



12609 - Imaging the Distribution of Iron in SN 1885 in M31

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) NGC224-SN1885	WFC3/UVIS	3	09-Jul-2011 02:16:15.0	yes
02	(1) NGC224-SN1885	WFC3/UVIS	3	09-Jul-2011 02:16:28.0	yes
03	(1) NGC224-SN1885	WFC3/UVIS	4	09-Jul-2011 02:16:42.0	yes

10 Total Orbits Used

ABSTRACT

Type Ia supernovae are the thermonuclear explosions of CO white dwarfs but we don't know the specifics of how the nuclear burning proceeds from the core outward once it starts. The thermonuclear instability is thought to start off as a subsonic turbulent deflagration wave but then transition into a supersonic detonation wave. While Ni-56 mass differences between normal and subluminous Type Ia SNe reflect differences in the amount of burning that has occurred, we don't know if the explosion begins at the very center or off-center as some recent models suggest.

Directly imaging the chemical distribution of ejecta from a Type Ia SN is actually possible in the case of the subluminous Type Ia SN 1885 which occurred on the near-side of M31's central bulge. The entire 126 year old remnant -- from core to the outer edge -- is visible via strong Ca and Fe

line absorptions. In Cycle 17, we imaged the remnant in Fe I using ACS/WFC which revealed a strongly off-center Fe I distribution. However, the dominant ionization species of the remnant's iron-rich ejecta is Fe II, not Fe I.

Here we propose a WFC3/F225W Fe II image of SN 1885 to obtain a high-resolution 2D map of all its iron-rich ejecta by taking advantage of an extraordinary situation: Having a young, nearby Type Ia SN remnant visible in silhouette against a galaxy-size light table -- plus a NUV WFC3 filter (F225W) that isolates the strong resonance lines of Fe II. The proposed observation will reveal the remnant's total iron distribution and sphericity as a function of expansion velocity directly testing SN Ia models with a 2D ejecta mapping.

OBSERVING DESCRIPTION

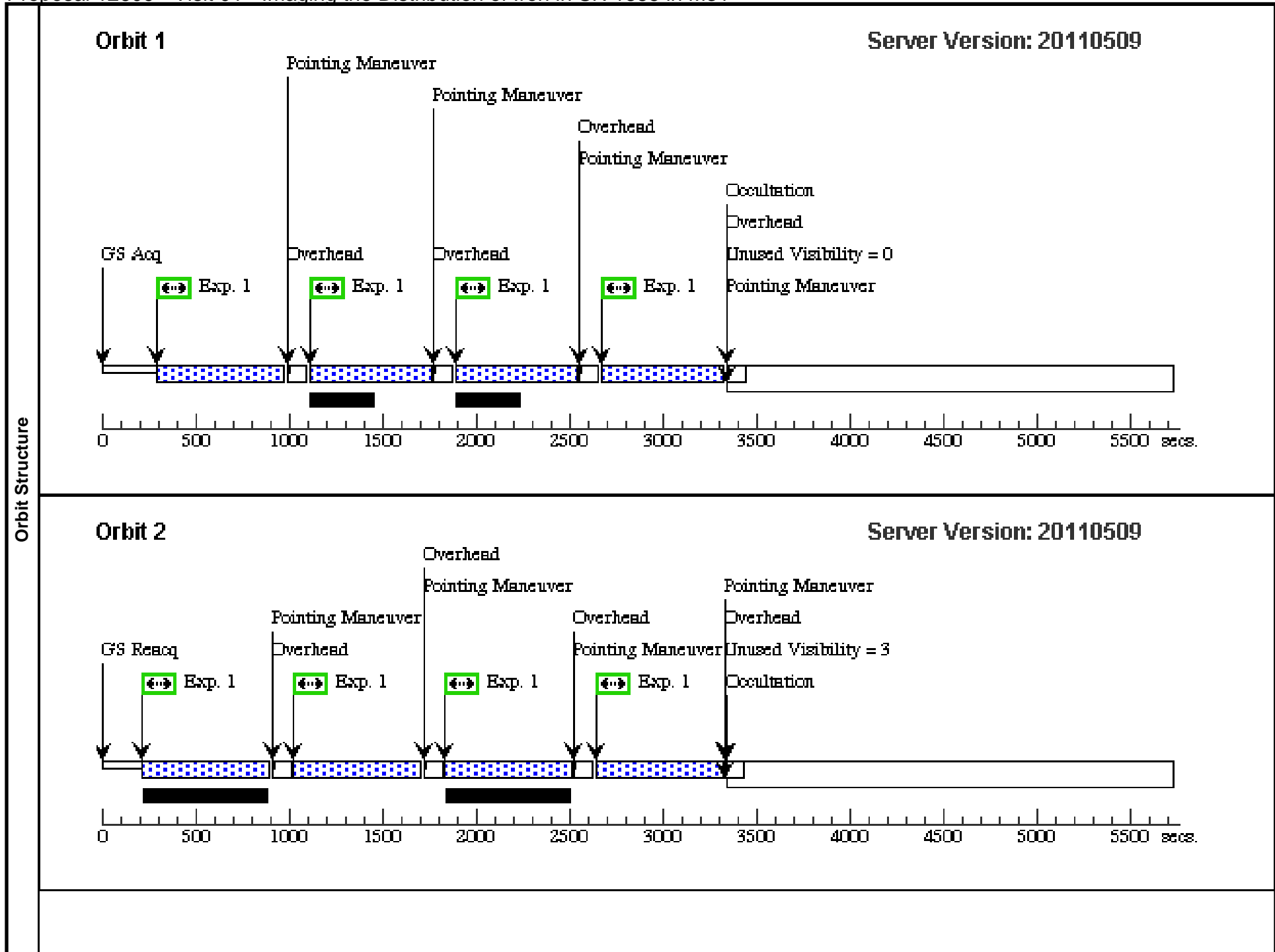
This project to to image the remnant of Supernova 1885 which occurred in the bulge of the M31 galaxy using WFC3 and UV filters F225W and F336W to detect the remnant's iron rich ejecta via strong [Fe II] absorptions at 2344 - 2599 Angstroms.

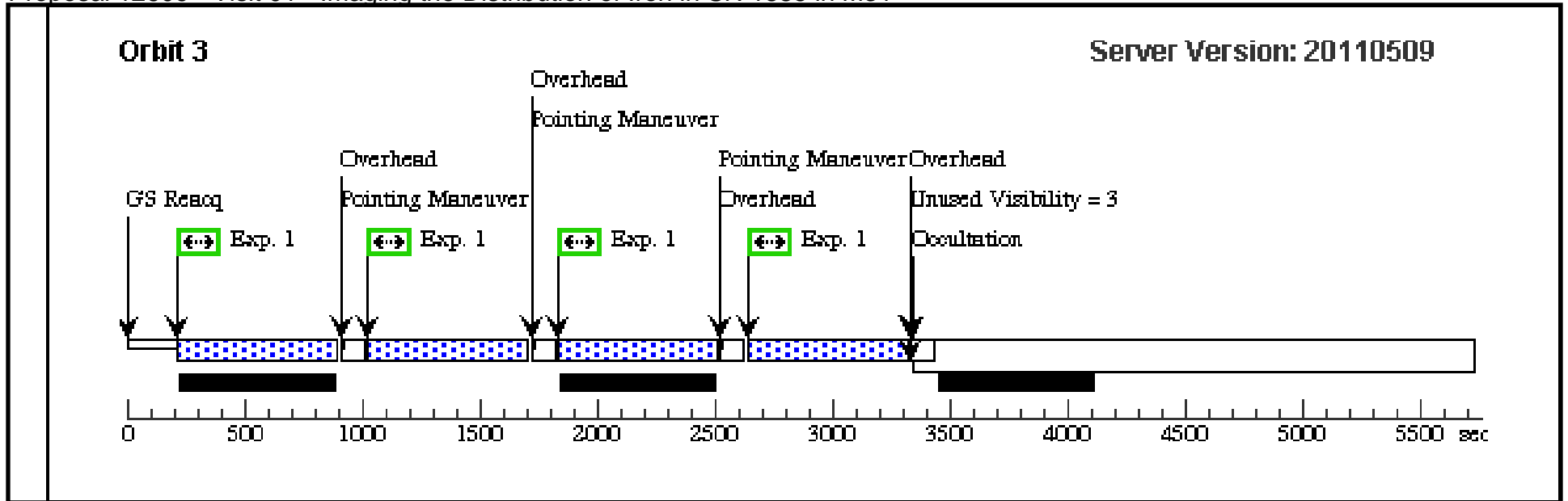
An off-band image showing the background light variations will be obtained from a one orbit image taken using the F336W filter.

