13782 - The Double Supernova in NGC 6984

Cycle: 22, Proposal Category: GO

(UV Initiative)

(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) SN2013EK	WFC3/UVIS	4	14-Jul-2014 21:11:27.0	yes

4 Total Orbits Used

ABSTRACT

In 2012 and 2013, two Type Ib/c supernovae -- SN2012im and SN2013ek -- were discovered at virtually the same location (< 0.4 arcsec) in NGC 6984 (D ~ 65 Mpc). A double supernova of this sort has never been observed before and it is possible that the two explosions are somehow physically linked. The uniqueness of the discovery prompted HST/WFC3 images of the region to be obtained in Cycle 21 via Director's Discretionary time led by our group. Those images revealed a weak source nearby to SN2013ek that could be late-time emission from SN2012im.

We propose a program of four orbits of Cycle 22 time to complete our original mission of determining the nature of this rare supernova coupling. A return visit with HST will conclusively verify whether the secondary source is indeed SN2012im. If the secondary source fades then this would mean a curious case of two neighboring but unrelated supernovae occurring within a year of each other. Alternatively, if the secondary source does not fade, then it is likely that the two events SN2012im/2013ek are connected -- a discovery that will have important ramifications in areas of high-mass binary star evolution and explosion mechanisms of core-collapse supernovae. The proposed UV and optical observations will enable us to perform a detailed investigation of the explosion site and model properties of the parent star cluster and its immediate environment.

OBSERVING DESCRIPTION

These observations are designed to obtain a suite of optical and UV images of SN 2013ek and its host galaxy NGC 6984. The WFC3/UVIS will be used in a total of four orbits over two visits of Cycle 22 time. The filters F275W, F336W, F475W, F555W, F665N, and F814W will be used. The images will be dithered in a three-point sub-pixel pattern. The entire galaxy fits nicely on the UVIS2 chip. We have incorporated the use of post-flash to improve charge transfer efficiency.

Visit

Proposal 13782, Visit 01

Tue Jul 15 01:11:29 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 01-JUN-2015 AND 30-SEP-2015

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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), (3-4), (5), (6), (7), (8)

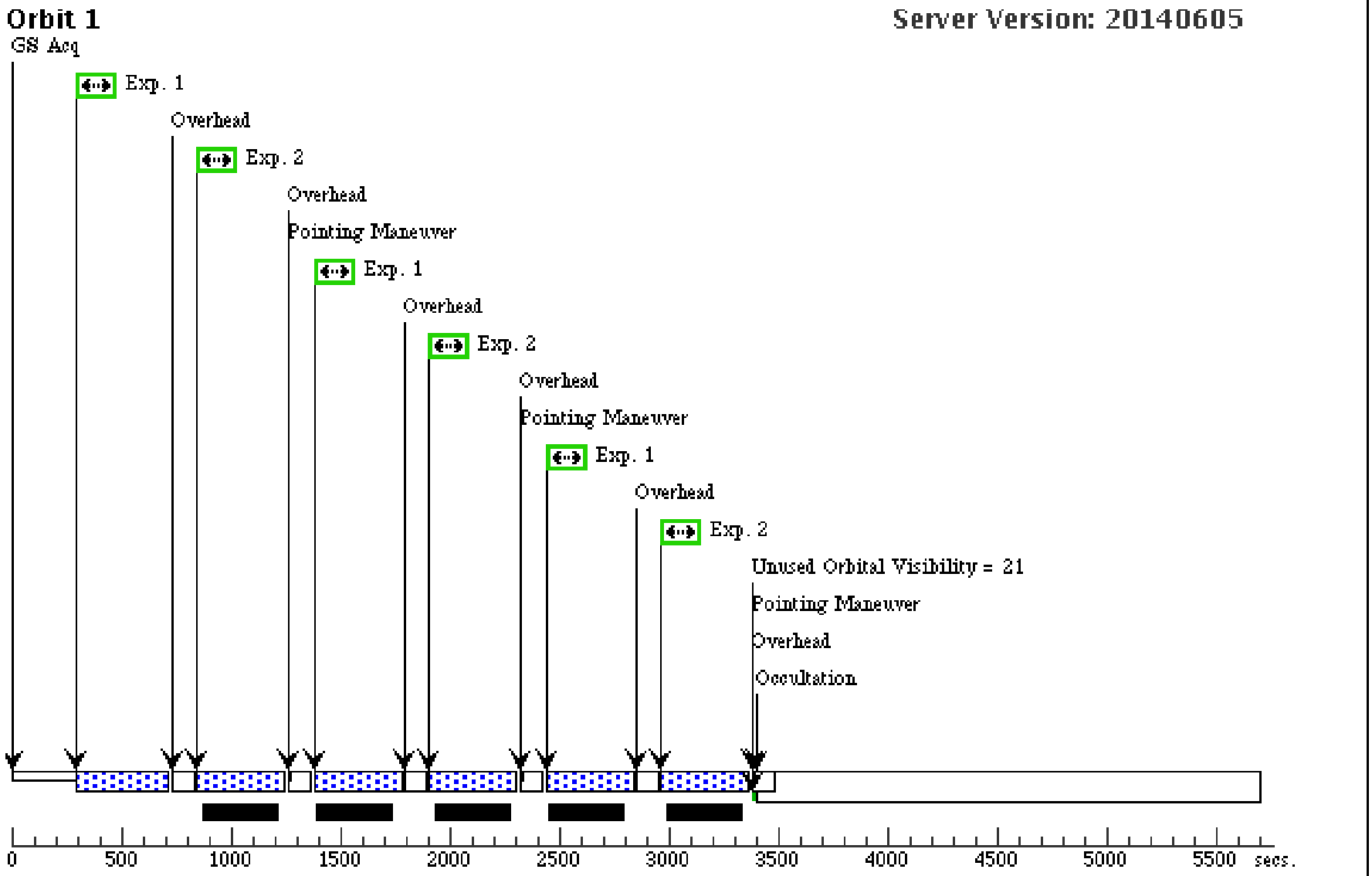
Fixed Targets

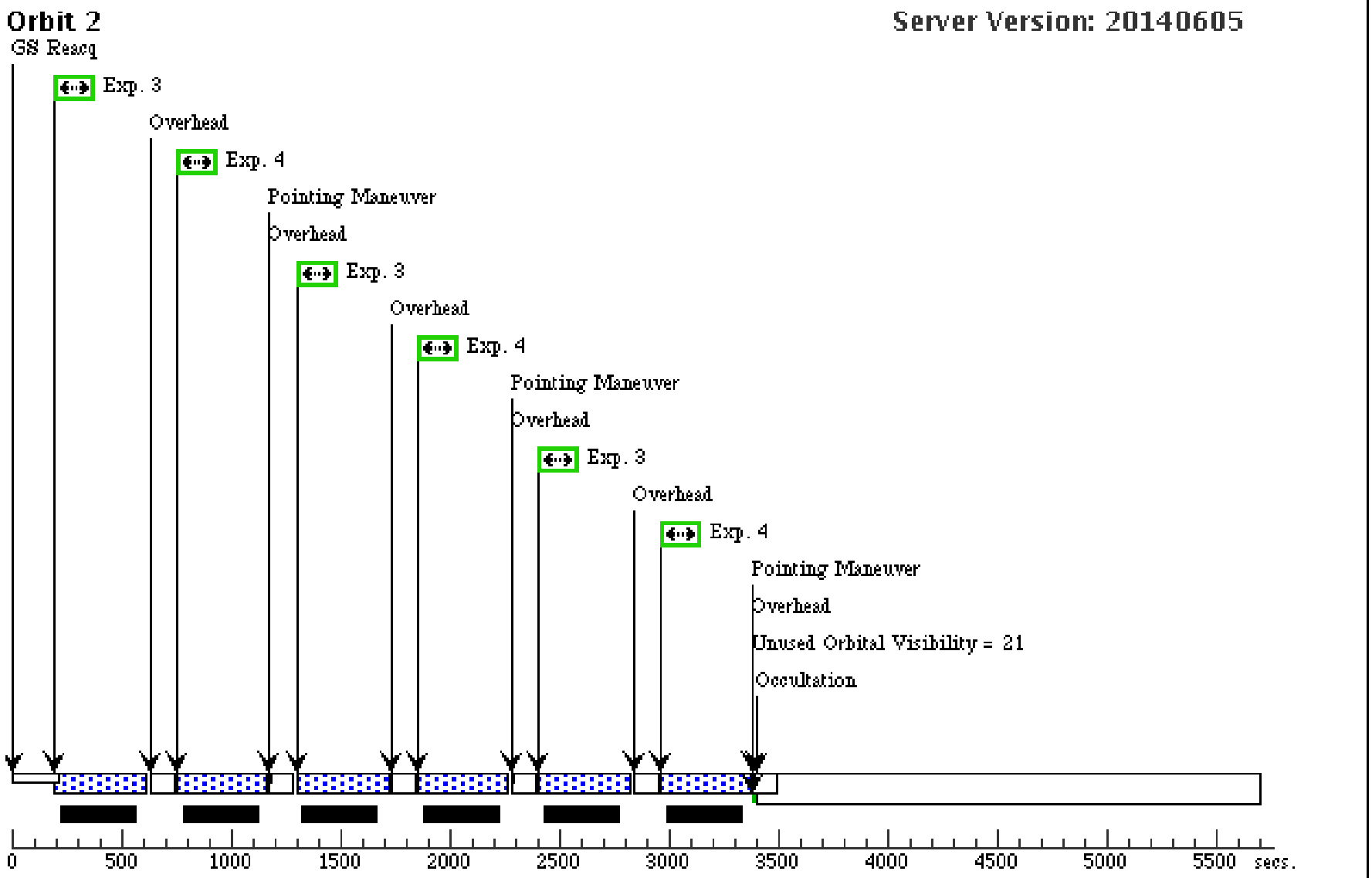
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2013EK	RA: 20 57 53.9000 (314.4745833d) Dec: -51 52 24.50 (-51.87347d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS

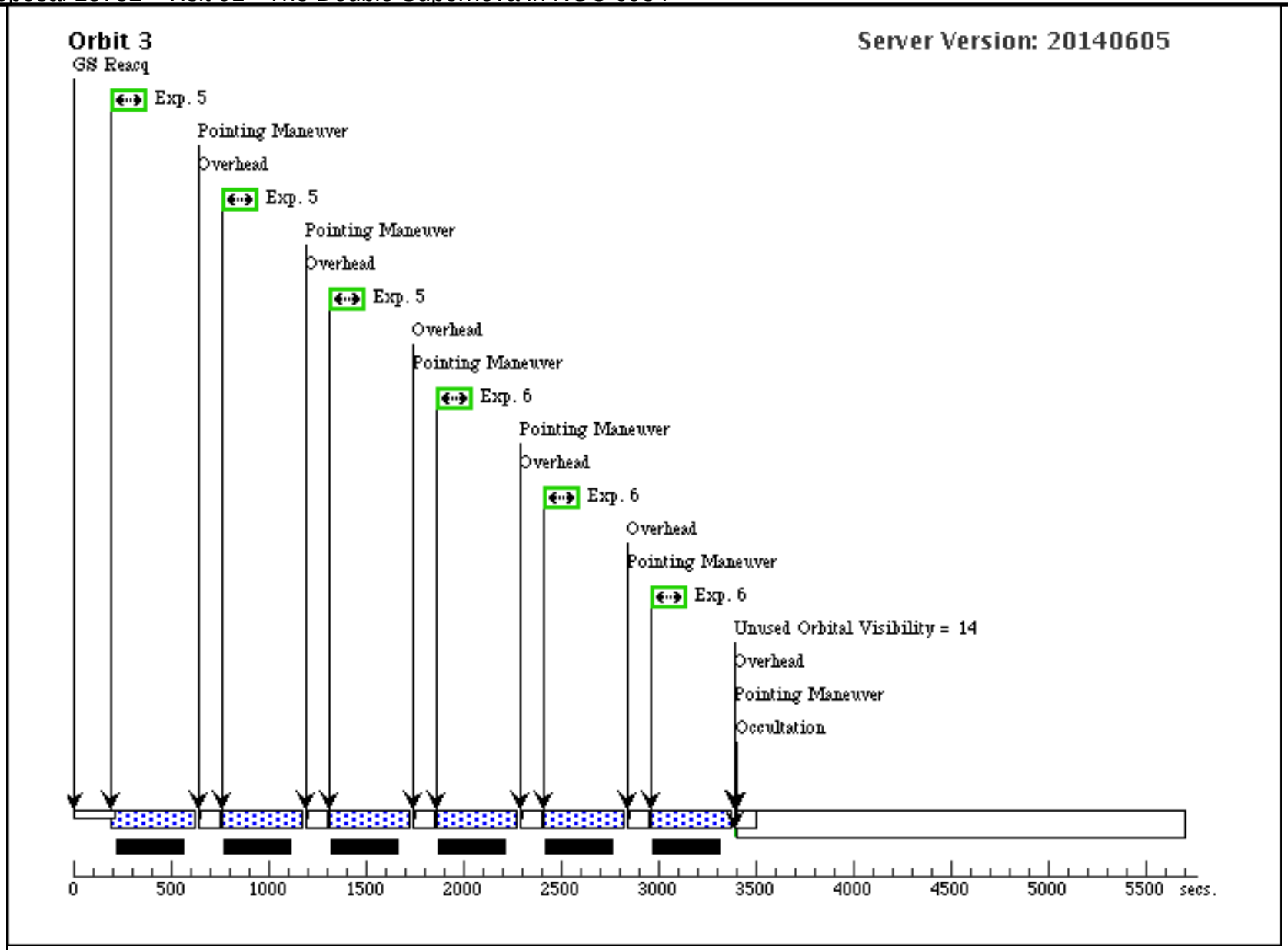
Exposures

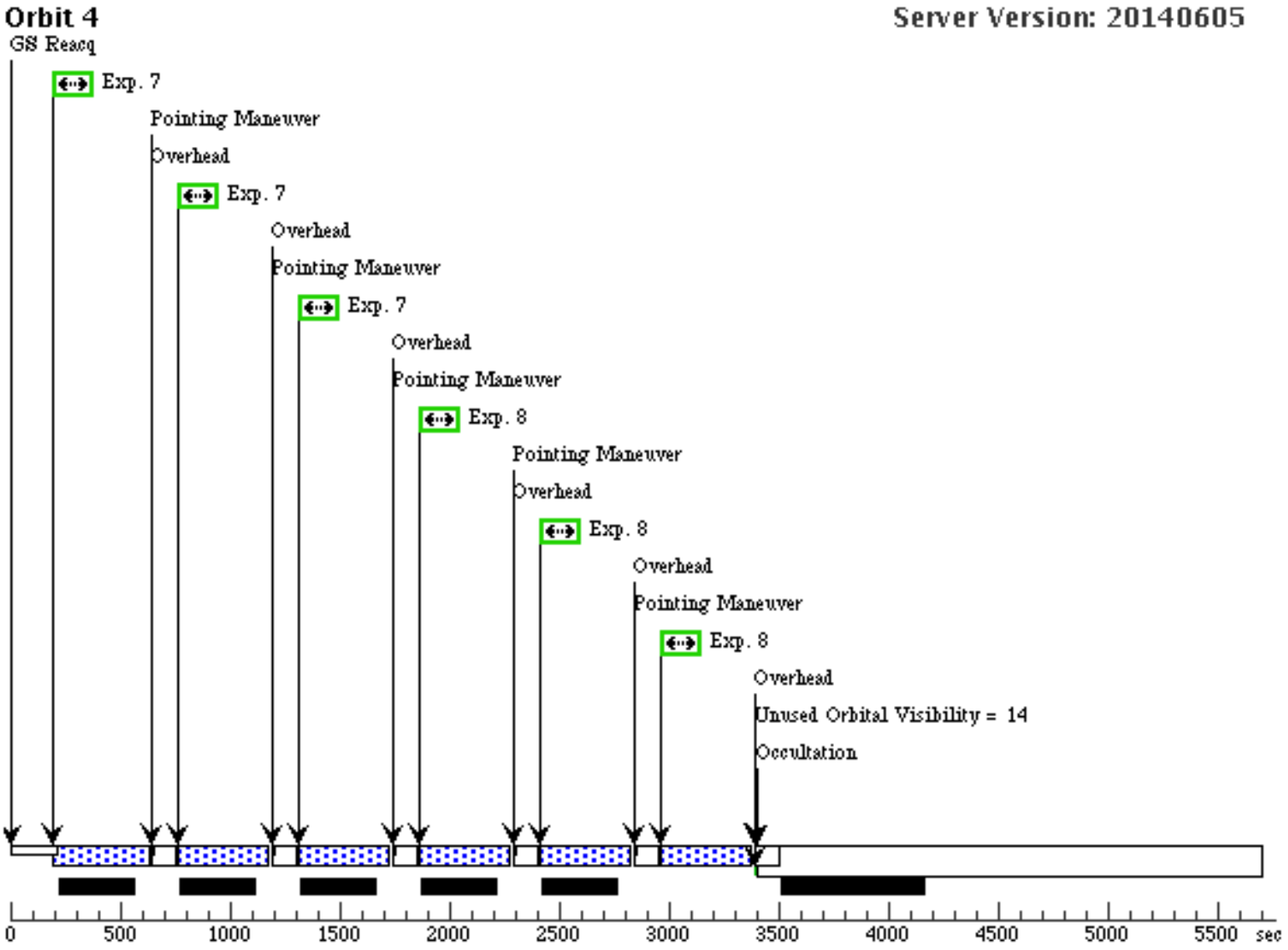
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F555W			Pattern 1, Exps 1-2 in Visit 01 (1)	390 Secs (1170 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F814W			Pattern 1, Exps 1-2 in Visit 01 (1)	390 Secs (1170 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
3		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=11		Pattern 1, Exps 3-4 in Visit 01 (1)	400 Secs (1200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
4		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F438W	FLASH=8		Pattern 1, Exps 3-4 in Visit 01 (1)	390 Secs (1170 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
5		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F665N	FLASH=11	POS TARG 0.5,0.5	Pattern 1, Exps 5-5 in Visit 01 (1)	415 Secs (1245 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
6		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F665N	FLASH=11		Pattern 1, Exps 6-6 in Visit 01 (1)	415 Secs (1245 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
7		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12		Pattern 1, Exps 7-7 in Visit 01 (1)	415 Secs (1245 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[4]***
8		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=12	POS TARG 0.5,0.5	Pattern 1, Exps 8-8 in Visit 01 (1)	415 Secs (1245 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[4]***

Orbit Structure




Orbit 2
Server Version: 20140605
GS Reacq
Exp. 3
Overhead
Exp. 4
Pointing Maneuver
Overhead
Exp. 3
Overhead
Exp. 4
Pointing Maneuver
Overhead
Exp. 3
Overhead
Exp. 4
Pointing Maneuver
Overhead
Unused Orbital Visibility = 21
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20140605
GS Reacq
Exp. 5
Pointing Maneuver
Overhead
Exp. 5
Pointing Maneuver
Overhead
Exp. 5
Overhead
Pointing Maneuver
Exp. 6
Pointing Maneuver
Overhead
Exp. 6
Overhead
Pointing Maneuver
Exp. 6
Unused Orbital Visibility = 14
Overhead
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20140605
GS Reacq
Exp. 7
Pointing Maneuver
Overhead
Exp. 7
Overhead
Pointing Maneuver
Exp. 7
Overhead
Pointing Maneuver
Exp. 8
Pointing Maneuver
Overhead
Exp. 8
Overhead
Pointing Maneuver
Exp. 8
Overhead
Unused Orbital Visibility = 14
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec