13230 - A supernova in the brightest gamma-ray burst

Cycle: 20, Proposal Category: GO/DD

(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?*
W1	(1) GRB130427A	WFC3/IR WFC3/UVIS	1	25-Mar-2014 21:01:23.0	yes
W2	(1) GRB130427A	WFC3/UVIS	1	25-Mar-2014 21:01:31.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
A1	(1) GRB130427A	ACS/WFC	1	25-Mar-2014 21:01:38.0	yes
A2	(1) GRB130427A	ACS/WFC	1	25-Mar-2014 21:01:44.0	yes

4 Total Orbits Used

ABSTRACT

While the connection between long duration gamma-ray bursts and stripped envelope type Ic supernovae is relatively well established, the strong spectroscopic evidence on which it rests comes primarily from a handful of low-energy GRB/SNe. These are far from typical of the GRB population, and have been suggested to arise from rather different physical processes (such as shock breakout) than the bulk of the GRB population. Opportunities to study supernovae in much brighter bursts are hindered by the typical high redshift for the more luminous bursts, and the presence of bright afterglows from which the supernove must be separated. The very recent discovery of the brightest burst yet observed in 8 years of Swift observations -- GRB 130427A -- provides a unique opportunity to perform these studies on a burst of great astrophysical and public interest. The proximity of the burst (z=0.34) means that supernova studies are plausible, and here we propose to use HST to cleanly separate the afterglow, host galaxy and supernova components via UV and IR photometric observations, coupled with a optical grism spectrum. By isolating the supernova light from the afterglow, and using the unparalleled PSF of ACS to separate the host, we will uniquely identify the type and luminosity of the supernovae to a degree that will not be possible from the ground. In turn this will test if the supernovae in high-energy GRBs match those in their low energy cousisns, or if differing properties of the progenitor star can impact both GRB and supernova.

OBSERVING DESCRIPTION

We plan to obtain two epochs of observations of GRB 130427A with WFC3 (UVIS and IR) and ACS (F606W and G800L). The aim of these observations is to follow the afterglow decay in the UV and IR and search for a supernova in the optical. For UVIS and IR channels on WFC3 we will conduct the observations with a three point dither obtaining both in a single orbit. For ACS we will use a 4-point dither (plus through image in F606W) to obtain the data.

We ask for the first two visits to be scheduled as close in time as possible (+/- 24 hours) to enable simultaneous data so the afterglow can be subtracted accurately.

Visit

Proposal 13230, Visit W1, completed Wed Mar 26 01:01:53 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: BEFORE 22-MAY-2013:00:00:00

Patterns

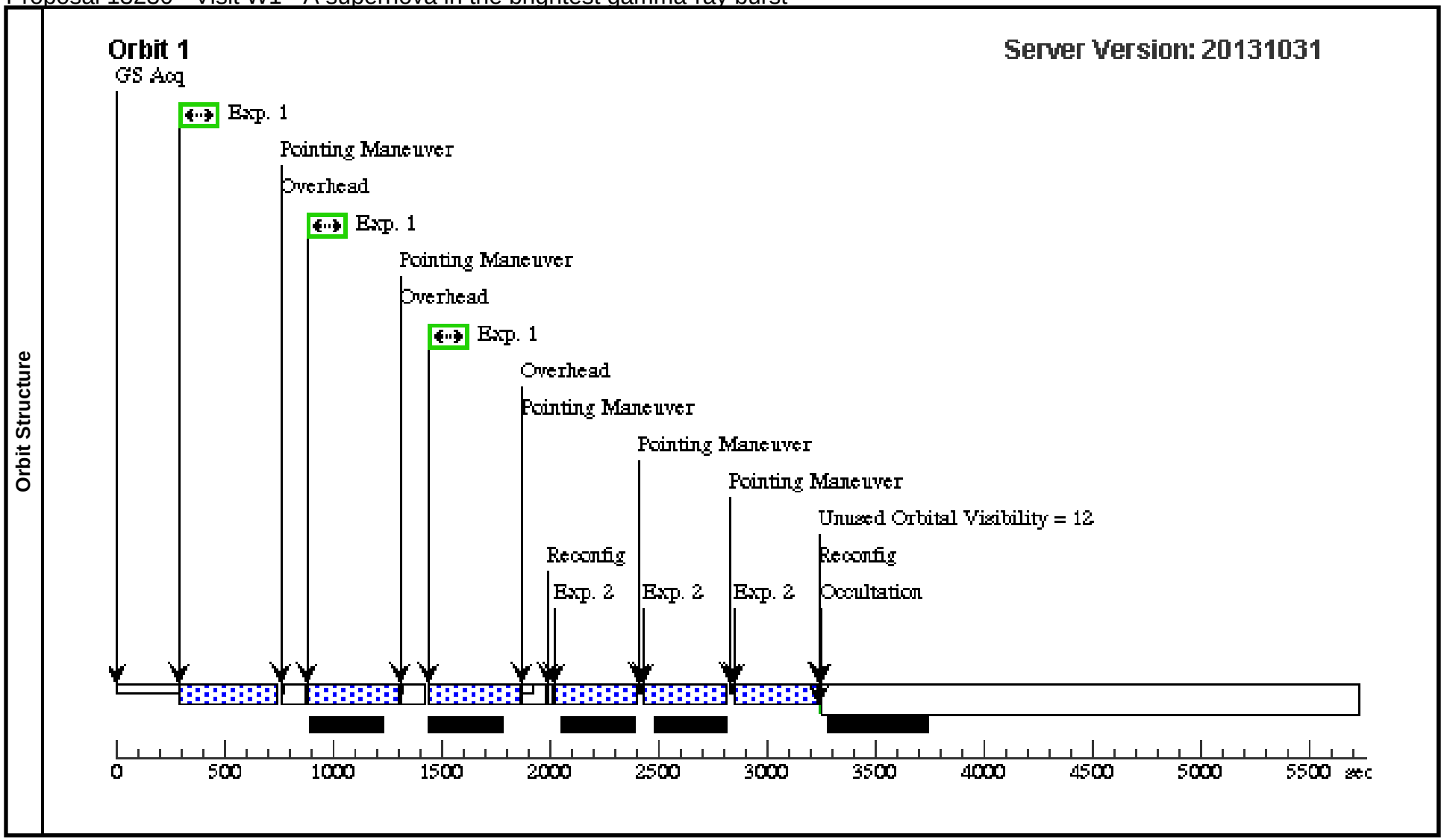
#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.605 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2)
(2)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER 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)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130427A	RA: 11 32 32.8400 (173.1368333d) Dec: +27 41 56.20 (27.69894d) Equinox: J2000		V=22+/-1	Reference Frame: SDSS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130427A	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=10	POS TARG -60,-30	Pattern 2, Exps 1-1 in Visit W1 (2)	500 Secs (1266 Secs) *[==>422.0 Secs (Pattern 1)]* *[==>422.0 Secs (Pattern 2)]* *[==>422.0 Secs (Pattern 3)]*	***[1]***
2		(1) GRB130427A	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=12		Pattern 1, Exps 2-2 in Visit W1 (1)	349.232932 Secs (1047.699 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20131031
GS Acq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Overhead
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 12
Reconfig
Reconfig
Exp. 2
Exp. 2
Exp. 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13230, Visit W2, pi Wed Mar 26 01:01:55 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS W1; AFTER A1 BY 300 D TO 400 D

Patterns

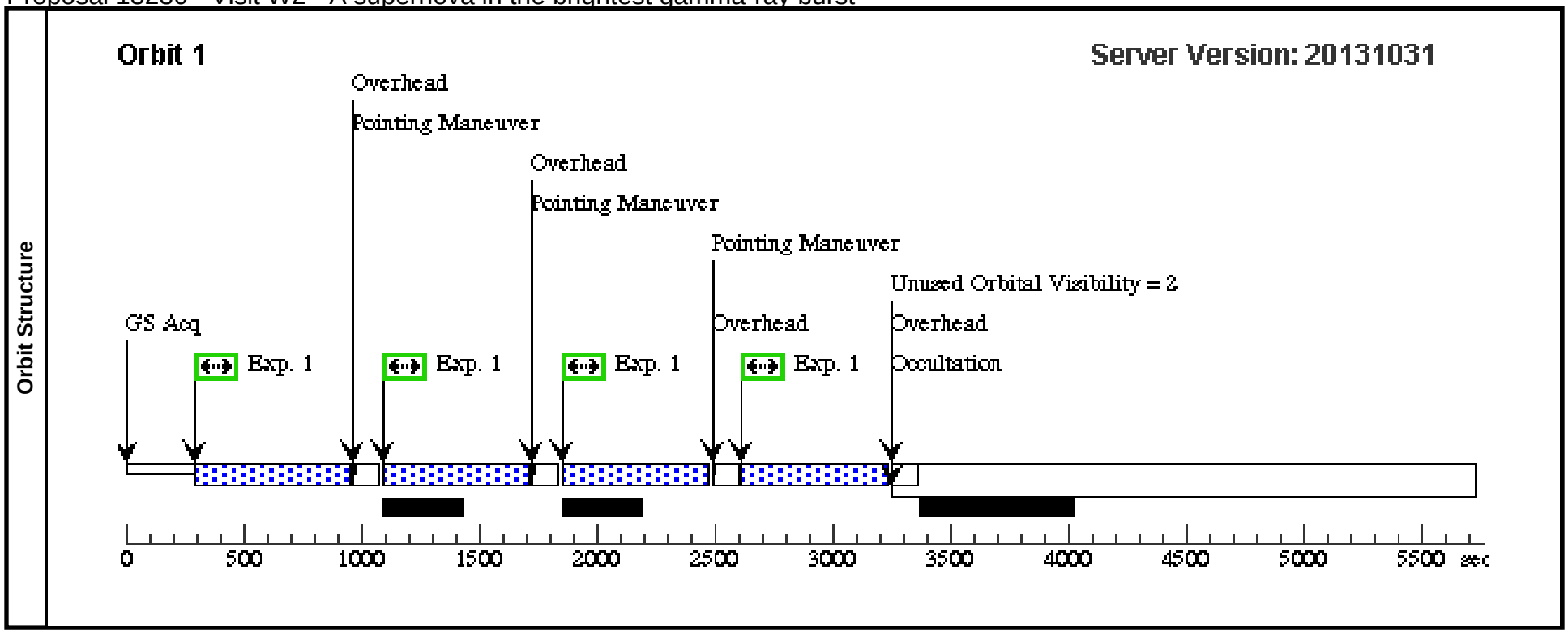
#	Primary Pattern		Secondary Pattern	Exposures
(4)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130427A	RA: 11 32 32.8400 (173.1368333d) Dec: +27 41 56.20 (27.69894d) Equinox: J2000		V=22+/-1	Reference Frame: SDSS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130427A	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=10	POS TARG -60,-30	Pattern 4, Exps 1-1 in Visit W2 (4)	620 Secs (2508 Secs)	
								[==>627.0 Secs (Pattern 1)]	***[1]***
								[==>627.0 Secs (Pattern 2)]	
								[==>627.0 Secs (Pattern 3)]	
								[==>627.0 Secs (Pattern 4)]	


Orbit Structure
Orbit 1
Server Version: 20131031
Overhead
Pointing Maneuver
Overhead
Pointing Maneuver
Pointing Maneuver
Unused Orbital Visibility = 2
GS Acq
Exp. 1
Exp. 1
Exp. 1
Overhead
Exp. 1
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13230, Visit A1, completed Wed Mar 26 01:01:56 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 134D TO 137 D; BEFORE 22-MAY-2013:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

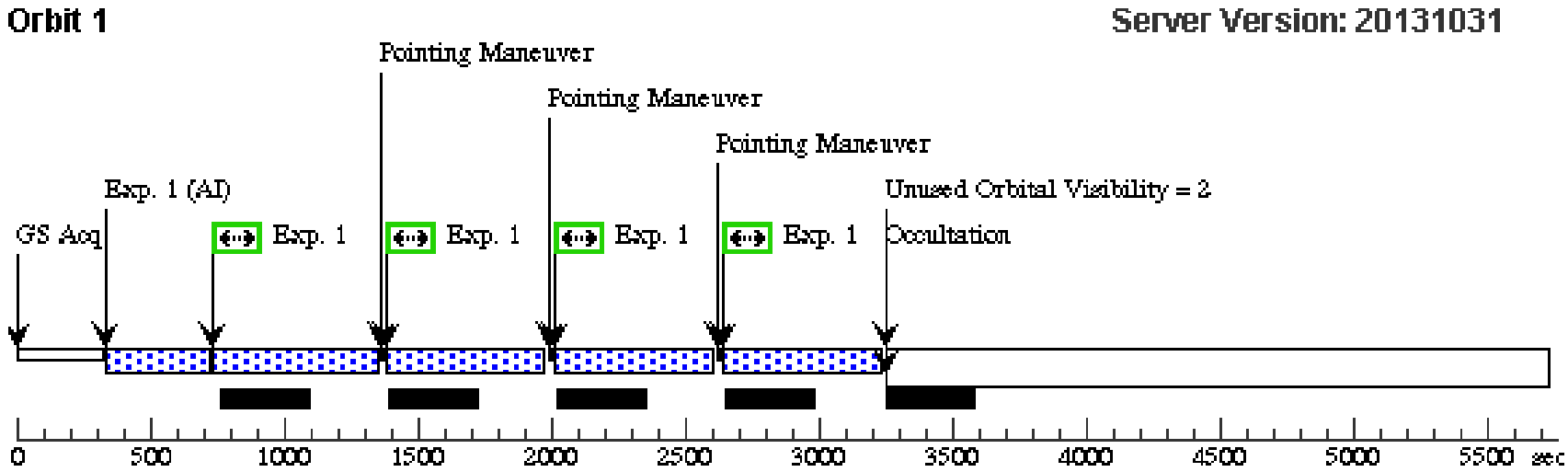
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130427A	RA: 11 32 32.8400 (173.1368333d) Dec: +27 41 56.20 (27.69894d) Equinox: J2000		V=22+/-1	Reference Frame: SDSS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130427A	ACS/WFC, ACCUM, WFC-FIX	G800L		POS TARG 75,-95	Pattern 3, Exps 1-1 in Visit A1 (3)	400 Secs (1880 Secs) *[==>470.0 Secs (Pattern 1)]* *[==>470.0 Secs (Pattern 2)]* *[==>470.0 Secs (Pattern 3)]* *[==>470.0 Secs (Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13230, Visit A2, scheduling Wed Mar 26 01:01:57 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: SAME ORIENT AS A1; AFTER A1 BY 300 D TO 400 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130427A	RA: 11 32 32.8400 (173.1368333d) Dec: +27 41 56.20 (27.69894d) Equinox: J2000		V=22+/-1	Reference Frame: SDSS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130427A	ACS/WFC, ACCUM, WFC-FIX	G800L		POS TARG 75,-95	Pattern 3, Exps 1-1 in Visit A2 (3)	400 Secs (1880 Secs) *[==>470.0 Secs (Pattern 1)]* *[==>470.0 Secs (Pattern 2)]* *[==>470.0 Secs (Pattern 3)]* *[==>470.0 Secs (Pattern 4)]*	*[1]*

Orbit Structure