Proposal 12609 - Visit 01 - Imaging the Distribution of Iron in SN 1885 in M31

Sat Jul 09 06:16:50 GMT 2011

Visit	Proposal 12609, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFC3-UVIS-MOSAIC-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.264 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=63.697 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	(1)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC224-SN1885	RA: 00 42 42.9600 (10.6790000d) Dec: +41 16 5.00 (41.26806d) Equinox: J2000		V=10.0	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC224-SN1885	WFC3/UVIS, ACCUM, UVIS2	F225W				Pattern 1, Exps 1-1 i n Visit 01 (1)	650 Secs [=>654.0 Secs (Pattern 1,1)] [=>654.0 Secs (Pattern 1,2)] [=>654.0 Secs (Pattern 1,3)] [=>654.0 Secs (Pattern 1,4)]
									[=>681.0 Secs (Pattern 2,1)] [=>681.0 Secs (Pattern 2,2)] [=>681.0 Secs (Pattern 2,3)] [=>681.0 Secs (Pattern 2,4)]	[2]
									[=>681.0 Secs (Pattern 3,1)] [=>681.0 Secs (Pattern 3,2)] [=>681.0 Secs (Pattern 3,3)] [=>681.0 Secs (Pattern 3,4)]	[3]

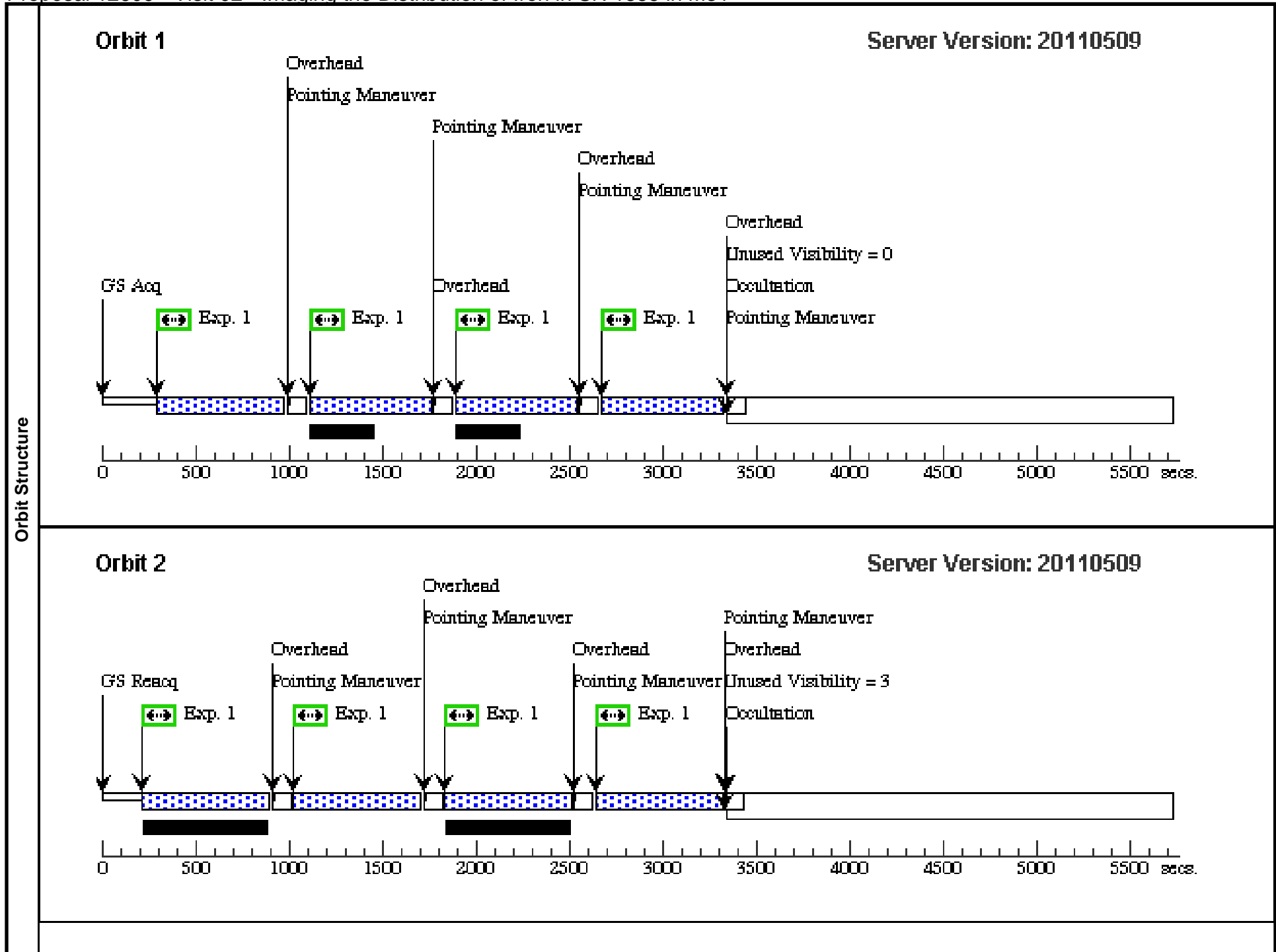


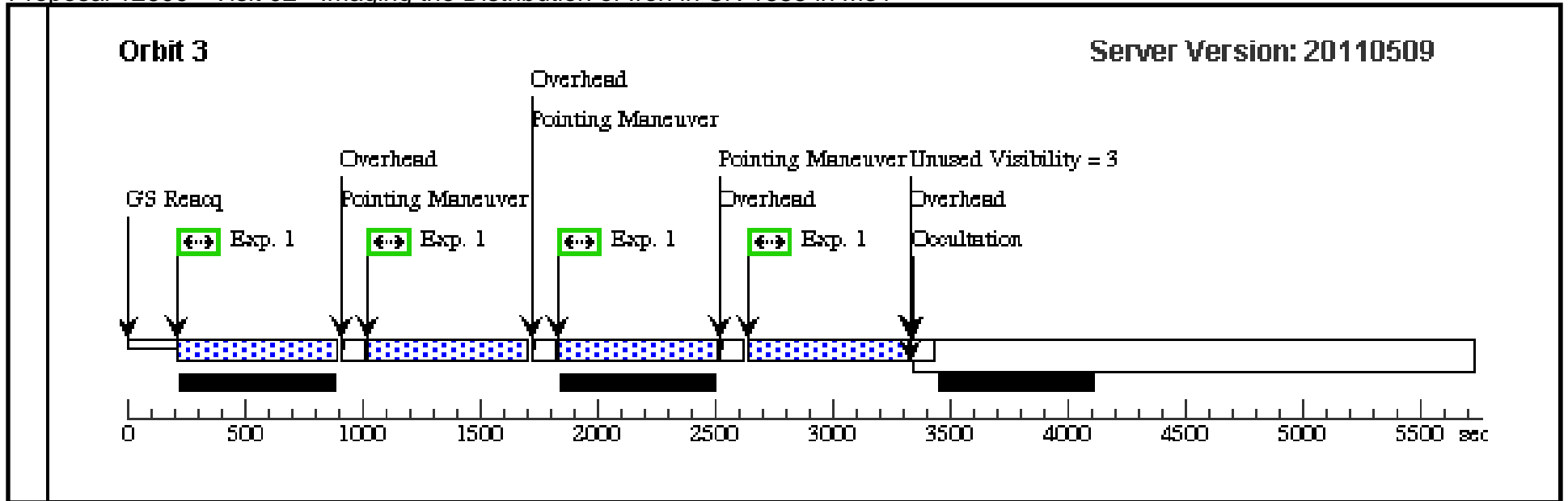


Proposal 12609 - Visit 02 - Imaging the Distribution of Iron in SN 1885 in M31

Sat Jul 09 06:16:52 GMT 2011

Visit	Proposal 12609, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=WFC3-UVIS-MOSAIC-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.264 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=63.697 Angle Between Sides= Center Pattern=false	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC224-SN1885	RA: 00 42 42.9600 (10.6790000d) Dec: +41 16 5.00 (41.26806d) Equinox: J2000		V=10.0	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC224-SN1885 5	WFC3/UVIS, ACCUM, UVIS2	F225W			Pattern 1, Exps 1-1 in Visit 02 (1)	650 Secs [==>654.0 Secs (Pattern 1,1)] [==>654.0 Secs (Pattern 1,2)] [==>654.0 Secs (Pattern 1,3)] [==>654.0 Secs (Pattern 1,4)]	[1]
								[==>681. Secs (Pattern 2,1)] [==>681 Secs (Pattern 2,2)] [==>681 Secs (Pattern 2,3)] [==>681 Secs (Pattern 2,4)]	[2]	
								[==>681.0 Secs (Pattern 3,1)] [==>681.0 Secs (Pattern 3,2)] [==>681.0 Secs (Pattern 3,3)] [==>681.0 Secs (Pattern 3,4)]	[3]	

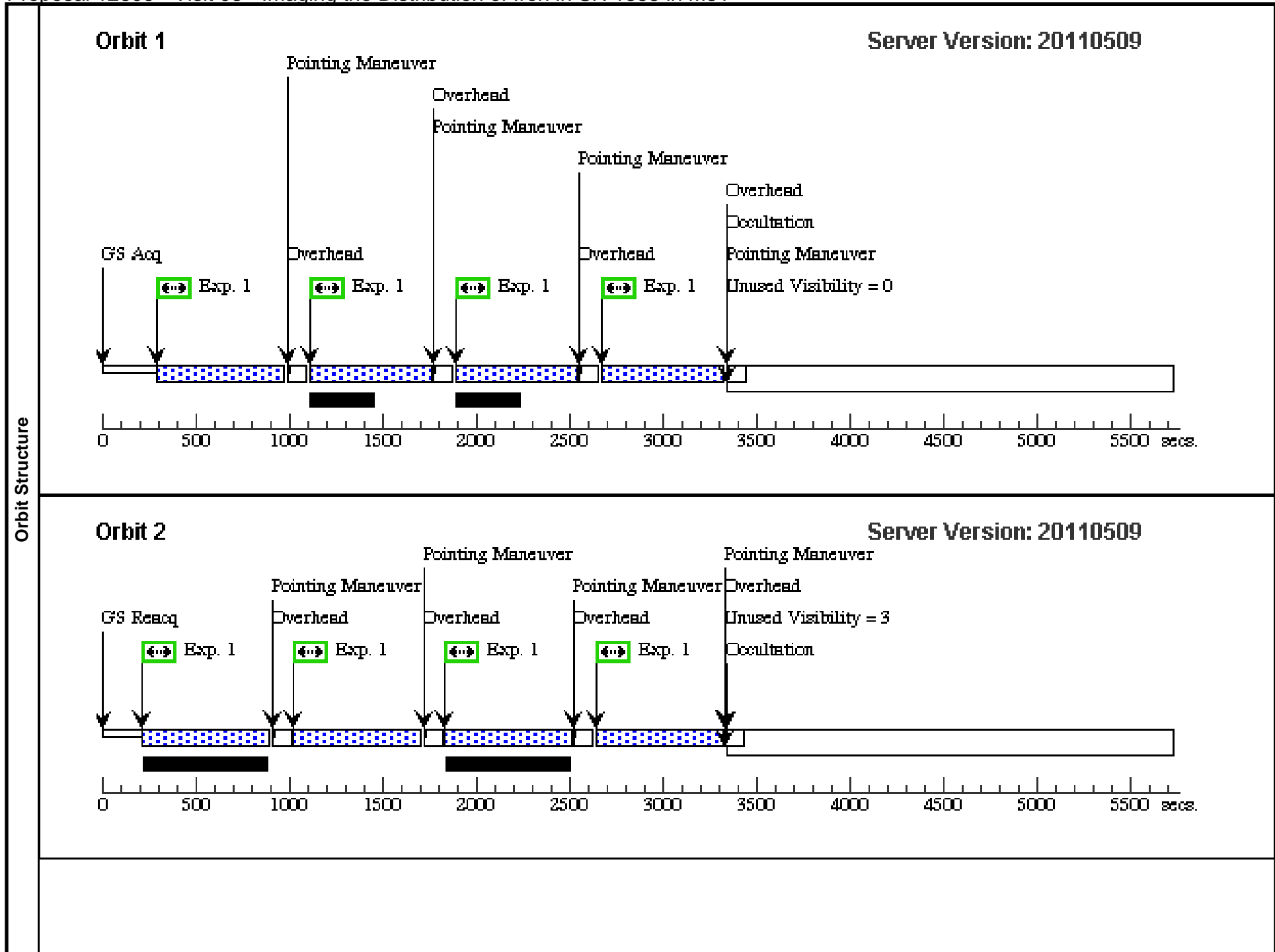




Proposal 12609 - Visit 03 - Imaging the Distribution of Iron in SN 1885 in M31

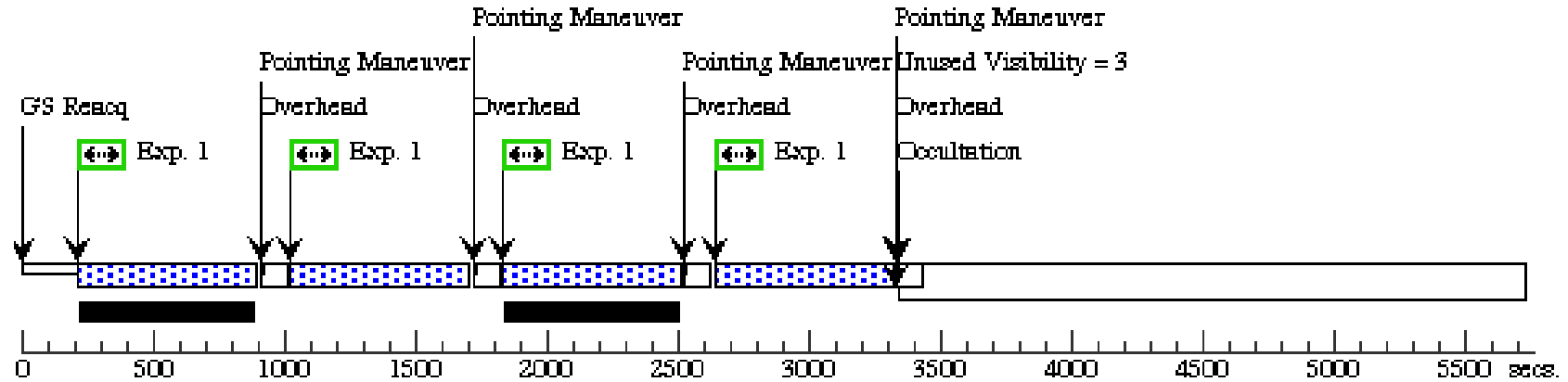
Sat Jul 09 06:16:52 GMT 2011

Visit	Proposal 12609, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
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Patterns	(1)	Pattern Type=WFC3-UVIS-MOSAIC-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.264 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=63.697 Angle Between Sides= Center Pattern=false	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)	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		(2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC224-SN1885	RA: 00 42 42.9600 (10.6790000d) Dec: +41 16 5.00 (41.26806d) Equinox: J2000		V=10.0	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC224-SN1885	WFC3/UVIS, ACCUM, UVIS2	F225W				Pattern 1, Exps 1-1 in Visit 03 (1) 650 Secs [=>654.0 Secs (Pattern 1,1)] [=>654.0 Secs (Pattern 1,2)] [=>654.0 Secs (Pattern 1,3)] [=>654.0 Secs (Pattern 1,4)]	[1]
									[=>681. Secs (Pattern 2,1)] [=>681 Secs (Pattern 2,2)] [=>681 Secs (Pattern 2,3)] [=>681 Secs (Pattern 2,4)]	[2]
									[=>681.0 Secs (Pattern 3,1)] [=>681.0 Secs (Pattern 3,2)] [=>681.0 Secs (Pattern 3,3)] [=>681.0 Secs (Pattern 3,4)]	[3]
2		(1) NGC224-SN1885	WFC3/UVIS, ACCUM, UVIS2	F336W				Pattern 2, Exps 2-2 in Visit 03 (2) 681 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[4]	



Orbit 3

Server Version: 20110509



Orbit 4

Server Version: 20110509

