14115 - The Stellar Origins of Supernovae

Cycle: 23, 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) AT2016ADJ	WFC3/UVIS	1	09-Nov-2016 10:50:18.0	yes
02	(2) SN2016BKV	WFC3/UVIS	1	09-Nov-2016 10:50:21.0	yes
03	(3) SN2016GKG	WFC3/UVIS	1	09-Nov-2016 10:50:23.0	yes
04	(4) SN2005GL	WFC3/UVIS	1	09-Nov-2016 10:50:25.0	yes

4 Total Orbits Used

ABSTRACT

Supernovae (SNe) have a profound effect on galaxies, and have been used as precise cosmological probes, resulting in the Nobel-distinguished discovery of the accelerating Universe. They are clearly very important events deserving of intense study. Yet, even with over 6400 IAU-designated SNe, we know relatively little about the stars which give rise to these powerful explosions. The main limitation has been the lack of spatial resolution

in pre-SN imaging data. However, our team has been at the vanguard of directly identifying SN progenitor stars in HST images. From this exciting line of study, we have learned that Type II-Plateau SNe appear to primarily arise from relatively low mass (8 to 20 Msun) red supergiants, leaving a puzzle as to what is happening to more massive stars. Additionally, evidence is accumulating that the progenitors of Type II-narrow SNe may be related to luminous blue variables. However, the nature of the progenitors of Type Ib/c SNe, a subset of which are associated with the amazing gamma-ray bursts, remains ambiguous. Furthermore, we remain in the continually embarrassing situation that we still do not yet know which progenitor systems explode as Type Ia SNe, which are being used for precision cosmology. In previous Cycles we have had great success with our approved ToO programs. As of this proposal deadline, we have had one trigger (SN 2014dt) completed so far and one pending (SN 2015G) with our Cycle 22 program. The compelling scientific questions lead us to continue this project to determine the identities of the progenitors of 4 SNe within, generally, about 20 Mpc, which we expect during Cycle 23, through ToO observations using WFC3/UVIS.

OBSERVING DESCRIPTION

We plan for four ToO triggers during Cycle 23. If we detect one or more candidate stellar objects within a 1-sigma positional uncertainty in ACS, WFPC2, or WFC3 pre-supernova archival image(s), we will request a trigger to pinpoint the location of the SN in the pre-SN images and attempt to confirm the progenitor candidate. Our plan is to image with WFC3/UVIS, to provide the highest possible spatial resolution. Our strategy, generally, is to acquire several short-exposure dithered images in V (F555W, 10-s) or I (F814W, 30-s), for the 3 core-collapse visits (which will likely best match with the available archival image data), and in U (F336W, 20-s) or B (F438W, 20-s) for a putative, nearby (<10 Mpc) SN Ia visit, since these SNe will likely be too bright in redder bands, but fade more rapidly in the blue. We will be using the UVIS2 1Kx1K subarray near amplifier C. Since the exposures are quite short, we will also be using post-flash with 12 e- for each exposure, in order to mitigate against CTE losses. The initial Phase II observations are meant to be representative of a typical trigger. Each of the four possible ToOs has an initial placeholder position of RA(J2000)=0, Dec(J2000)=0. We will likely request triggers when the SN is still fairly bright, depending on its age at discovery, but limit this, generally, to m >14 mag. We therefore may alter exposure times and bands, depending on the expected brightness of a given SN when it is scheduled and depending on the bands of the pre-SN images available for the SN site in the HST archive. This may also result in changes in the dither strategy for a given visit. The ToOs are not intended to be high-impact, and will be requested to occur after 2 to 3 weeks from discovery, so there should be no disruption of normal scheduling.

Visit

Proposal 14115, Visit 01, completed

Wed Nov 09 15:50:25 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ON HOLD

On Hold Comments: Pending ToO activation.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1-6)

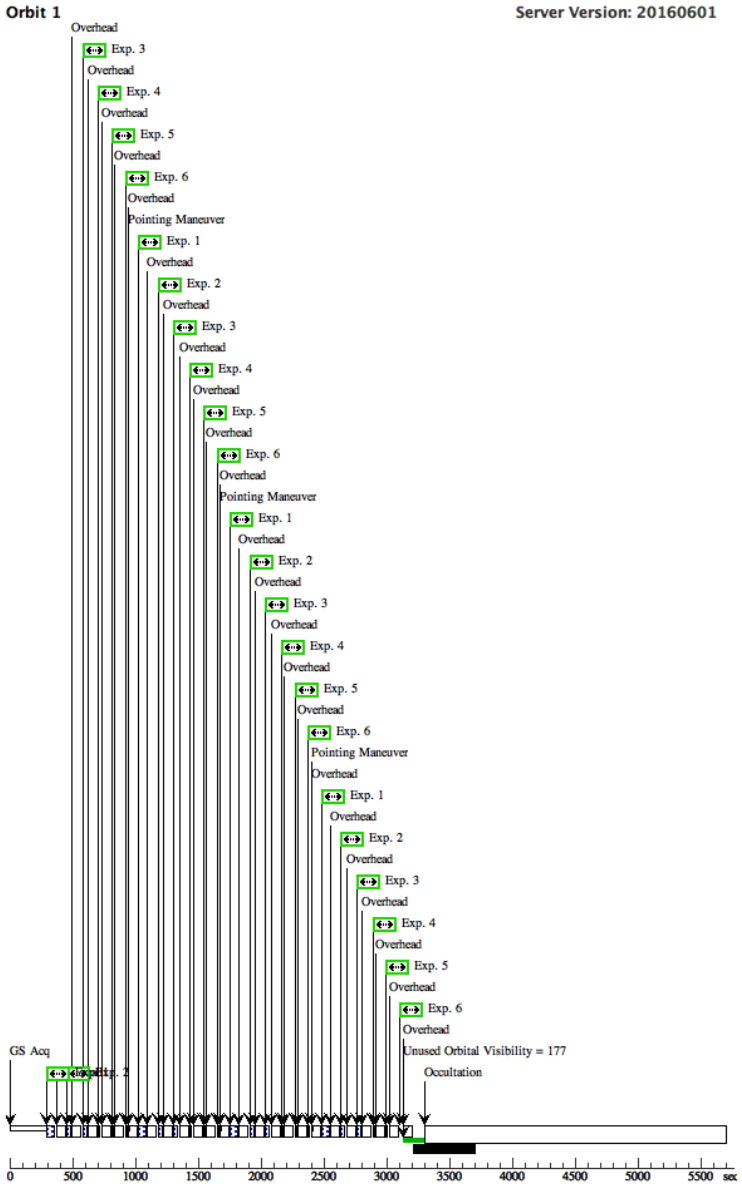
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	AT2016ADJ	RA: 13 25 24.1100 (201.3504583d) Dec: -43 00 57.50 (-43.01597d) Equinox: J2000		V=14.0+/-1.0	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	30 Secs (120 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	30 Secs (120 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
5		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
6		(1) AT2016ADJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=12		Pattern 1, Exps 1-6 in Visit 01 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 14115, Visit 02, completed

Wed Nov 09 15:50:25 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1-6)

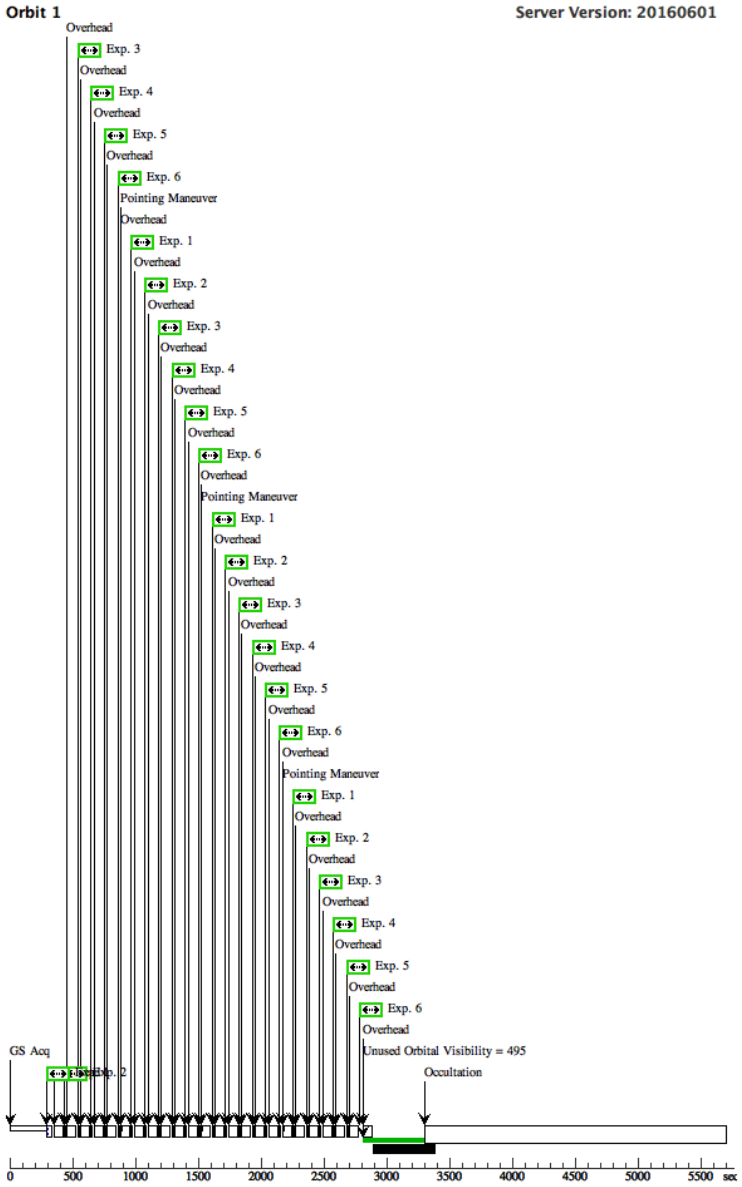
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN2016BKV	RA: 10 18 19.3100 (154.5804583d) Dec: +41 25 39.30 (41.42758d) Equinox: J2000		V=14.0+/-1.0	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
5		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
6		(2) SN2016BKV	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 02 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 14115, Visit 03, scheduled Wed Nov 09 15:50:26 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ON HOLD

On Hold Comments: Pending ToO activation.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1-6)

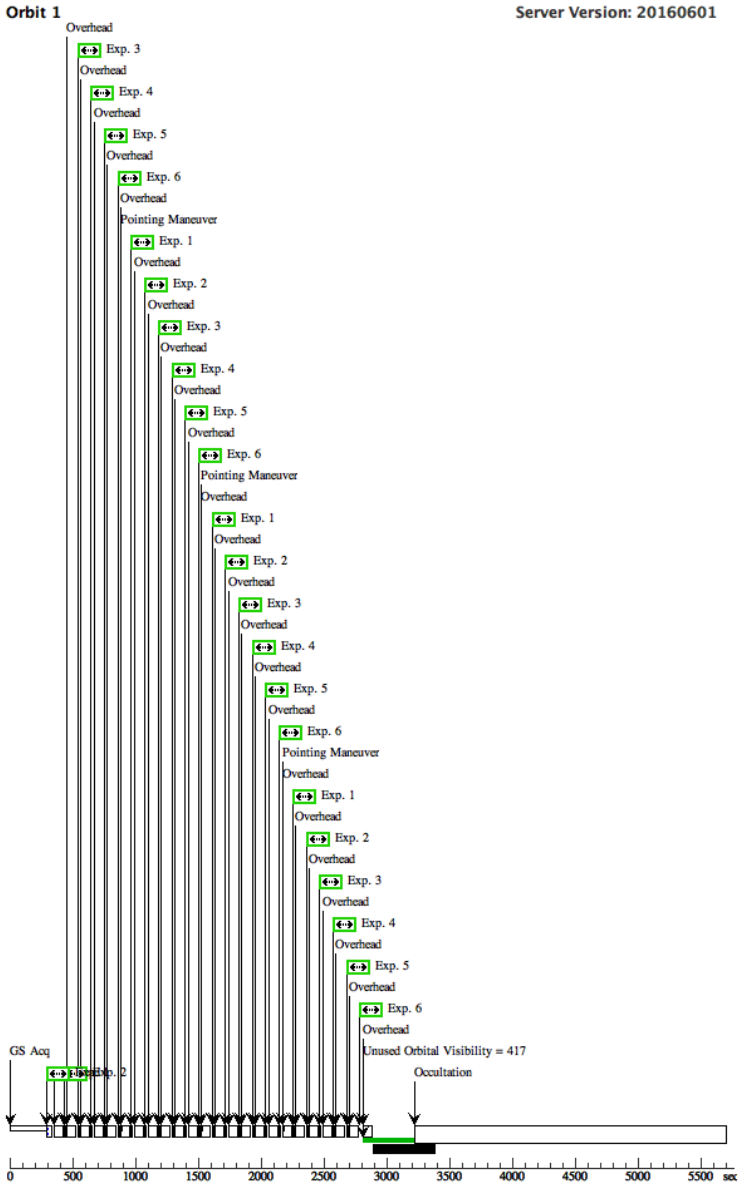
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN2016GKG	RA: 01 34 14.4600 (23.5602500d) Dec: -29 26 25.00 (-29.44028d) Equinox: J2000		V=14.0+/-1.0	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
5		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
6		(3) SN2016GKG	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 1-6 in Visit 03 (1)	10 Secs (40 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 14115, Visit 04, implementation Wed Nov 09 15:50:26 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

