13405 - SAINTS: Images of SN 1987A

Cycle: 21, 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) SN-1987A	WFC3/UVIS	1	26-Sep-2013 21:14:34.0	yes
02	(1) SN-1987A	ACS/SBC	3	26-Sep-2013 21:14:45.0	yes
03	(1) SN-1987A	WFC3/UVIS	2	26-Sep-2013 21:14:53.0	yes
04	(1) SN-1987A	WFC3/UVIS	4	26-Sep-2013 21:15:06.0	yes

10 Total Orbits Used

ABSTRACT

SN 1987A is the great supernova of the HST era. It is the only case where we have detailed knowledge of the pre-existing structure in the circumstellar gas. It is the only case where we can observe the details of a transition from supernova to supernova remnant. An unbroken string of observations is the essential tool for detecting change and establishing a uniform legacy archive. As we have demonstrated, images reveal a wide variety of processes at work-- most notably the change in the energetics of the debris from radioactive power in the first 5000 days to X-ray illumination from the outside at the present day. We also observed the explosive eruption of "hotspots" around the circumstellar ring and are now using their time history to infer their structure. We have devised a way to image the reverse shock at both Lyman alpha and H-alpha that will help solve a riddle in the excitation of these lines and illuminate the hydrodynamics of the site where non-thermal processes are at work. We

propose this novel UV work for the current cycle. The HST observations have a unique blend of photometric fidelity and angular resolution that also makes them the indispensable partner to ongoing X-ray, radio, and far-IR observations. ALMA provides a new way to study dust formation and the kinematics of the explosion by comparison to HST images. This HST program is a long term study: for a 25 year old remnant, we believe brief and simple annual sampling is adequate, but an ongoing commitment is essential.

OBSERVING DESCRIPTION

The proposed imaging program of SN 1987A will provide continuing information on the luminosity and expansion of the debris, eruption and evolution of hotspots, and photoionization of the surrounding gas, all at the highest available spatial resolution.

Summary of the proposed observations:

Cycle 21: 1 orbit with F435W, F625W, 2 orbits with F657N, F502N, 4 orbits with F656N, F645N, F665N and F658N, and 3 orbits with ACS/SBC/F122M = total 10 orbits

Cycle 22: 1 orbit with F435W, F625W = total 1 orbit

Cycle 23: 1 orbit with F435W, F625W, 2 orbits with F657N, F502N = total 3 orbits

Observations using WFC3/UVIS with filters F435W, F625W, F657N, F502N will connect with our earlier observations at similar signal-to-noise ratio (S/N) through drizzled observations.

Visit

Proposal 13405, Visit 01, implementation Fri Sep 27 01:15:16 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 13-JUN-2014:00:00:00 AND 15-JUL-2014:00:00:00; SEQ 01,02,03,04 WITHIN 10 D

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		(1-2)

