12462 - The Remarkable Young Supernova Remnant in NGC 4449

Cycle: 19, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Knox S. Long (PI)	**Space Telescope Science Institute**	**long@stsci.edu**
Dr. William P. Blair (CoI)	The Johns Hopkins University	wpb@pha.jhu.edu
Dr. P. Frank Winkler (CoI)	Middlebury College	winkler@middlebury.edu
Dr. Robert A. Fesen (CoI)	Dartmouth College	robert.fesen@dartmouth.edu
Mr. Dan Milisavljevic (CoI)	Dartmouth College	danny.milisavljevic@dartmouth.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SNR-NGC4449	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	4	01-Aug-2011 21:45:12.0	yes
02	(1) SNR-NGC4449	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	4	01-Aug-2011 21:45:28.0	yes
03	(1) SNR-NGC4449	STIS/CCD	1	01-Aug-2011 21:45:41.0	yes

9 Total Orbits Used

ABSTRACT

In the irregular galaxy NGC 4449 lies a young core-collapse supernova remnant (SNR) with remarkable optical, radio, and X-ray luminosities. With an estimated age of just 50 - 100 years, it fills an important gap in our understanding of the evolutionary development of a SNR as its forward shock

and stellar debris expand into the local circumstellar environment. This is a proposal to use STIS to obtain new UV spectra of this extraordinary object, an extreme example of objects that are now making the transition from free expansion to a shock-dominated phase. Optical spectra and X-ray observations show that emission from the SNR has changed since it was observed with the FOS in 1993. We will use STIS spectra together with existing ground-based observations to (1) explore the abundances and kinematic distribution of elements in the ejecta from this core-collapse SN and compare these with nucleosynthesis models; (2) probe the interaction of the SN blast wave with what must be a very dense environment to produce its extraordinary luminosity; and (3) assess the surrounding stellar population that gave rise to this SNR. UV observations with HST are critical to a better understanding of the SNR, since this is the only way to gain access to carbon and hence measure CNO abundance ratios needed to estimate the precursor mass, and the only way to characterize shocked gas with temperatures of order 100,000 - 300,000 K. The combination of UV sensitivity and narrow slit to better isolate the SNR and stellar components makes STIS ideally suited to the needs of this program.

OBSERVING DESCRIPTION

This project is intended to obtain spectra of a single SNR in the irregular galaxy NGC4449.

We are using the FUV (G140L) and NUV (G230L) gratings with the FUV and NUV MAMA detectors, as well as the G430L grating with the CCD. Our intent is to obtain a high quality spectrum of this object from the FUV through the visible. We want also to be able to compare the spectra of the SNR to nearby HII regions and a nearby compact star cluster.

We have place orientation requirements on the visits to avoid having other objects in the slit very close to the SNR and to capture the nearby star cluster (as we described in our Phase I proposal).

Since the region is crowded, we want all of the observations to have the same slit orientation, and so have imposed SameOrient speciall requirements. We will use the 0.2 arcsec by 52 arcsec slit for all of the the observations.

Because the source is relatively faint we will are using the 52X0.2E1 apeture for the CCD observation to limit the CTE effects in the CCD.

REAL TIME JUSTIFICATION

There are no realtime requirements.

CALIBRATION JUSTIFICATION

There are no special calibration requirements.

Visit

Proposal 12462, Visit 01, implementation Tue Aug 02 01:45:47 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA, STIS/NUV-MAMA

Special Requirements: ORIENT 101.7D TO 102.7 D

Comments: This visit consists of the acquisition and 3 orbits of FUV observations forllowed by one orbit of NUV observations of the SNR in NGC4449

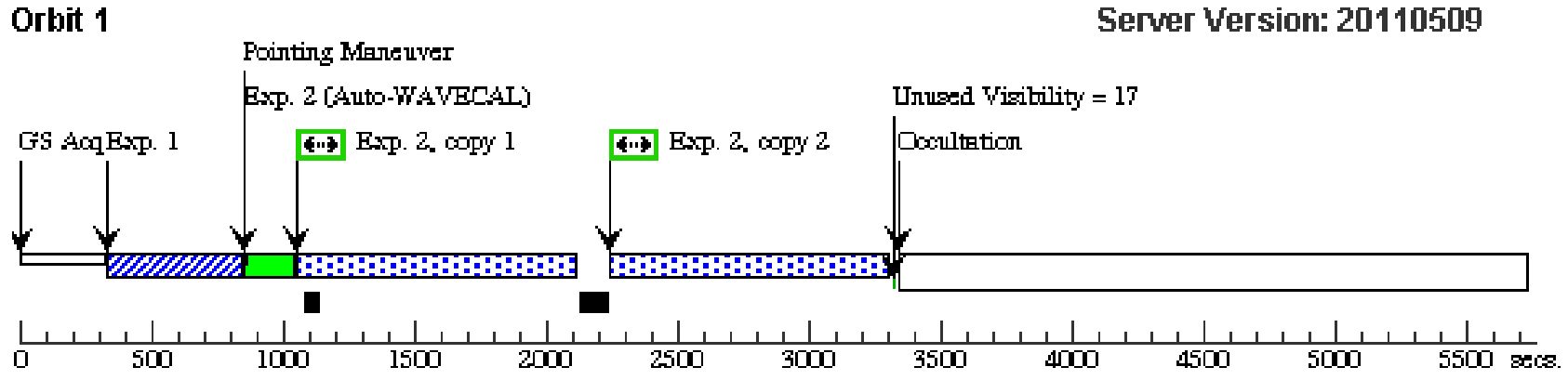
Fixed Targets

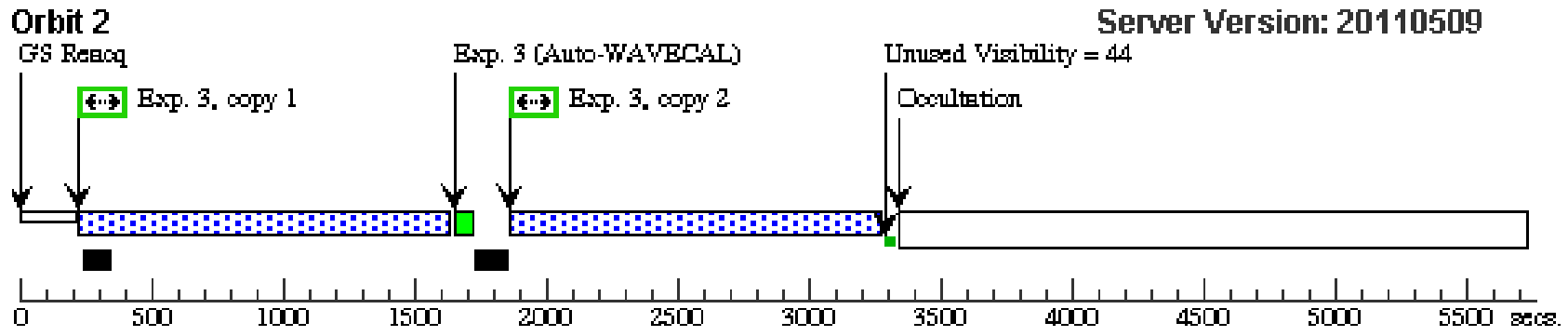
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SNR-NGC4449	RA: 12 28 10.9500 (187.0456250d) Dec: +44 06 48.60 (44.11350d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

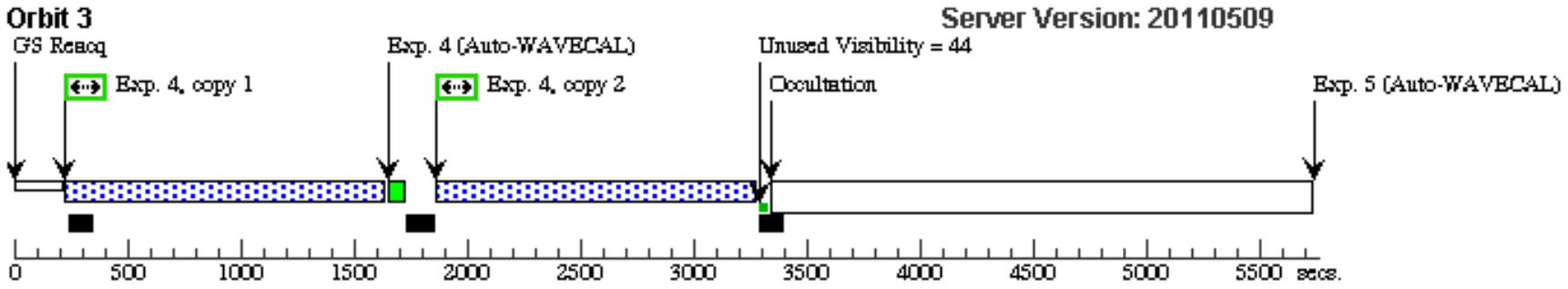
Exposures

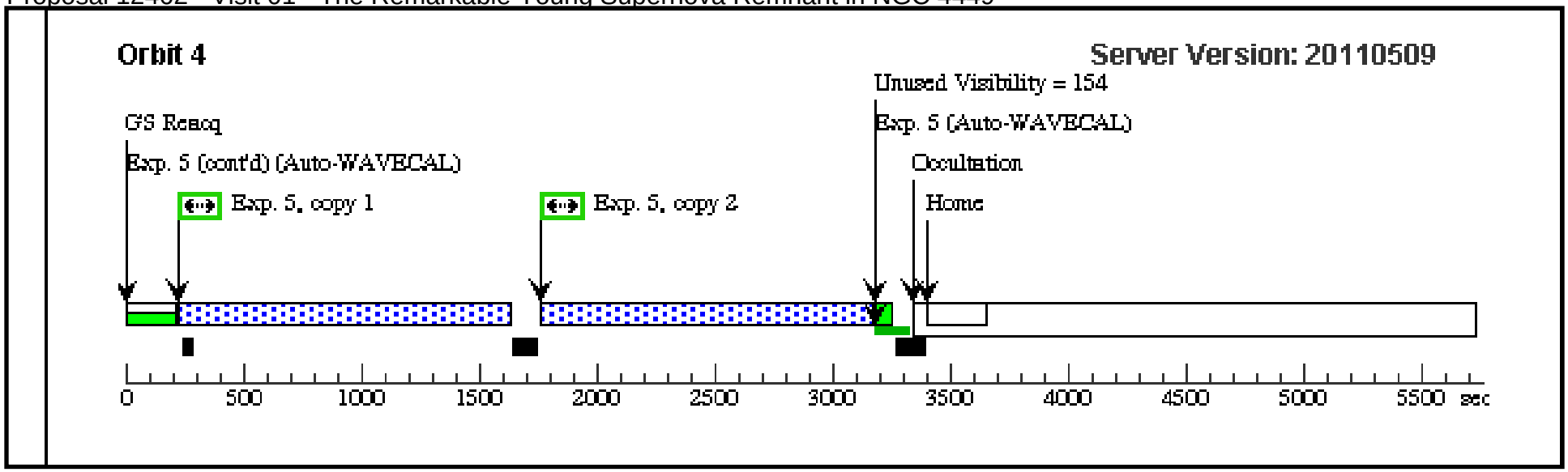
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SNR-NGC4449	STIS/CCD, ACQ, F28X50OIII	MIRROR		GS ACQ SCENARIO BASE1B3		60 Secs *[==>]*	***[1]***
2	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1050 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1400 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***
4	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1400 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
5	(178656)	(1) SNR-NGC4449	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A				1400 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***

Orbit Structure








Orbit 4
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Unused Visibility = 154
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Exp. 5 (Auto-WAVECAL)
Exp. 5 (cont'd) (Auto-WAVECAL)
Occultation
Exp. 5, copy 1
Exp. 5, copy 2
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12462, Visit 02, implementation Tue Aug 02 01:45:50 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA, STIS/NUV-MAMA

Special Requirements: SAME ORIENT AS 01

Comments: This visit consists of the acquisition and 3 orbits of FUV observations forllowed by one orbit of NUV observations of the SNR in NGC4449. It should be identical in terms of planning to Visit 1

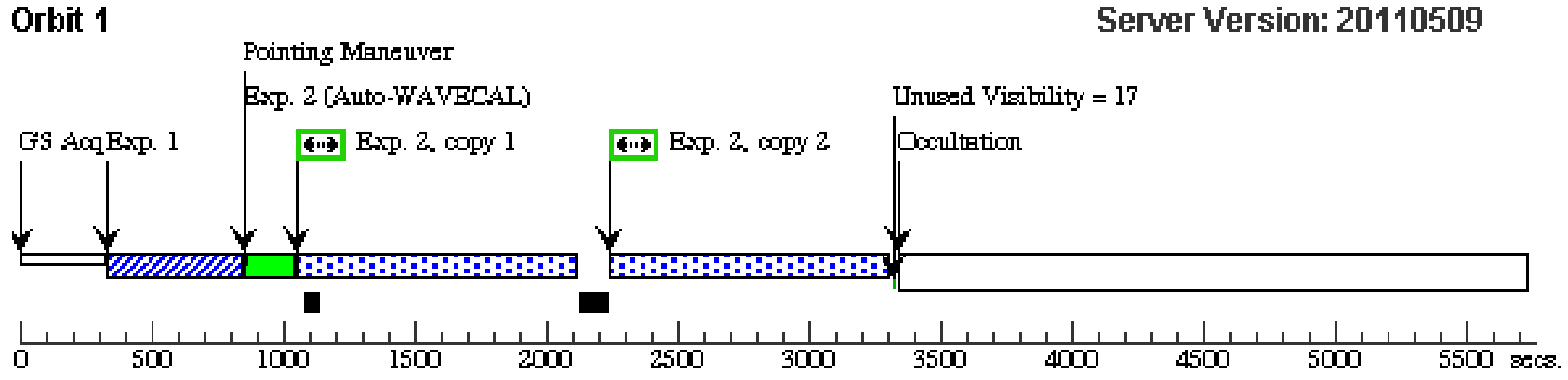
Fixed Targets

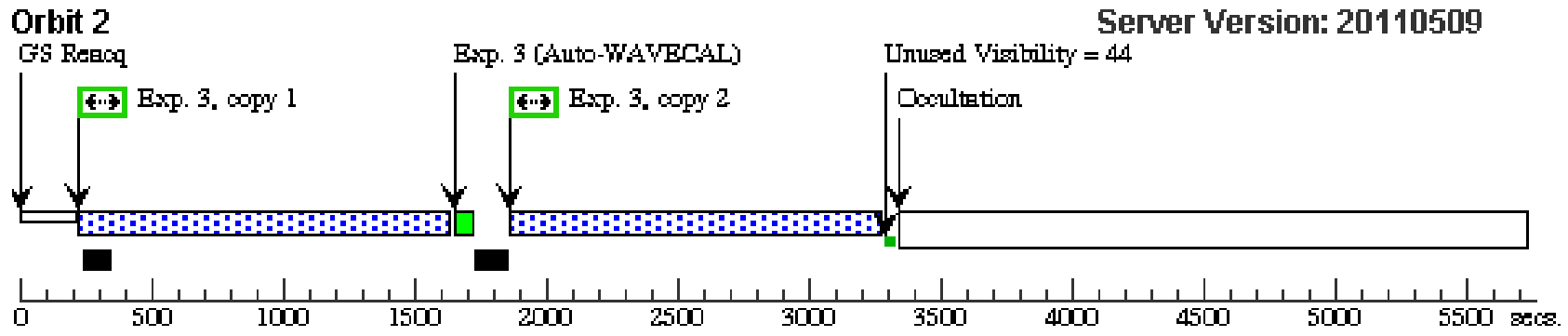
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SNR-NGC4449	RA: 12 28 10.9500 (187.0456250d) Dec: +44 06 48.60 (44.11350d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

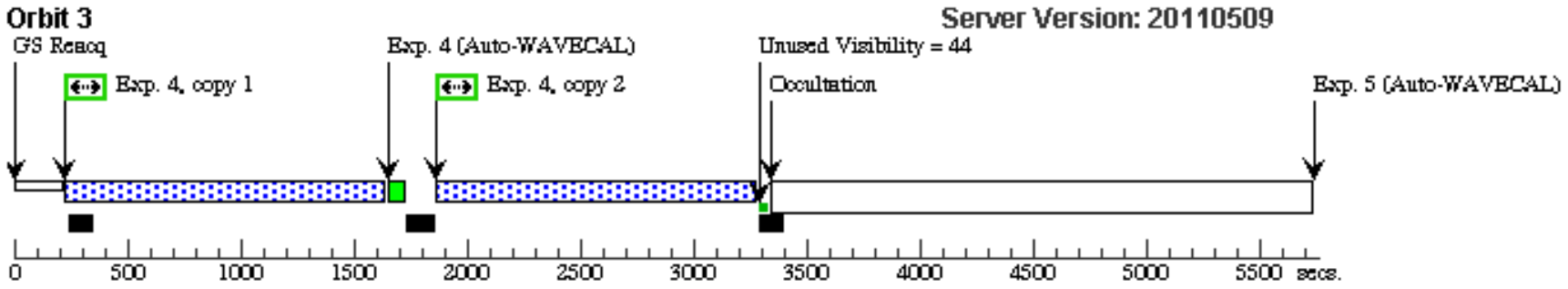
Exposures

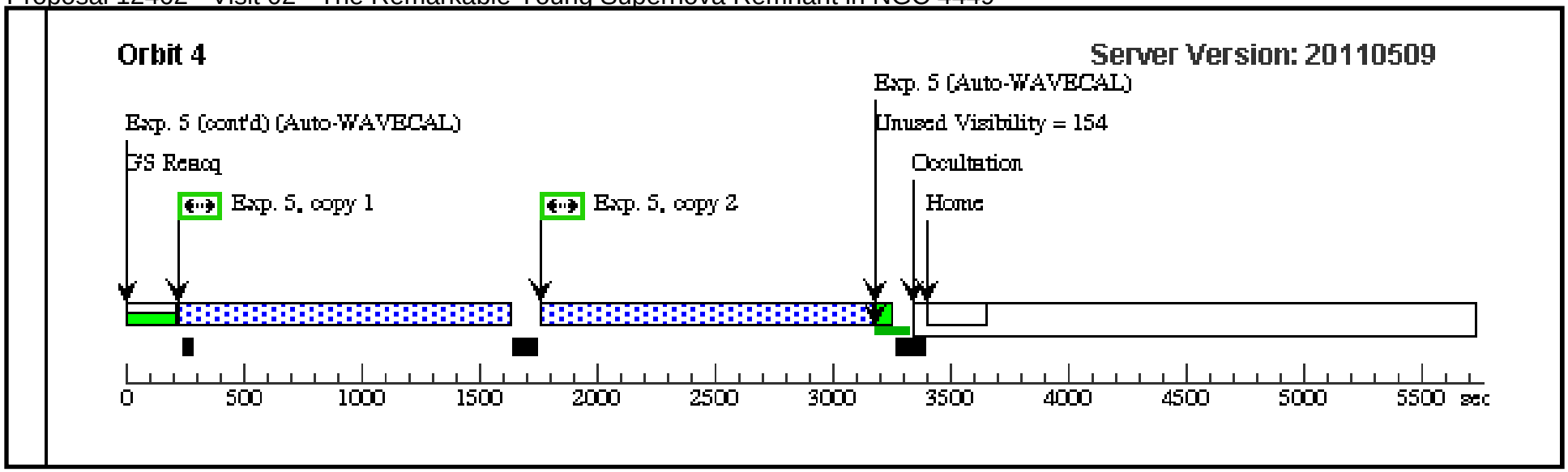
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SNR-NGC4449	STIS/CCD, ACQ, F28X50OIII	MIRROR		GS ACQ SCENARIO BASE1B3		60 Secs	
								[==>]	***[1]***
2	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1050 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
3	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1400 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[2]***
4	(178654)	(1) SNR-NGC4449	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A				1400 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[3]***
5	(178656)	(1) SNR-NGC4449	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A				1400 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[4]***

Orbit Structure








Orbit 4
Server Version: 20110509
Exp. 5 (Auto-WAVECAL)
Exp. 5 (cont'd) (Auto-WAVECAL)
Unused Visibility = 154
FS Reacq
Occultation
Exp. 5, copy 1
Exp. 5, copy 2
Home
0
500
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1500
2000
2500
3000
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4000
4500
5000
5500
sec

Visit

Proposal 12462, Visit 03, implementation Tue Aug 02 01:45:52 GMT 2011

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: SAME ORIENT AS 01

Comments: This visit obtains the visible spectrum of the SNR in NGC4449 with the STIS CCD

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.4	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
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Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SNR-NGC4449	STIS/CCD, ACQ, F28X50OIII	MIRROR		GS ACQ SCENARIO BASE1B3		60 Secs	
								[==>]	***[1]***
2	(178657)	(1) SNR-NGC4449	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=NO		Pattern 1, Exps 2-2 in Visit 03 (1)	1100 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***

Orbit Structure