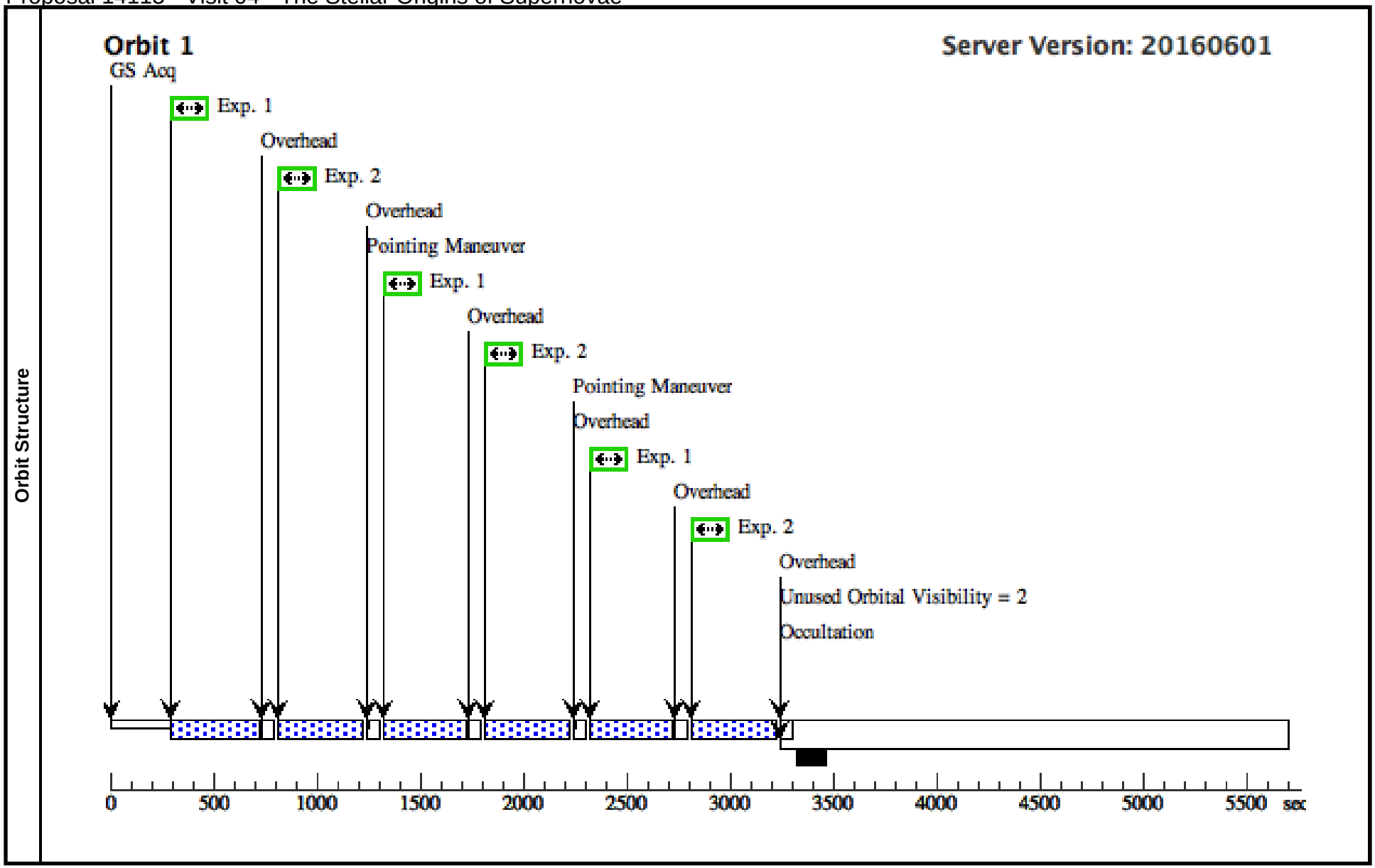
#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SN2005GL	RA: 00 49 50.0200 (12.4584167d) Dec: +32 16 56.80 (32.28244d) Equinox: J2000		V=26+/-1.0	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) SN2005GL	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=1		Pattern 2, Exps 1-2 in Visit 04 (2)	398 Secs (1194 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2		(4) SN2005GL	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=3		Pattern 2, Exps 1-2 in Visit 04 (2)	398 Secs (1194 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***


Orbit 1
Server Version: 20160601
Orbit Structure
GS Acq
Exp. 1
Overhead
Exp. 2
Overhead
Pointing Maneuver
Exp. 1
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 1
Overhead
Exp. 2
Overhead
Unused Orbital Visibility = 2
Occultation
0
500
1000
1500
2000
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sec