12242 - UV Studies of a Core Collapse Supernova

Cycle: 18, 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	(2) SNUGC5185A	STIS/CCD	2	15-Dec-2010 08:37:31.0	yes
02	(3) SN2010JL	STIS/CCD	2	15-Dec-2010 08:37:33.0	yes
03	(3) SN2010JL	COS/FUV COS/NUV	1	15-Dec-2010 08:37:35.0	yes
04	(3) SN2010JL	STIS/CCD	3	15-Dec-2010 08:37:37.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
05	(3) SN2010JL	COS/FUV COS/NUV	2	15-Dec-2010 08:37:39.0	yes

10 Total Orbits Used

ABSTRACT

The UV spectrum of a core collapse SN encodes unique information about nucleosynthesis, the star's mass loss history, shock physics, and dust formation. This proposal aims at a detailed study of one bright core collapse SN, discoved as a result of the many ongoing surveys, either a Type IIP, IIn or Ib or Ic supernova. We will address the role of circumstellar interaction and mass loss through CNO lines in the UV, the nature of dust formation from UV line profiles, and we will use the UV continuum as a diagnostic of non-thermal emission from the shock. The overall goal is to achieve a better understanding of these objects by combining ground-based observations with complementary HST data. We have used HST to obtain critical UV spectra from the explosion to the nebular phase with good results for a limited number of objects. The advent of COS provides new capability for UV observations which we would like to exploit. Over the past decade, we have conducted studies of a small number of nearby SN with HST, and we have published an extensive series of papers. When nature provides a bright candidate, HST should be ready to respond. We are ready to run that program.

OBSERVING DESCRIPTION

We have developed a very effective set of observations which have worked well for SN~1992A (SN~Ia) , SN~1993J

(SN~IIb), SN~1994I (SN~Ic), SN~1998S (SN~IIn), SN~1999em (SN~II),
SN~2001ig
(SN~IIb), and SN~2002ap (SN~Ic),
to gather unique spectra in the UV with HST. We propose 10
orbits of observations spread over 4 epochs, the first at the earliest
the HST system
will allow, the second 1-4 weeks later, a third that follows in 2-4
weeks, and a final observation at age 2-6 months.

The observing technique will be different for each type of supernova,
which we will determine from optical spectra taken at our own CfA
facilities, or from spectra taken by others.

For Type IIn or IIP (or Ib or Ic that show circumstellar interaction):
The first visit will use only the CCD on STIS to ensure it is safe to
use more delicate detectors. STIS/CCD/G230LB (1.6 orbits) and
STIS/CCD/G430L (0.4) will be used to obtain the near UV and optical
spectra.
After we measure the UV flux in G230LB, an accurate estimate of the
FAR UV
$<$ 1700A can be determined. We have prepared a number of safe visits
with COS,
with either COS/G140L or COS/G130M and COS/G160M, each tailored for a
specific UV
flux.
We expect the 2nd, 3rd, and 4th epochs will be use COS, which has
exceptional performance for point sources like supernovae.
We expect a scheduling pause will occur between obtaining
the first epoch observations with STIS/CCD, which measure the UV flux,

then scheduling the appropriate safe COS visits.
We request 2 orbits for first visit, and 2 orbits for second, and 3
orbits for visits 3 and 4.
The spectra in the figures show the quality
of the HST UV Spectra: our main concern is avoid an object that is
too bright.
We have used the ETC to create a series of visits, using SN 1998S
spectra as a guide for possible COS visits.
For example: Using the day 27 spectrum of SN~1998S
(which was about 14 mag in B) we obtain a S/N of 20 in 1 orbit with G140L (COS.A278919).
and using the day 70 SN 1998S spectrum, we obtain $S/N 10$ in about 2 orbits (COS.A278923).
For Type Ib, Ic or IIb (that show no circumstellar interaction):
We propose to use STIS G230LB and G430L for the first visit.
Again, we expect a scheduling pause after obtaining
the first epoch observations with STIS/CCD, measuring the UV flux, to
schedule
the appropriate safe follow up visits, with either COS or STIS.
We request the same allocation of 2 orbits for first visit, and 2
orbits for second, and 3 orbits for visits 3 and 4.
As an example: Using the day 6 spectrum of SN~1999em, the ETC indicates
one orbit of exposure yields a S/N of about 10 (COS.A278934).

Proposal 12242 - Visit 01UV Studies of a Core Collapse Supernova

Visit

Proposal 12242, Visit 01, completed Wed Dec 15 13:37:40 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SCHED 100%; ON HOLD

Comments: ToO
Acquisition time is correct for snUGC5189A @ mag 13.0

On Hold Comments: ToO

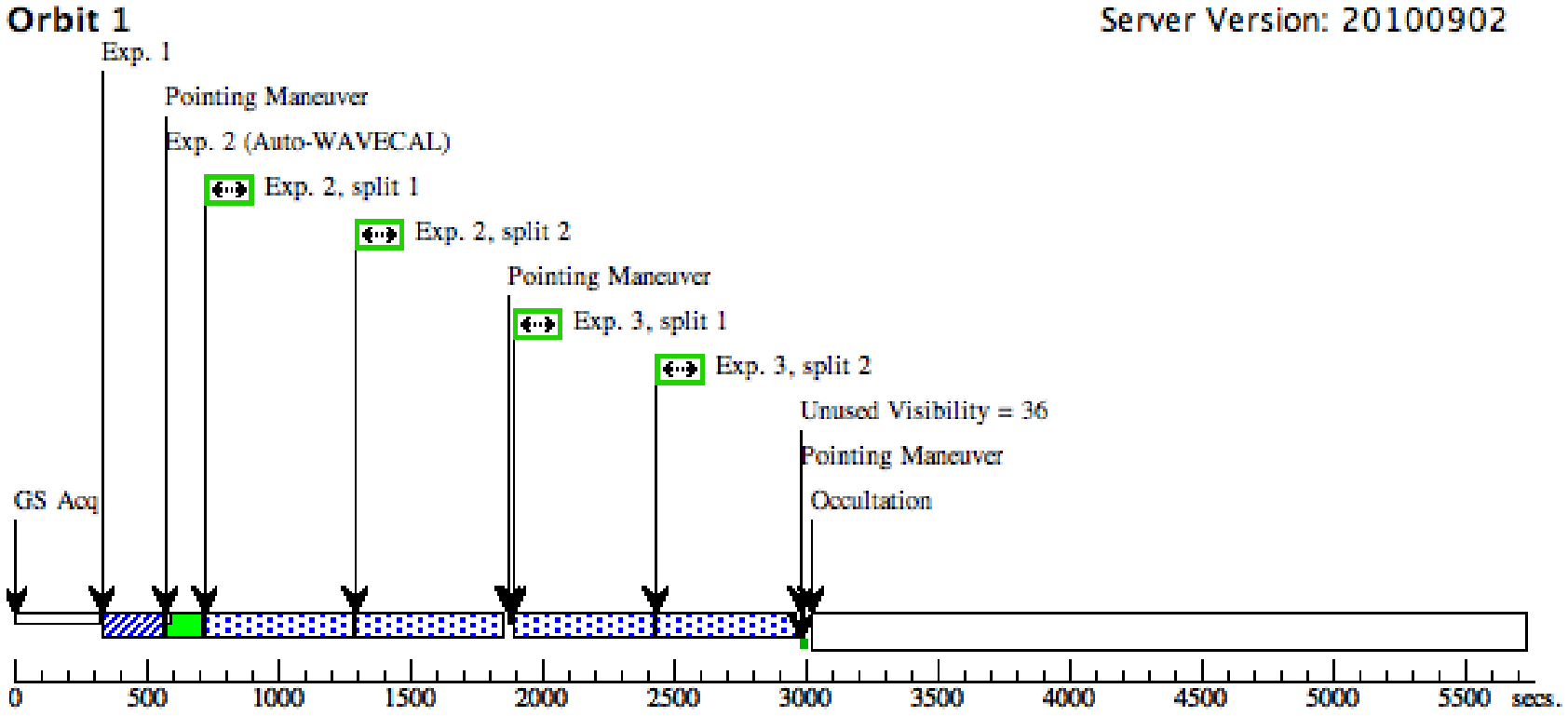
Fixed Targets

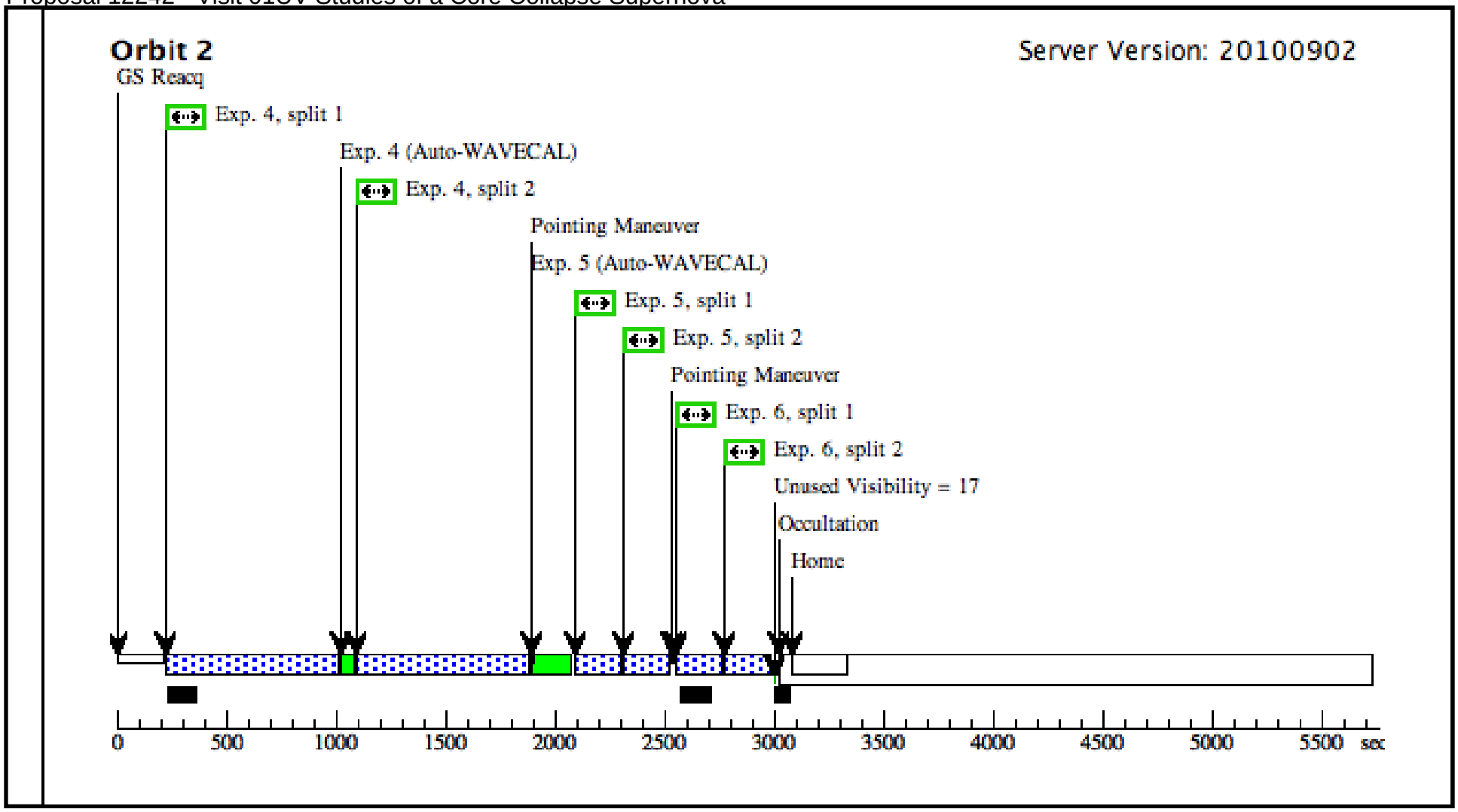
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SNUGC5185A	RA: 09 42 53.3300 (145.7222083d) Dec: +09 29 41.80 (9.49494d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.0+/-	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) SNUGC5185A	STIS/CCD, ACQ, F28X50LP	MIRROR				0.1 Secs *[==>]*	***[1]***
Comments: Acq for bright supernova v=13.0									
2		(2) SNUGC5185A	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2			1050 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
3		(2) SNUGC5185A	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,0.5		1000 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
4		(2) SNUGC5185A	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,1.0		1500 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
5		(2) SNUGC5185A	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,1.5		350 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
6		(2) SNUGC5185A	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,1.0		350 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20100902
GS Reacq
Exp. 4, split 1
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 2
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 6, split 1
Exp. 6, split 2
Unused Visibility = 17
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Proposal 12242 - Visit 02UV Studies of a Core Collapse Supernova

Visit

Proposal 12242, Visit 02, completed Wed Dec 15 13:37:40 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SCHED 100%; AFTER 01 BY 10 D TO 14 D; SEQ 02,03 WITHIN 1 D; ON HOLD

Comments: Acqusition time is set for mag 13.5

On Hold Comments: ToO

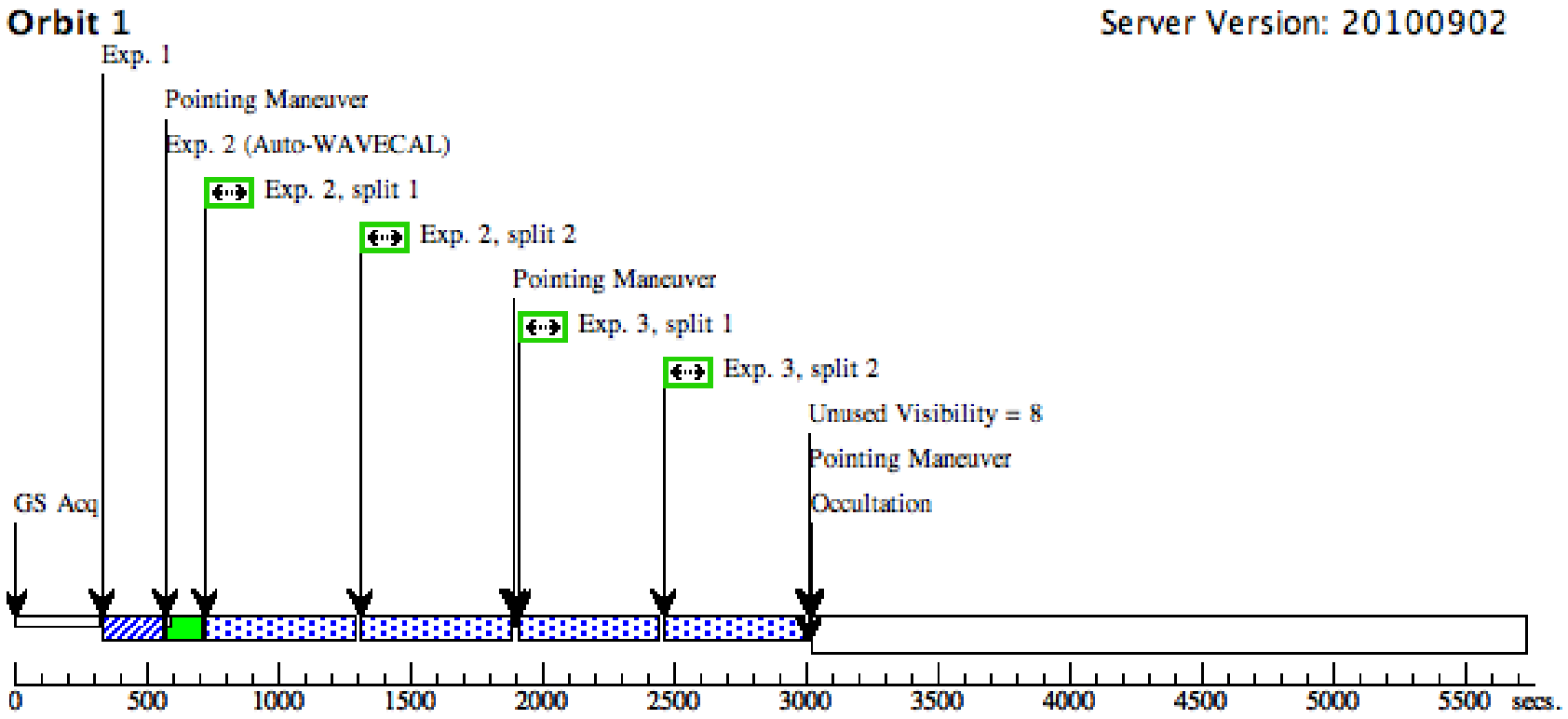
Fixed Targets

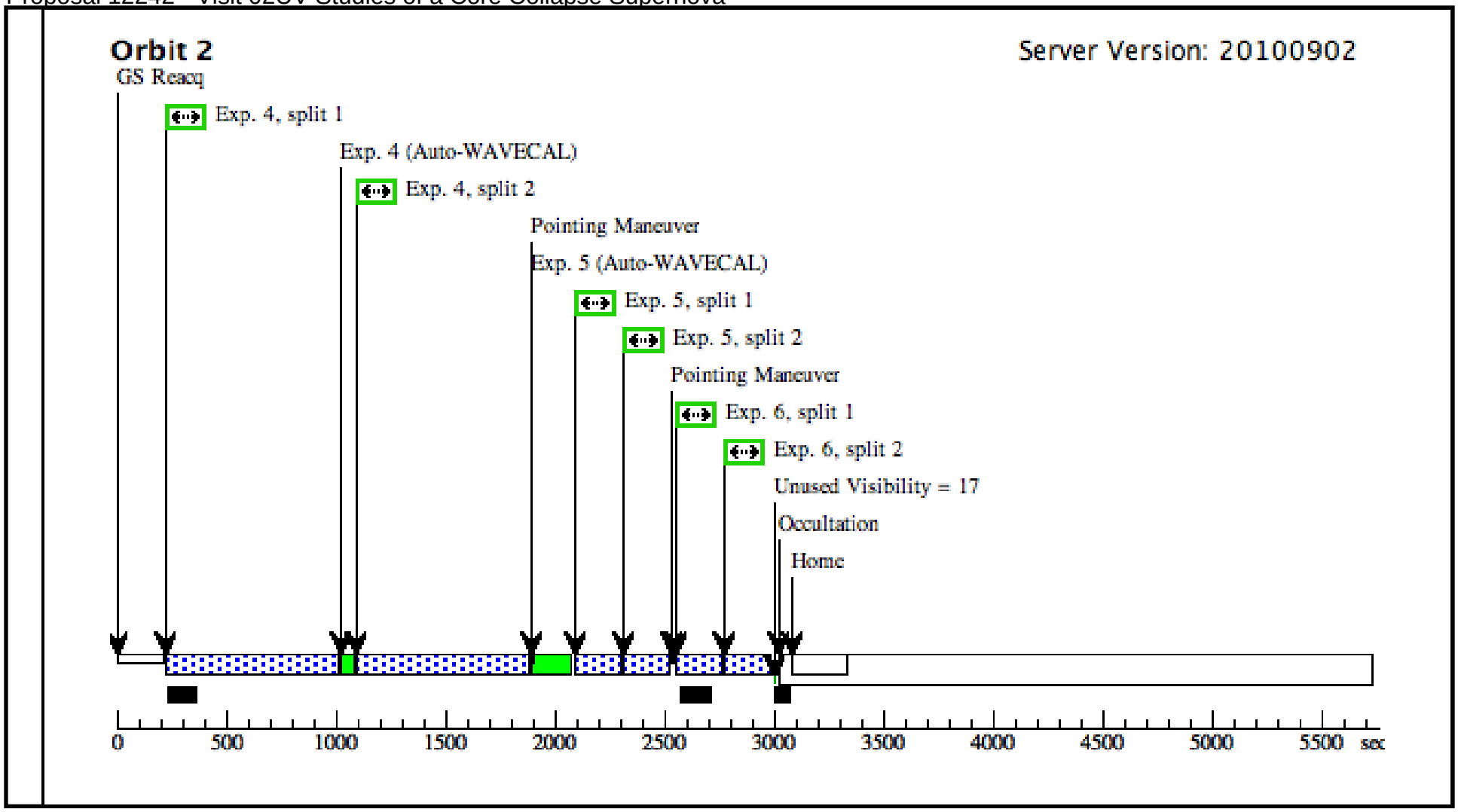
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN2010JL	RA: 09 42 53.3300 (145.7222083d) Dec: +09 29 41.80 (9.49494d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.0+/-	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) SN2010JL	STIS/CCD, ACQ, F28X50LP	MIRROR				0.5 Secs *[==>]*	*[1]*
Comments: Acq for bright supernova v=13									
2		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2			1075 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[1]*
3		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,0.5		1000 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[1]*
4		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,1.0		1500 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[2]*
5		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,1.5		350 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[2]*
6		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,1.0		350 Secs *[==>(Split 1)]* *[==>(Split 2)]*	*[2]*

