12888 - Stellar Origins of Supernovae

Cycle: 20, 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) SN2013DF	WFC3/UVIS	1	01-Oct-2013 21:01:26.0	yes
02	(2) SN2013DK	WFC3/UVIS	1	01-Oct-2013 21:01:54.0	yes
03	(3) IPTF13BVN	WFC3/UVIS	1	01-Oct-2013 21:02:11.0	yes
04	(4) SN2012AU	WFC3/UVIS	1	01-Oct-2013 21:02:19.0	yes

4 Total Orbits Used

ABSTRACT

Supernovae (SNe) have a profound effect on galaxies, and have been used recently as precise cosmological probes, resulting in the Nobel-recognized discovery of the accelerating Universe. They are clearly very important events deserving of intense study. Yet, even with over 5900 known 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, since 1999 our team has been at the vanguard of directly identifying SN progenitor stars in HST images. From this exciting line of study, the emerging trend from 7 detections for Type II-Plateau SNe is that their progenitors appear to be relatively low mass (8 to 20 Msun) red supergiants, although more cases are needed. Additionally, we have identified the possibly yellow supergiant progenitors of two likely Type II-Linear SNe. Also, one case indicates 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 currently being used for precision cosmology. In Cycles 16 and 17 we had great success with our approved ToO programs. We therefore propose to build on that success by determining the identities of the progenitors of 4 SNe within, generally, about 20 Mpc, which we expect to occur during Cycle 20, through ToO observations using WFC3/UVIS.

OBSERVING DESCRIPTION

We plan for four ToO triggers during Cycle 20. 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. 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 12888, Visit 01, completed Wed Oct 02 01:02:26 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: PCS MODE FINE; SCHED 100%

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(7)
(2)	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), (2), (3), (4), (5), (6)

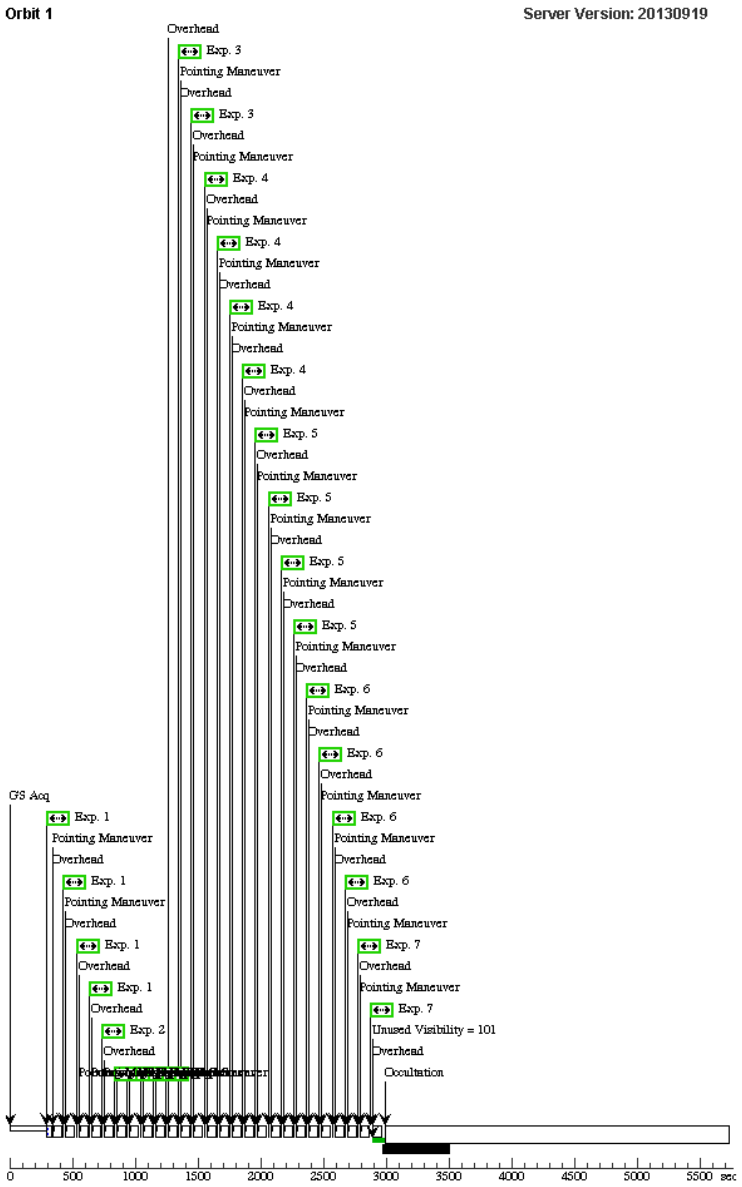
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2013DF	RA: 12 26 29.3500 (186.6222917d) Dec: +31 13 37.50 (31.22708d) Equinox: J2000		V=14.5+/-0.5	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12	GS ACQ SCENARIO BASE1B3	Pattern 2, Exps 1-1 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 2-2 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 3-3 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 4-4 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
5		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 5-5 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
6		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 6-6 in Visit 01 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
7		(1) SN2013DF	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 1, Exps 7-7 in Visit 01 (1)	5 Secs (10 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 12888, Visit 02, completed Wed Oct 02 01:02:30 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: PCS MODE FINE; SCHED 100%