Fixed Targets

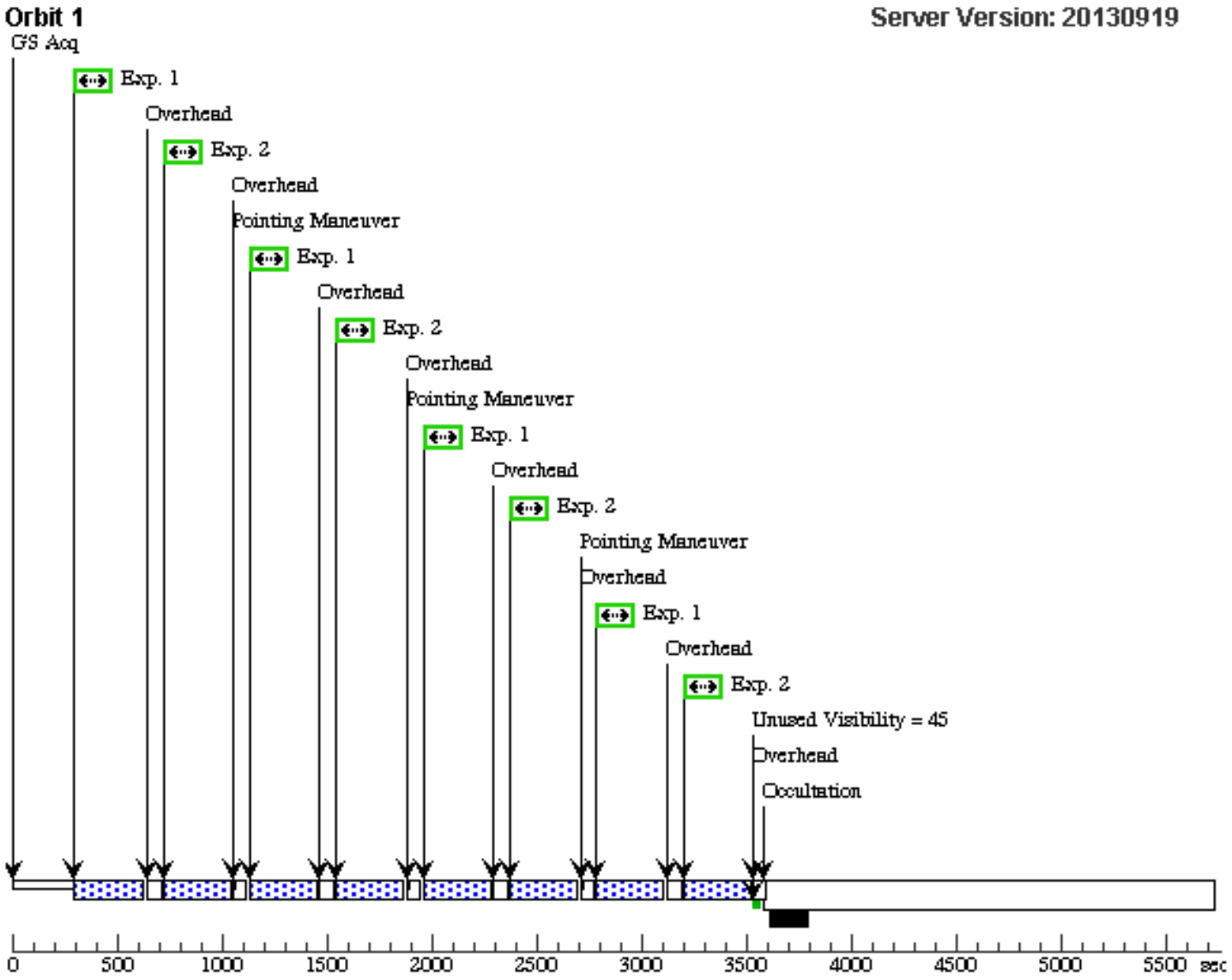
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-1987A	RA: 05 35 28.0200 (83.8667500d) Dec: -69 16 11.07 (-69.26974d) Equinox: J2000		V=20	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	CR-SPLIT=NO; FLASH=10		Pattern 1, Exps 1-2 in Visit 01 (1)	300 Secs (1200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F625W	CR-SPLIT=NO; FLASH=2		Pattern 1, Exps 1-2 in Visit 01 (1)	300 Secs (1200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 13405, Visit 02, implementation Fri Sep 27 01:15:18 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-SBC-DITHER-BOX	Coordinate Frame=POS-TARG		(1), (2)
	Purpose=DITHER	Pattern Orientation=20.02		
	Number Of Points=4	Angle Between Sides=63.65		
	Point Spacing=0.179	Center Pattern=false		
	Line Spacing=0.116			

Fixed Targets

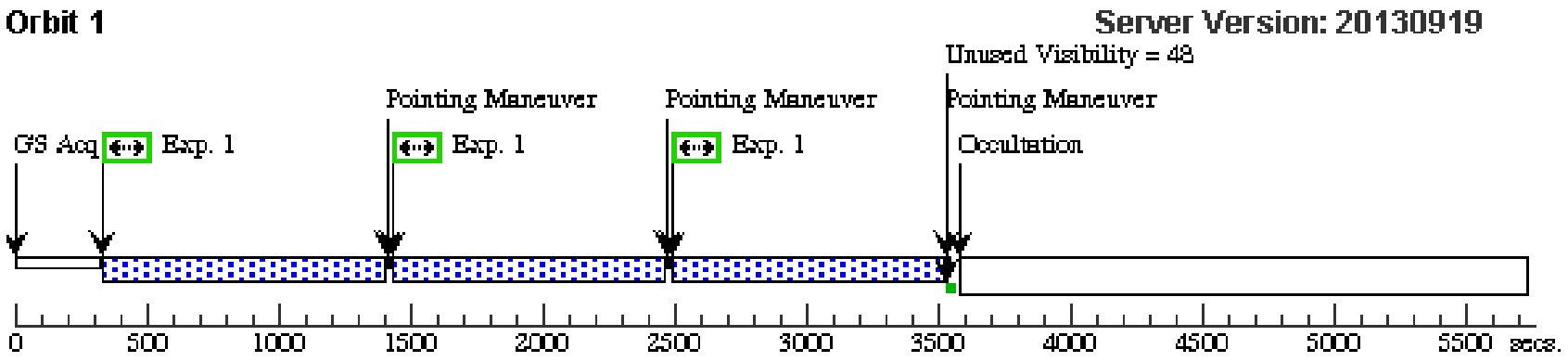
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-1987A	RA: 05 35 28.0200 (83.8667500d)		V=20	Reference Frame: SIMBAD
		Dec: -69 16 11.07 (-69.26974d)			
		Equinox: J2000			

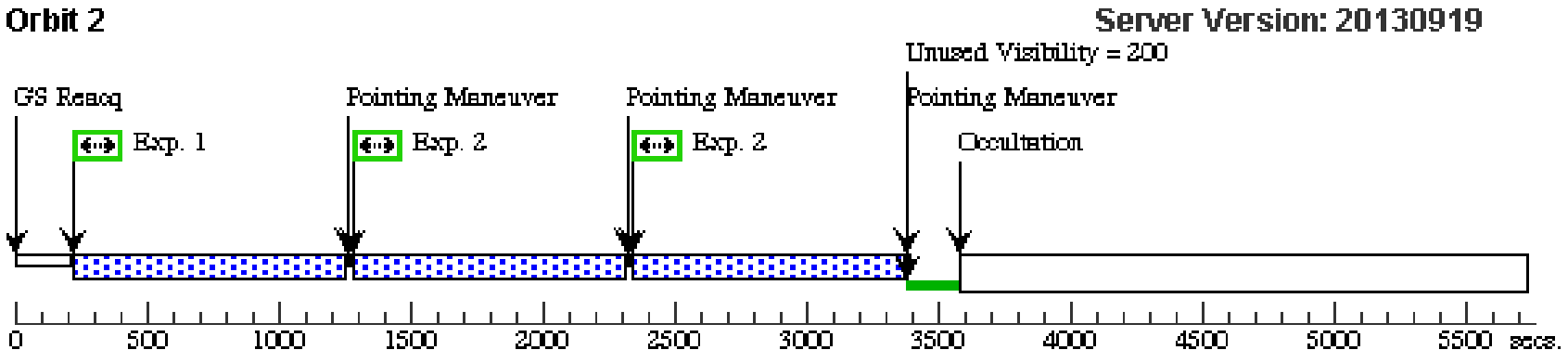
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

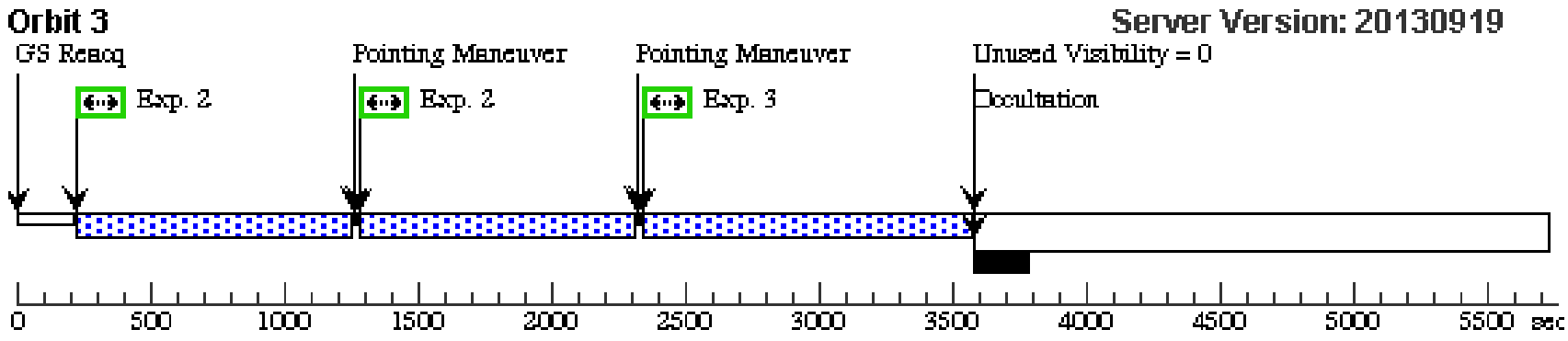
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(ACS.im.518463)	(1) SN-1987A	ACS/SBC, ACCUM, SBC	F122M			Pattern 2, Exps 1-1 in Visit 02 (2)	1000 Secs (4000 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	***[2]***
2	(ACS.im.518463)	(1) SN-1987A	ACS/SBC, ACCUM, SBC	F122M		POS TARG 0.15,0.15	Pattern 2, Exps 2-2 in Visit 02 (2)	1000 Secs (4000 Secs)	
								[==>(Pattern 1)]	***[2]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	
3	(ACS.im.518463)	(1) SN-1987A	ACS/SBC, ACCUM, SBC	F122M				1200 Secs (1200 Secs)	
								[==>]	***[3]***

Orbit Structure







Visit

Proposal 13405, Visit 03, implementation Fri Sep 27 01:15:20 GMT 2013

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		(1-2)

Fixed Targets

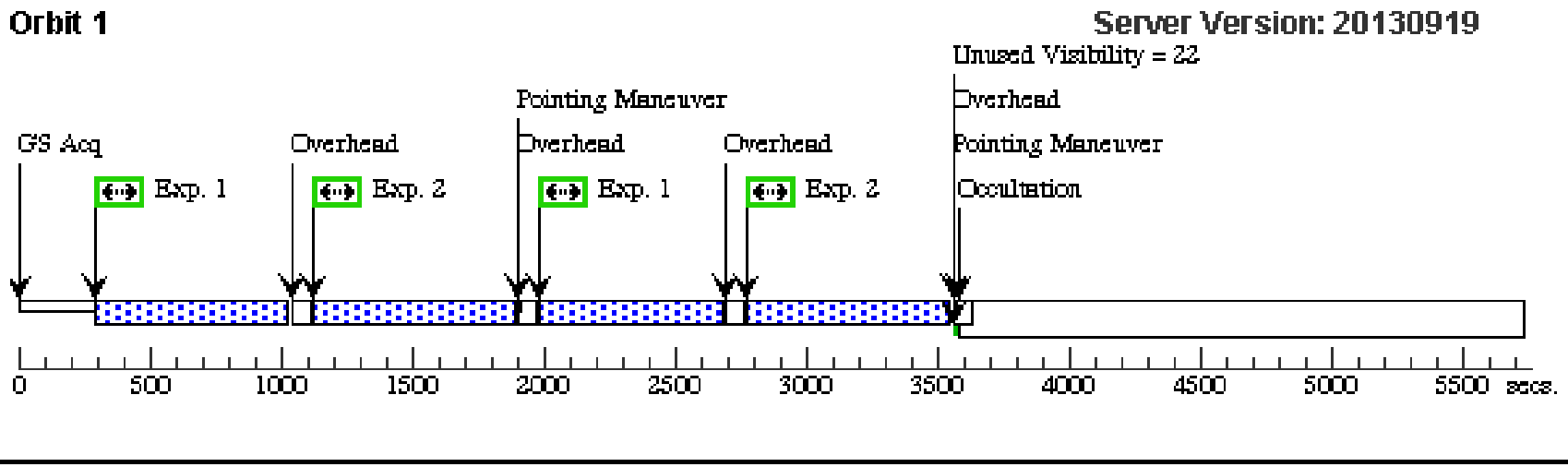
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-1987A	RA: 05 35 28.0200 (83.8667500d) Dec: -69 16 11.07 (-69.26974d) Equinox: J2000		V=20	Reference Frame: SIMBAD

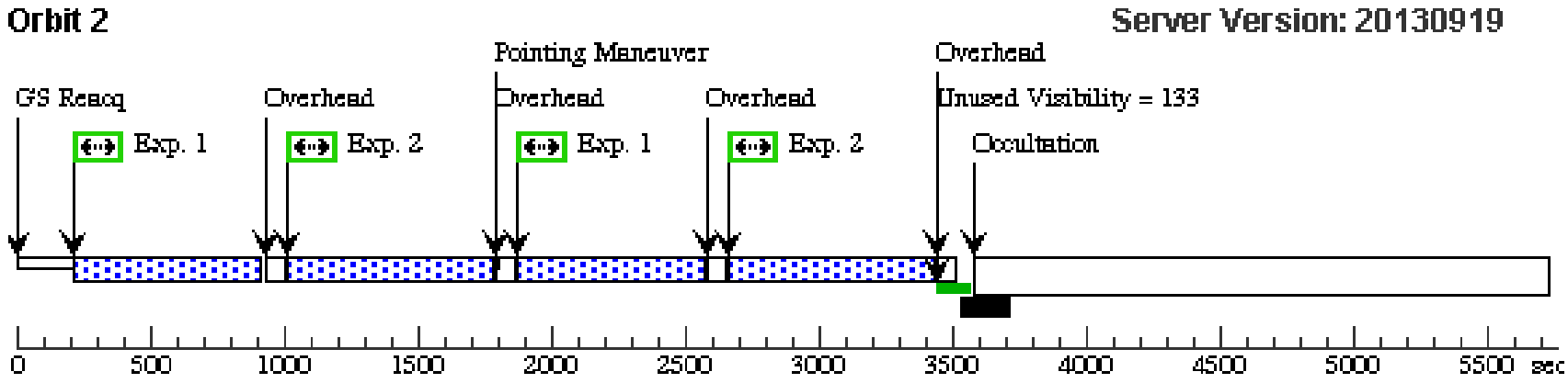
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F502N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-2 in Visit 03 (1)	700 Secs (2800 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
								[==>(Pattern 3)] *[==>(Pattern 4)]*	***[2]***
2		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F502N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-2 in Visit 03 (1)	770 Secs (3080 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
								[==>(Pattern 3)] *[==>(Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 13405, Visit 04, implementation Fri Sep 27 01:15:21 GMT 2013

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		(1-4)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-1987A	RA: 05 35 28.0200 (83.8667500d) Dec: -69 16 11.07 (-69.26974d) Equinox: J2000		V=20	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F645N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-4 in Visit 04 (1)	720 Secs (2880 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
2		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F656N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-4 in Visit 04 (1)	720 Secs (2880 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
3		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F658N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-4 in Visit 04 (1)	720 Secs (2880 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	***[3]***
								[==>(Pattern 4)]	***[4]***
4		(1) SN-1987A	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F665N	CR-SPLIT=NO; FLASH=11		Pattern 1, Exps 1-4 in Visit 04 (1)	720 Secs (2880 Secs)	
								[==>(Pattern 1)]	***[1]***
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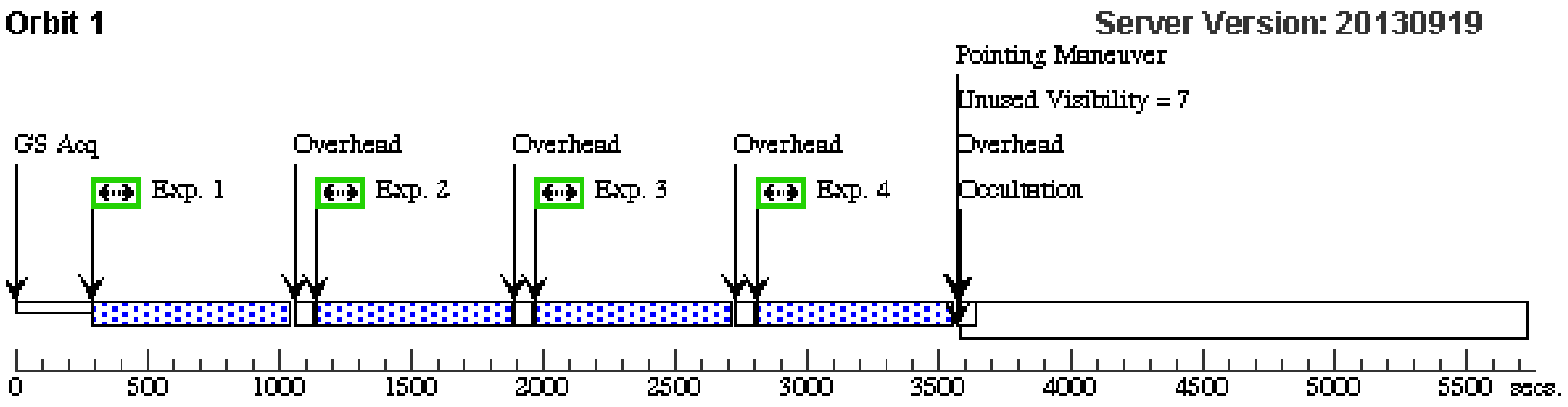
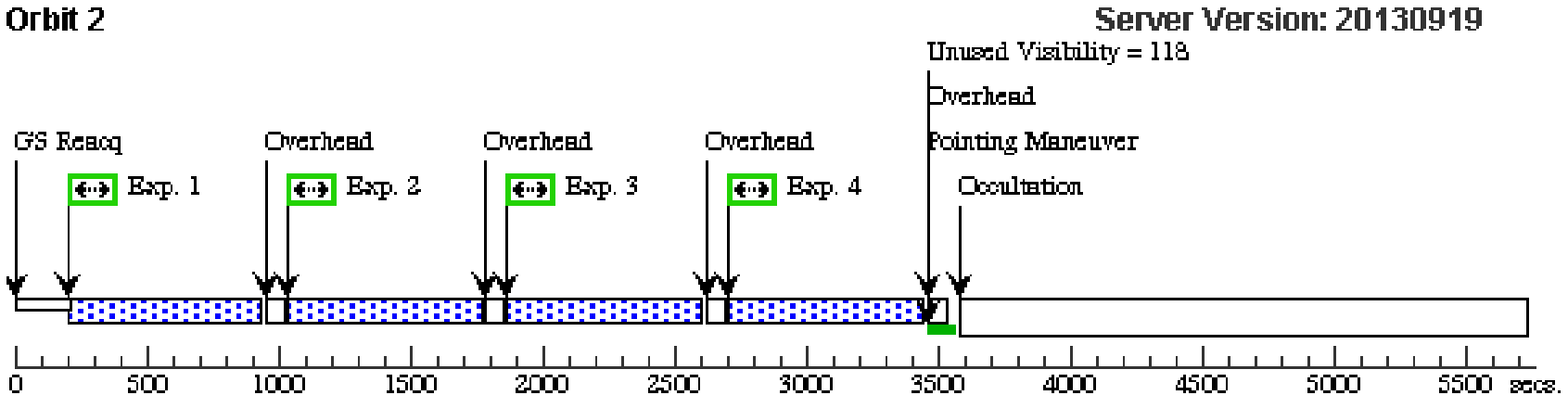
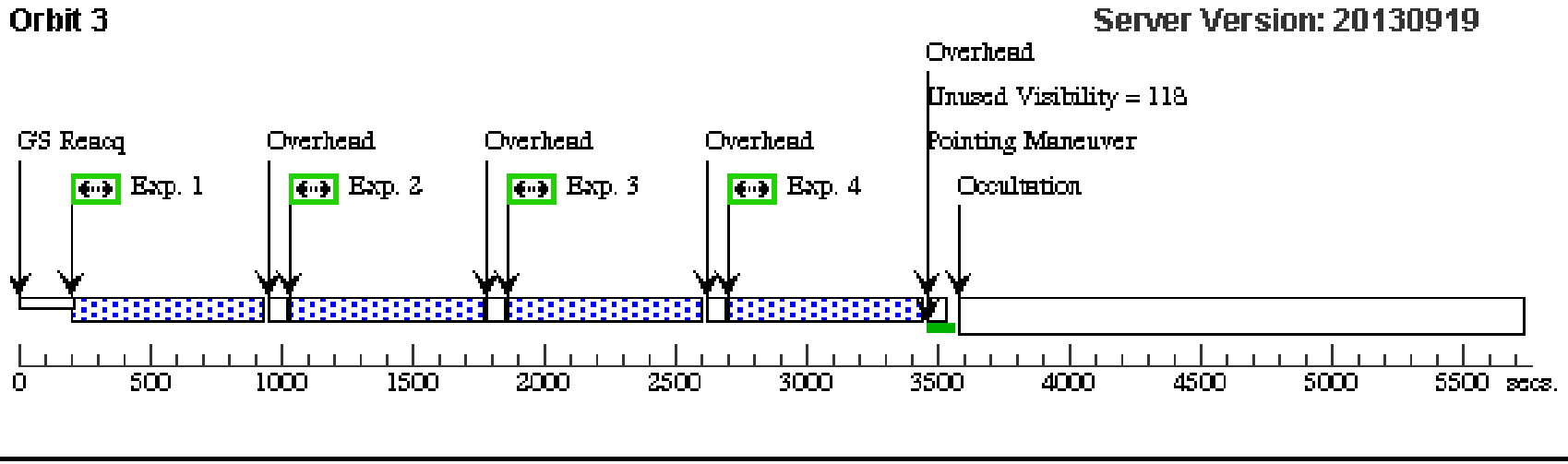
Orbit Structure



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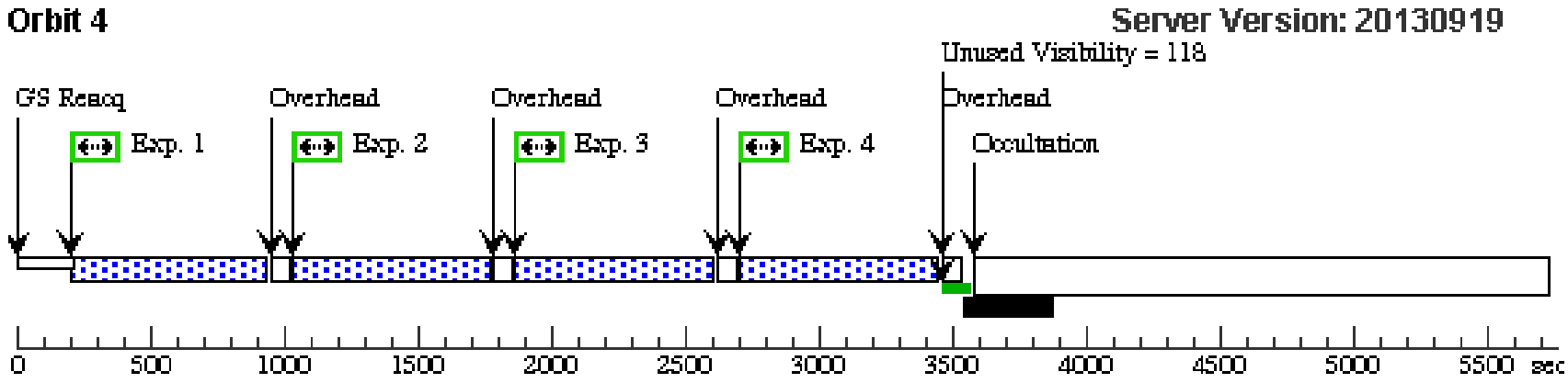
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