Orbit Structure




Orbit 2
Server Version: 20100902
GS Reacq
Exp. 4, split 1
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 2
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 6, split 1
Exp. 6, split 2
Unused Visibility = 17
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12242, Visit 03, completed Wed Dec 15 13:37:40 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: SCHED 100%; ON HOLD

Comments: exposure time is set for mag 14 BB 7000
Mirror B + PSA = 60 seconds

On Hold Comments: ToO

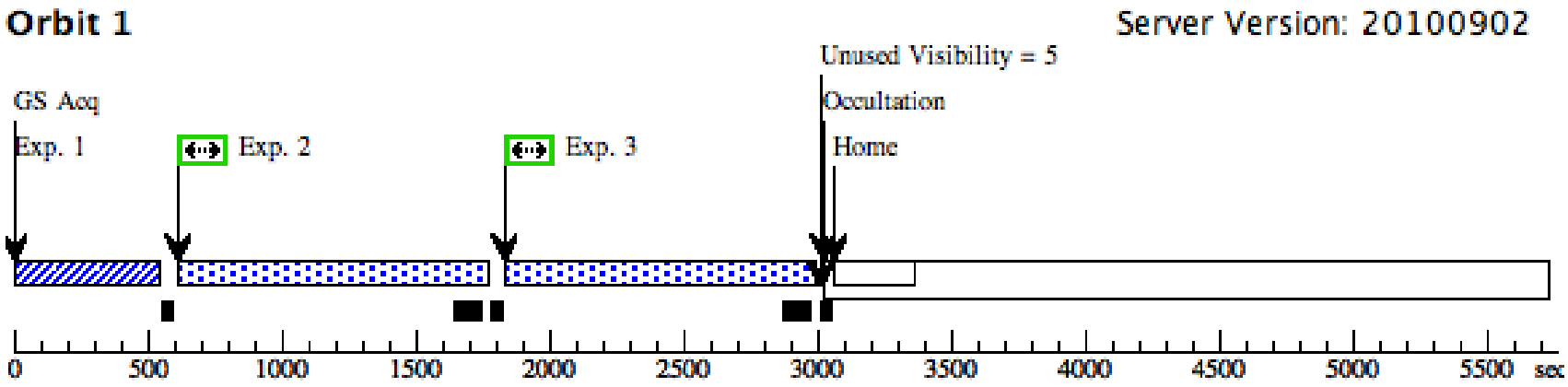
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN2010JL	RA: 09 42 53.3300 (145.7222083d) Dec: +09 29 41.80 (9.49494d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.0+/-	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) SN2010JL	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs	
								[==>]	***[1]***
Comments: For a bright supernova v = 13, BB 7250,A372522									
2		(3) SN2010JL	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=890			1000 Secs	
								[==>]	***[1]***
3		(3) SN2010JL	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=890			1000 Secs	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 12242, Visit 04, implementation Wed Dec 15 13:37:40 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: BETWEEN 14-JAN-2011:00:00:00 AND 15-MAR-2011:00:00:00; SEQ 04,05 WITHIN 1 D; ON HOLD

On Hold Comments: ToO

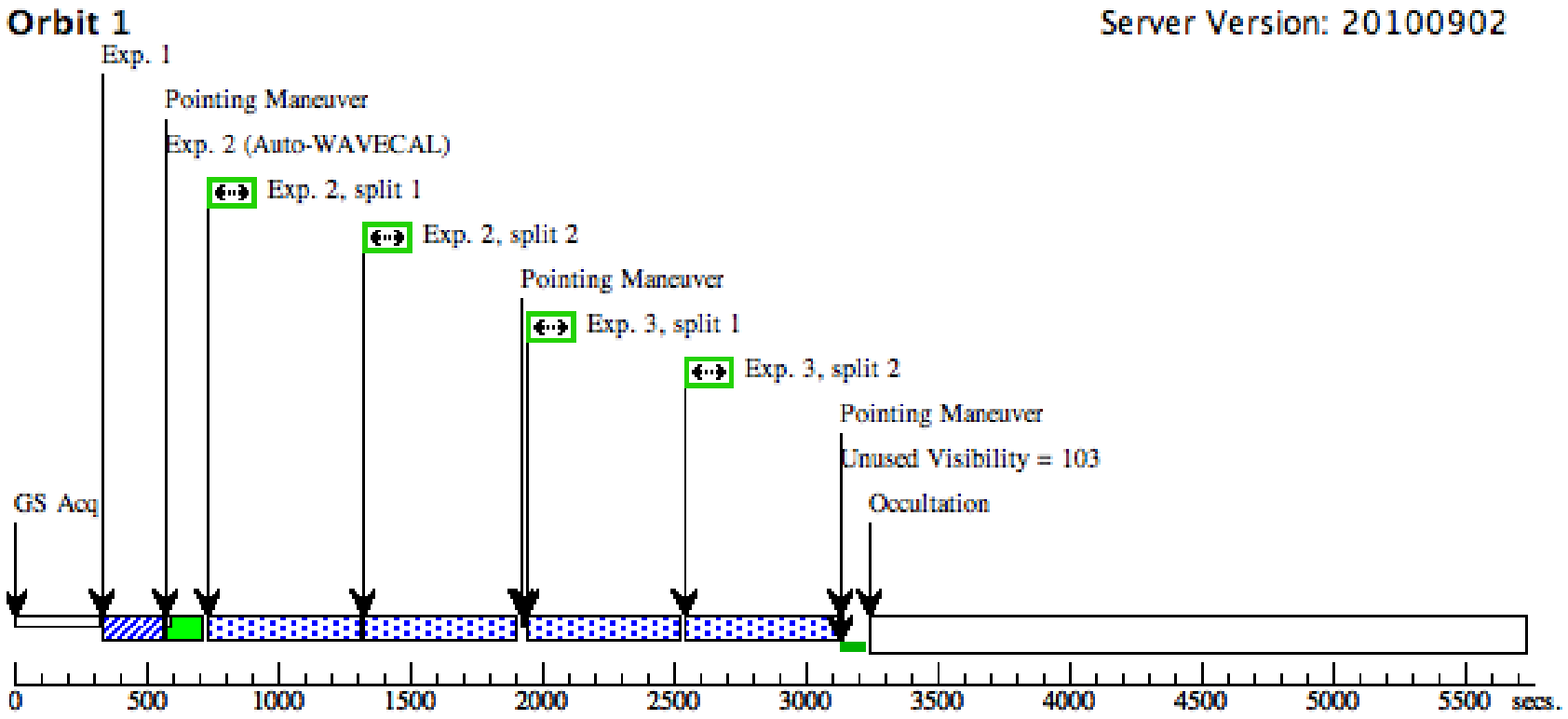
Fixed Targets

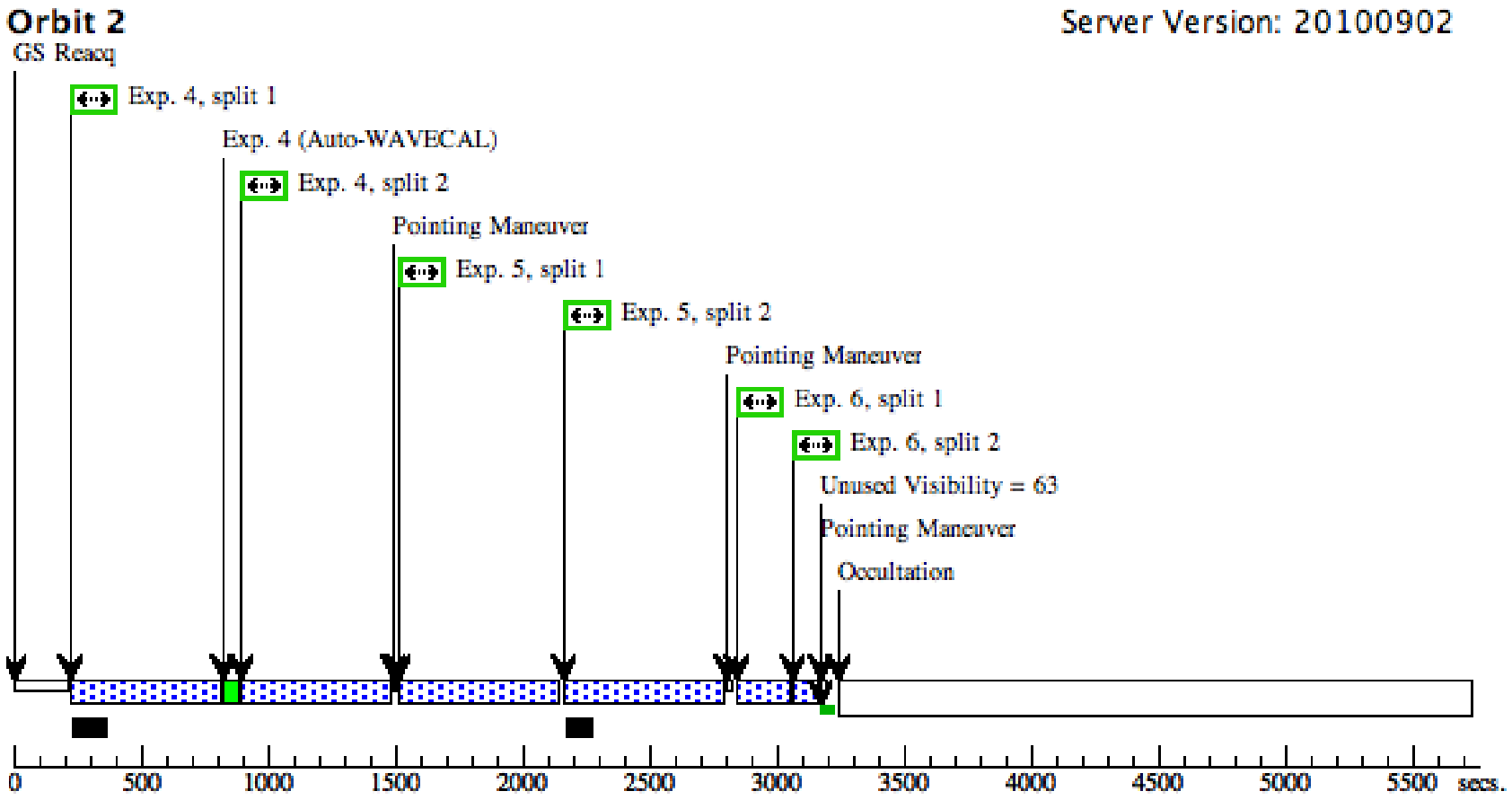
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN2010JL	RA: 09 42 53.3300 (145.7222083d) Dec: +09 29 41.80 (9.49494d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.0+/-	Reference Frame: ICRS

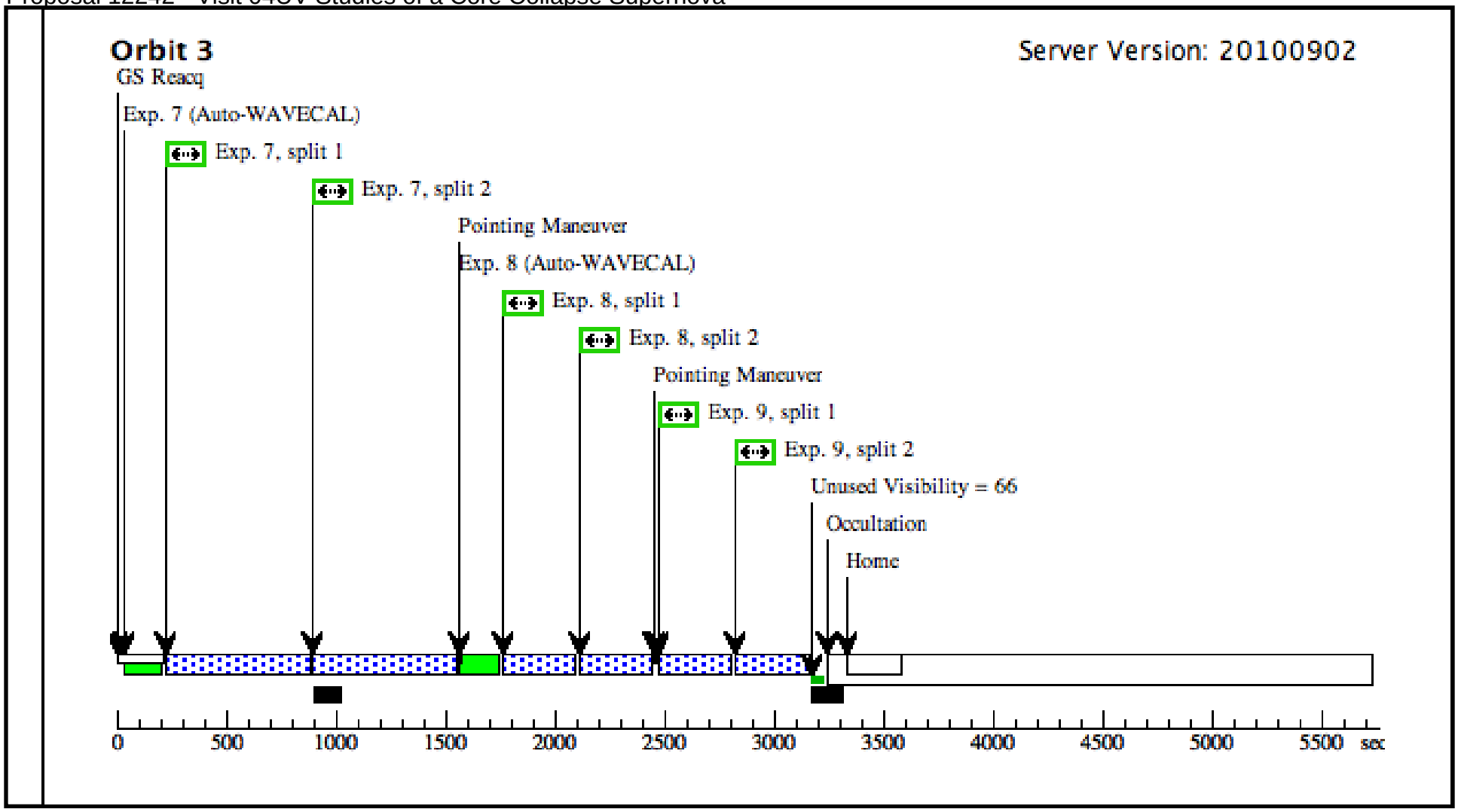
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) SN2010JL	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs *[==>]*	***[1]***
Comments: Acq for bright supernova v=14.5									
2		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2			1100 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
3		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,0.5		1100 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
4		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,1.0		1100 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
5		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,1.5		1198 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
6		(3) SN2010JL	STIS/CCD, ACCUM, 50CCD	MIRROR	CR-SPLIT=2	POS TARG 0,0		120 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
7		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=2	POS TARG 0,-0.5		1250 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
8		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,0		600 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
9		(3) SN2010JL	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2	POS TARG 0,0.5		600 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***

Orbit Structure




Orbit 2
Server Version: 20100902
GS Reacq
Exp. 4, split 1
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 2
Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 6, split 1
Exp. 6, split 2
Unused Visibility = 63
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20100902
GS Reacq
Exp. 7 (Auto-WAVECAL)
Exp. 7, split 1
Exp. 7, split 2
Pointing Maneuver
Exp. 8 (Auto-WAVECAL)
Exp. 8, split 1
Exp. 8, split 2
Pointing Maneuver
Exp. 9, split 1
Exp. 9, split 2
Unused Visibility = 66
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12242, Visit 05, implementation Wed Dec 15 13:37:40 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: ON HOLD

Comments: Using the light curve. the supenova should be U = 15.4 on Jan 31st.
the supernova is currently fading @ 0.013 mags/day
Coordinate should be known to 0.1"., so ACQ/IMAGE should be fine.
Buffer times are set to expsoure time - 110s as recommended by COS team.