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	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)
(3)	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		(7)

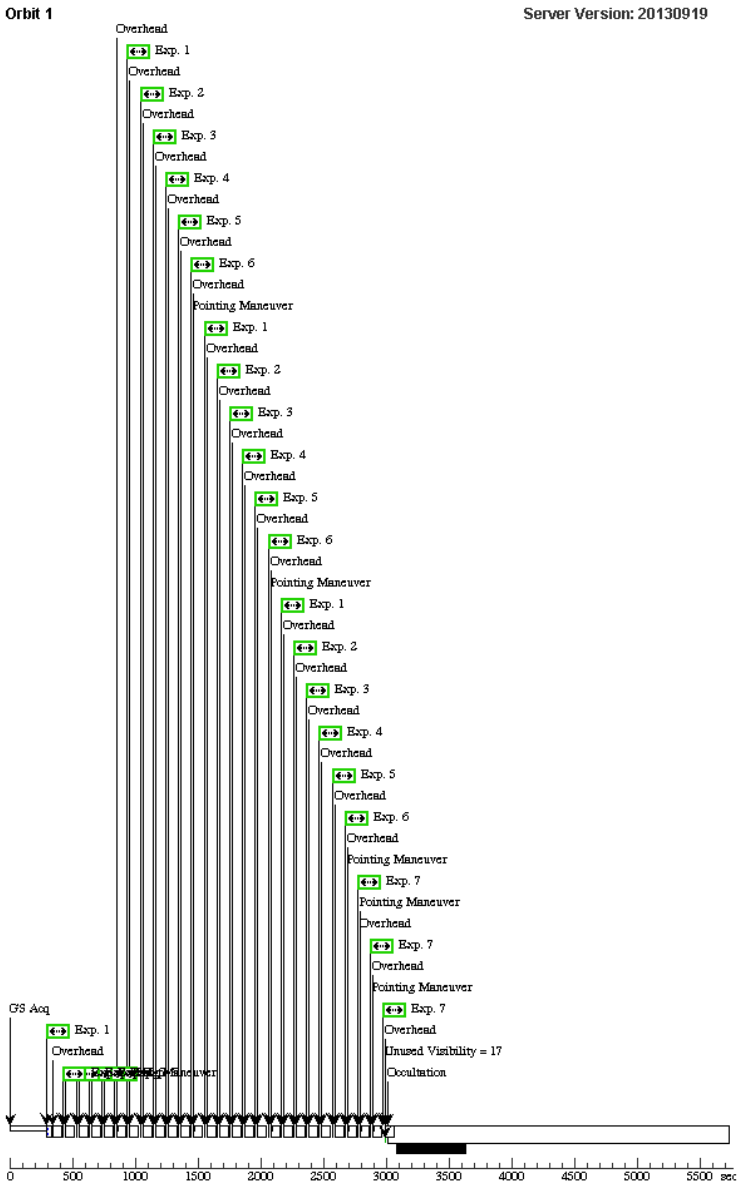
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN2013DK	RA: 12 01 52.7200 (180.4696667d) Dec: -18 52 18.30 (-18.87175d) Equinox: J2000		V=15.0+/-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) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
5		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
6		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 2, Exps 1-6 in Visit 02 (2)	5 Secs (20 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
7		(2) SN2013DK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=12		Pattern 3, Exps 7-7 in Visit 02 (3)	5 Secs (15 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 12888, Visit 03, completed Wed Oct 02 01:02:32 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: PCS MODE FINE; SCHED 100%; ON HOLD

On Hold Comments: Pending ToO activation.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	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		(1-4)

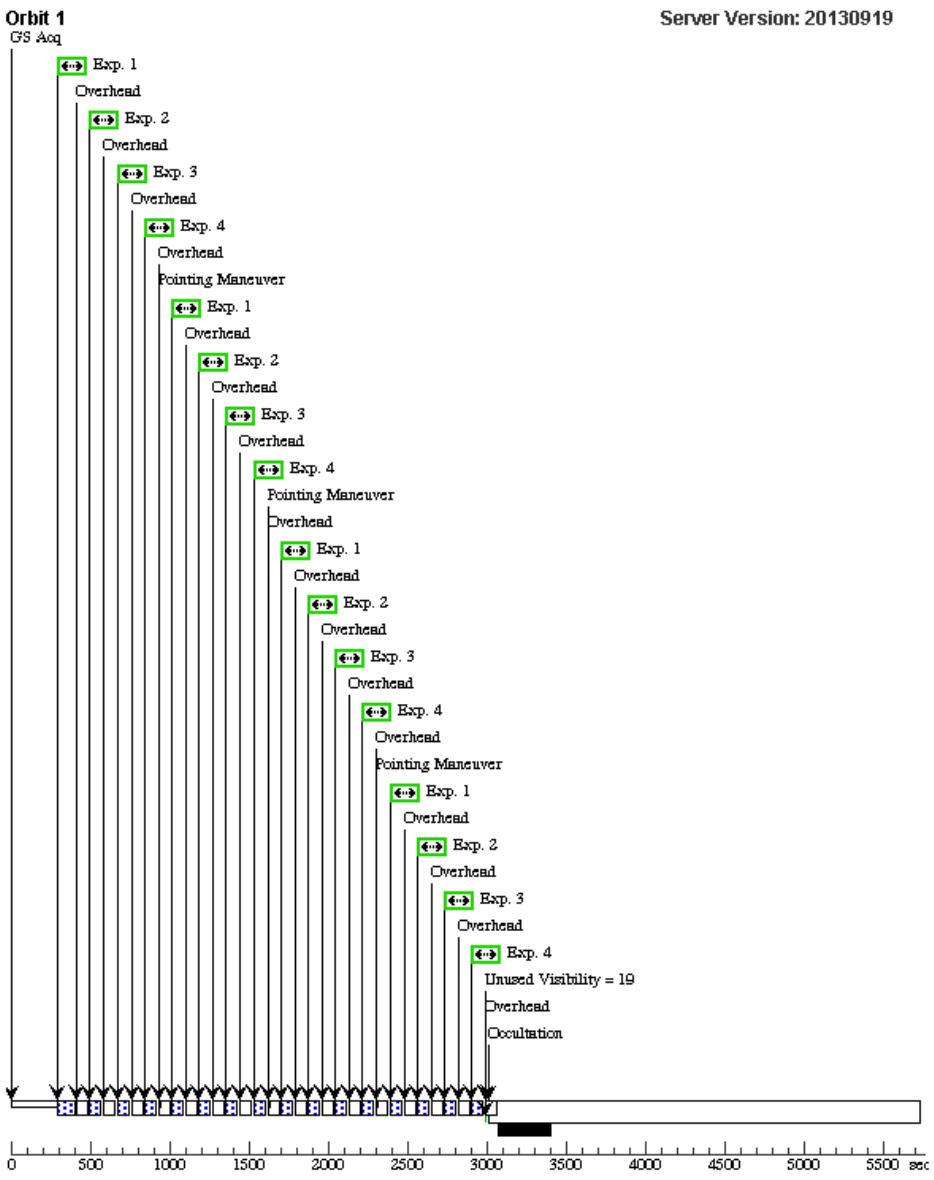
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	IPTF13BVN	RA: 15 00 0.1800 (225.0007500d) Dec: +01 52 53.50 (1.88153d) Equinox: J2000		V=16.5+/-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) IPTF13BVN	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12	GS ACQ SCENARIO BASE1B3	Pattern 2, Exps 1-4 in Visit 03 (2)	75 Secs (300 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(3) IPTF13BVN	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 1-4 in Visit 03 (2)	75 Secs (300 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(3) IPTF13BVN	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 1-4 in Visit 03 (2)	75 Secs (300 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
4		(3) IPTF13BVN	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W	FLASH=12		Pattern 2, Exps 1-4 in Visit 03 (2)	75 Secs (300 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 12888, Visit 04, implementation Wed Oct 02 01:02:33 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: PCS MODE FINE; SCHED 100%

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 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)	SN2012AU	RA: 12 54 52.1800 (193.7174167d) Dec: -10 14 50.20 (-10.24728d) Equinox: J2000		V=24.0+/-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		(4) SN2012AU	WFC3/UVIS, ACCUM, UVIS2	F606W		GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in Visit 04 (1)	550 Secs (1100 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(4) SN2012AU	WFC3/UVIS, ACCUM, UVIS2	F438W	FLASH=12		Pattern 1, Exps 1-2 in Visit 04 (1)	550 Secs (1100 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure