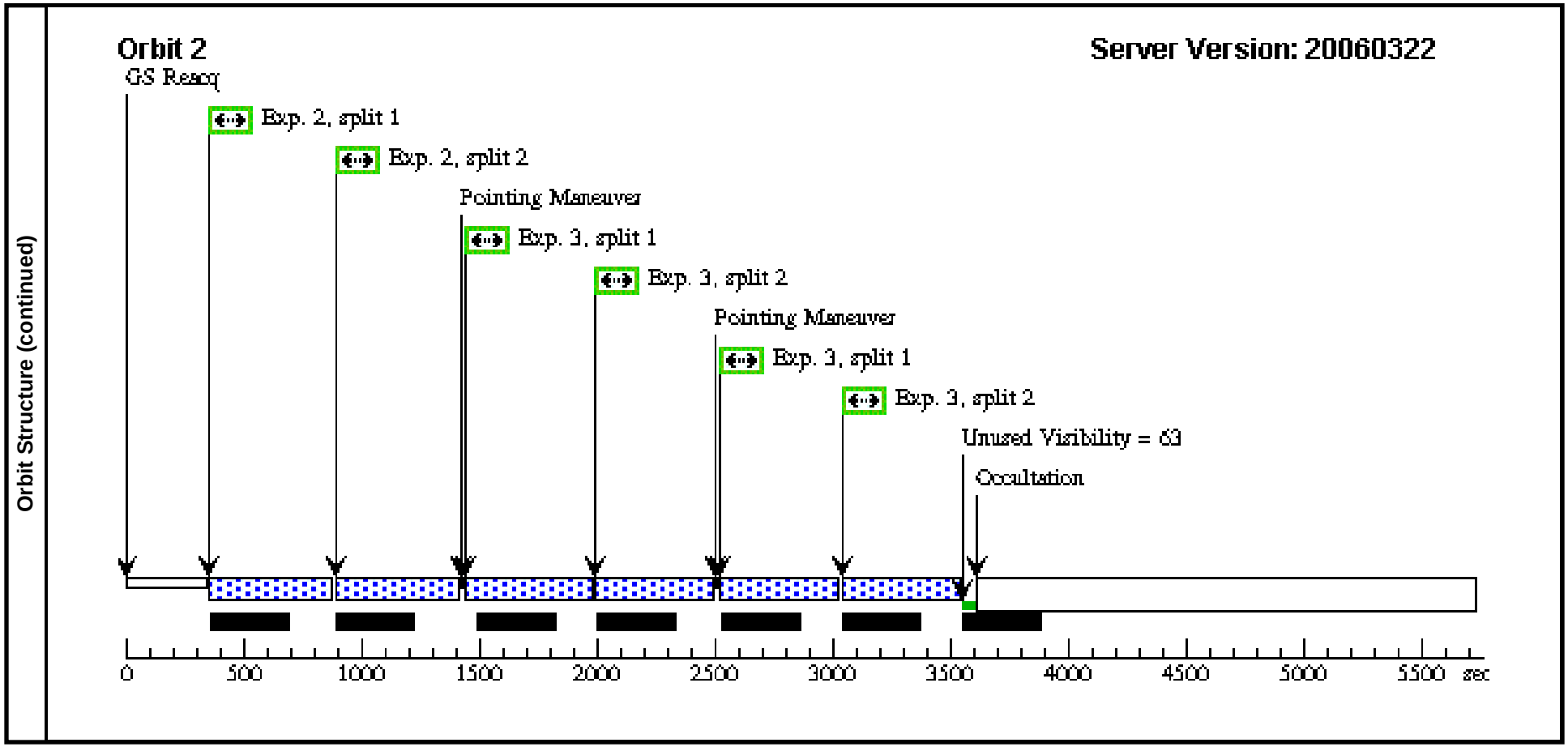
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN2006BC Alt Name1: NGC2397	RA: 07 21 16.5000 (110.3187500d) Dec: -68 59 57.30 (-68.99925d) Equinox: J2000 Plate Id: (?)		V=17.5+/-0.5 B=19.5, I=16.5	Coordinate Source: HST_IMAGE

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) SN2006BC	ACS/WFC, ACCUM, WFC1	F435W			Pattern 1-1 (1)	700.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]*	***[1]***
2		(2) SN2006BC	ACS/WFC, ACCUM, WFC1	F814W			Pattern 2-2 (1)	800.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]*	***[1]***
								[==>(Pattern 2, Split 1)] *[==>(Pattern 2, Split 2)]*	***[2]***
3		(2) SN2006BC	ACS/WFC, ACCUM, WFC1	F555W			Pattern 3-3 (1)	750.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]*	***[2]***

Orbit Structure




Orbit Structure (continued)
Orbit 2
Server Version: 20060322
GS Reacq
Exp. 2, split 1
Exp. 2, split 2
Pointing Maneuver
Exp. 3, split 1
Exp. 3, split 2
Pointing Maneuver
Exp. 3, split 1
Exp. 3, split 2
Unused Visibility = 63
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10498, Visit 03 Fri Jul 28 01:01:26 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: BEFORE 21-DEC-2006:00:00:00

Comments: ToO trigger

Patterns

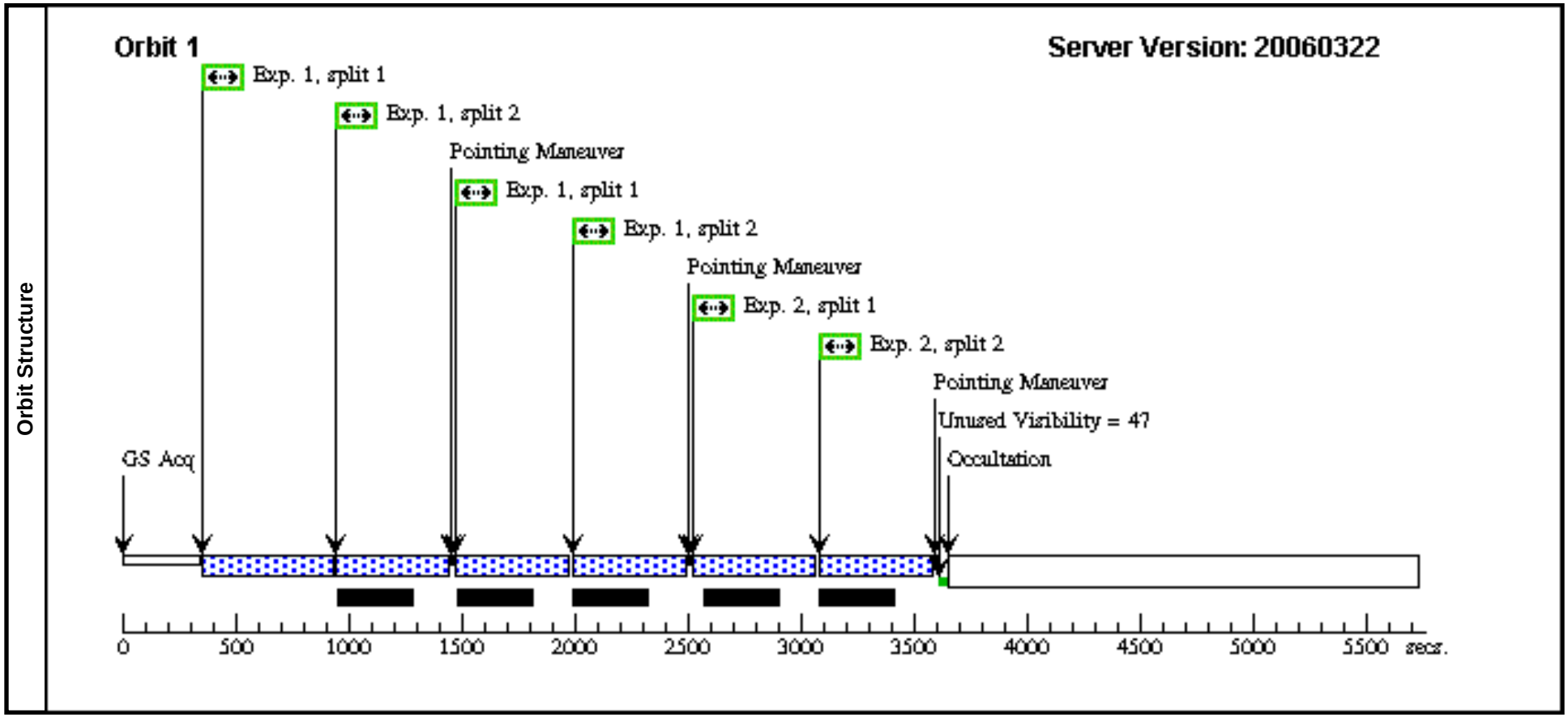
#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.2 Angle Between Sides= Center Pattern=false		(1), (2), (3)

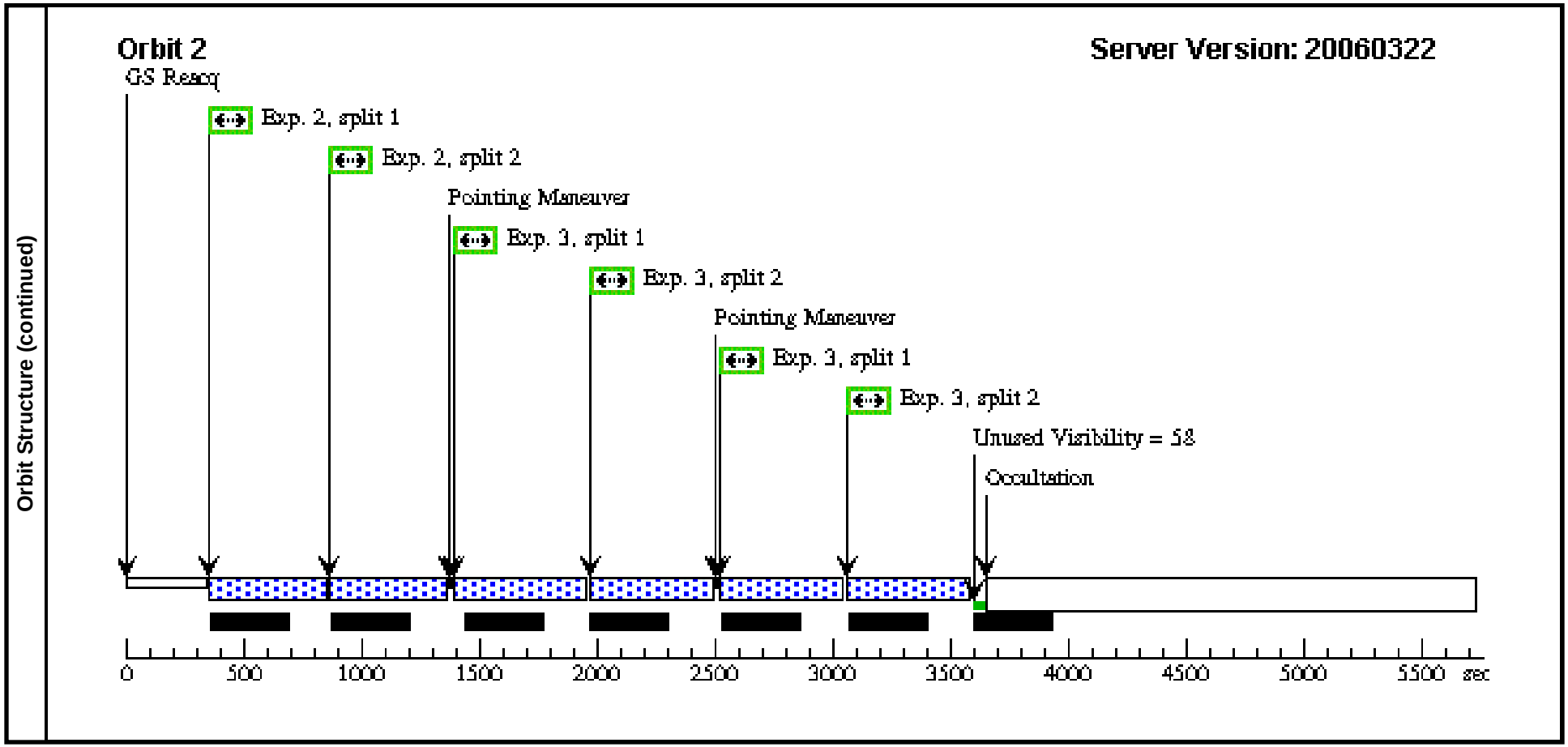
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	SN2005CZ Alt Name1: NGC4589	RA: 12 37 27.8000 (189.3658333d) Dec: +74 11 25.00 (74.19028d) Equinox: J2000 Plate Id: (?)		V=24.0+/-1.0	Coordinate Source: HST_IMAGE

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(6) SN2005CZ	ACS/WFC, ACCUM, WFC1	F435W			Pattern 1-1 (1)	750.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]*	***[1]***
2		(6) SN2005CZ	ACS/WFC, ACCUM, WFC1	F555W			Pattern 2-2 (1)	750.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]*	***[1]***
								[==>(Pattern 2, Split 1)] *[==>(Pattern 2, Split 2)]*	***[2]***
3		(6) SN2005CZ	ACS/WFC, ACCUM, WFC1	F814W			Pattern 3-3 (1)	800.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]*	***[2]***


Orbit Structure
Orbit 1
Server Version: 20060322
Exp. 1, split 1
Exp. 1, split 2
Pointing Maneuver
Exp. 1, split 1
Exp. 1, split 2
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Pointing Maneuver
Unused Visibility = 47
Occultation
GS Acq
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit Structure (continued)
Orbit 2
Server Version: 20060322
GS Reacq
Exp. 2, split 1
Exp. 2, split 2
Pointing Maneuver
Exp. 3, split 1
Exp. 3, split 2
Pointing Maneuver
Exp. 3, split 1
Exp. 3, split 2
Unused Visibility = 58
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10498, Visit 04 Fri Jul 28 01:01:27 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: ON HOLD

On Hold Comments: ToO on hold

Generic Targets

#	Name	Criteria	Description
(4)	SN2006ZZ	None	SUPERNOVA

Comments: On hold - ToO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	SN2006ZZ	(4) SN2006ZZ	ACS/HRC, ACCUM, HRC	F555W				900.0 Secs	
								[==>(Split 1)]	
								[==>(Split 2)]	***[1]***

Orbit Structure