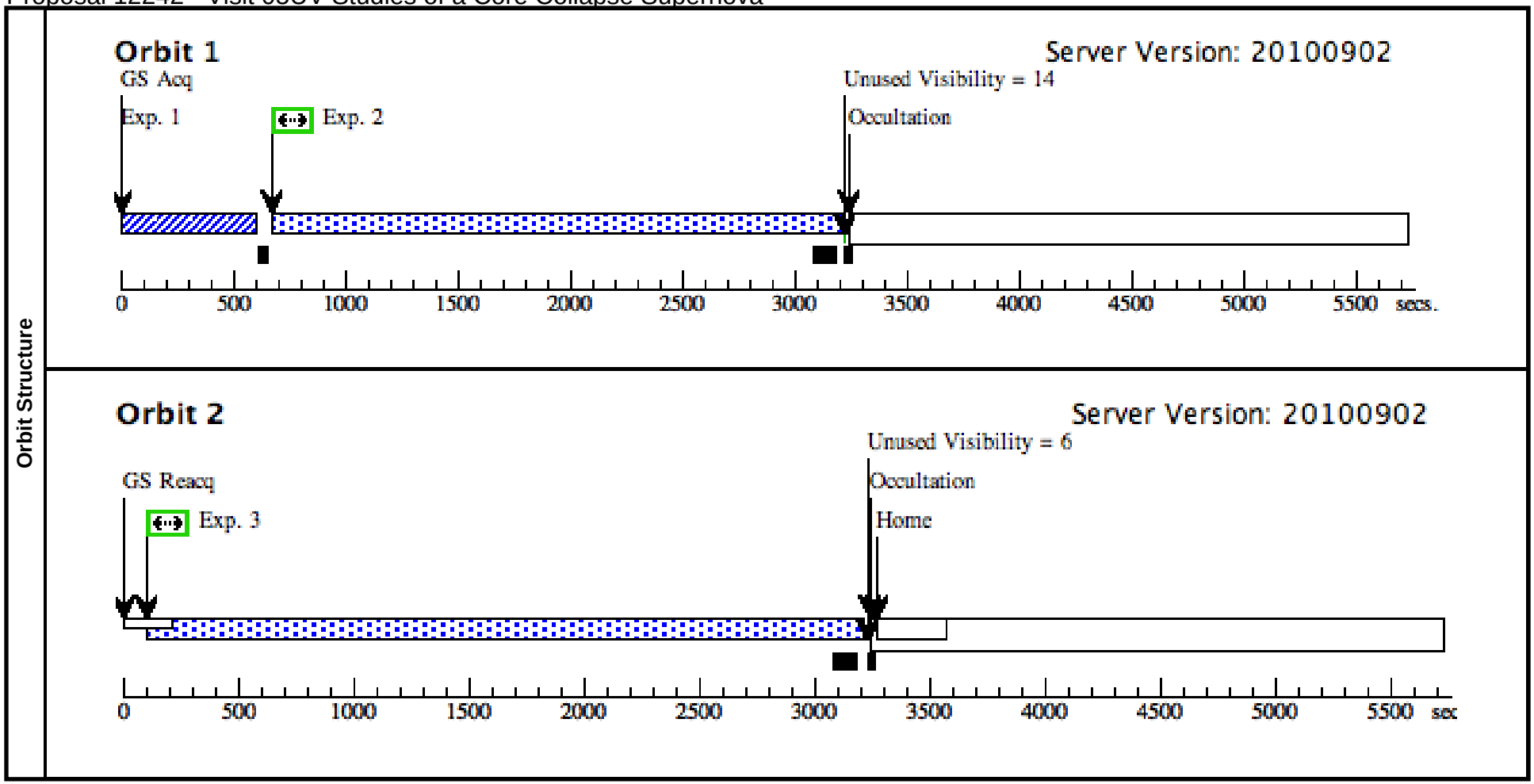
On Hold Comments: ToO

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN2010JL	RA: 09 42 53.3300 (145.7222083d) Dec: +09 29 41.80 (9.49494d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.0+/-	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) SN2010JL	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				90 Secs	
								[==>]	***[1]***
Comments: I use the previous HST/STIS spectrum with the estimates brightness from the light curve Jan 30 the U mag will be about 15.4 COS.ta.000840									
2		(3) SN2010JL	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=2270			2380 Secs	
								[==>]	***[1]***
3		(3) SN2010JL	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=2830			2950 Secs	
								[==>]	***[2]***


Orbit Structure
Orbit 1
Server Version: 20100902
GS Acq
Exp. 1
Exp. 2
Unused Visibility = 14
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20100902
Unused Visibility = 6
GS Reacq
Occultation
Exp. 3
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec