14449 - Mid-Cycle: High res UV spectrum from galactic nova V5668 Sgr post dust formation

Cycle: 23, Proposal Category: GO/DD

(Availability Mode: AVAILABLE)

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) V5668SGR	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	23-Oct-2015 21:08:56.0	yes
1B	(2) V5668SGR-SAFE-TARGET	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	23-Oct-2015 21:08:57.0	yes
1A	(1) V5668SGR	S/C	1	23-Oct-2015 21:08:58.0	yes

3 Total Orbits Used

ABSTRACT

One high dispersion HST/STIS spectrum (1200-3100A) of the bright Galactic and extreme dust forming nova V5668 Sgr is required 1: to use the FUV spectrum to leverage the scientific return we can obtain from the extended set of Swift UVOT spectra with excellent temporal coverage (daily) of the dust-formation. A single HST orbit will extend that coverage to the important FUV and thus make V5668 Sgr a truly panchromatic nova when tied with the other multiwavelength observations. 2:use the full STIS FUV+NUV for calibrating and identifying blended lines in the recent UVOT spectra as well as determining the extinction from the 2175 A bump, Ly-alpha, and numerous important UV ISM lines. A good E(B-V) estimate is critical as it affects the derived luminosities and line strengths. 3:because V5668 Sgr is the brightest strong dust former in many decades and likely the only opportunity to obtain high res FUV spectra of a dusty nova in HSTs remaining life span. This data set can be used in conjunction with the IUE observations of the last one, V705 Cas (1993), to help understand the nature of the dust. This needs the multi-wavelength observations from radio to X-rays as well as the detailed determination of the velocities, densities, excitation and ionisation state that the STIS spectrum provides. V5668 Sgr already has an extensive data set available from gamma-rays through radio. Open questions are, why doesn't dust always form, what is its make-up and process of formation, and what is the effect of the X-rays on dust formation. 4:It is critical to obtain the high res UV observations while the nova emits X-rays. That phase is short-lived and will likely expire by the start of Cycle24.

OBSERVING DESCRIPTION

Only a single orbit is required to obtain sufficient S/N data with the medium echelle spectrograph. The STIS/MAMA UV observation can be scheduled any time during Cycle 23 as V5668 Sgr is only now reaching X-ray maximum. The X-rays provide the necessary photons to photoionize the ejecta making for a bright source. We anticipate this phase will continue for on order one year based on the X-ray evolution of other novae (Schwartz et al 2011, ApJS 197, 31). We do not expect V5668 Sgr to still be a bright X-ray source by the start of the next observing cycle.

The HST target visibility window for nova V5668 Sgr is about 50 minutes per orbit. A conservatively estimated overhead for each STIS MAMA exposure is 8 minutes, including all the necessary grating position changes, wavelength calibration exposures, and read out time. Since the brightness is V ~ 9.0 mag, we will be using the 0.2x0.2 arcsec^2 slit so no acquisition peak-up exposure is needed. Each orbital visit requires 12 minutes to acquire the source (6 minutes each for Guide Star and STIS target acquisitions). The STIS echelle protects the MAMA detectors from bright sources, provides the maximum spectral coverage with a minimum number of configurations, and provides the necessary high resolution. One E140M and two E230M (1978 A and 2707 A) exposures provide continuous UV coverage, 1123 A to 3111 A. The overhead leaves 6 minute exposures each for the E140M and two E230M exposures. This base observing plan has been successfully executed for four bright novae (T Pyx, V339 Del, V1369 Cen, V959 Mon) with V band magnitudes between 7th and 13th magnitude at sufficient SN.

The timing of this single orbit is not critical and thus can be fit into any available HST window in which V5668 Sgr is visible, though an earlier time is preferred. The reason for the flexibility is that the emission from the ejecta will remain bright for the foreseeable future since the energy is derived

from the strenghing X-ray photoionization coming from the white dwarf. The visit planner shows that V5668 Sgr can be observed until Nov 10, 2015, and from Feb 29 - Mar 20, 2016, and again from Apr 24 - May 13, 2016.

The exposure times were calculated using a spectrum from Swift UVOT for 1700-3200A, with a scaled HST spectrum of Nova Del (V339 Del) obtained during the second visit. The scaling was based on the mean flux level in the 2000-3000A region. The predicted S/N is more than 10.

Visit

Proposal 14449, visit 1 (01), implementation Sat Oct 24 01:08:59 GMT 2015

Diagnostic Status: Warning

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

Special Requirements: (none)

Comments: This should be scheduled in the evening-local time. Flags need to be cleared during the work day.

Diagnostics

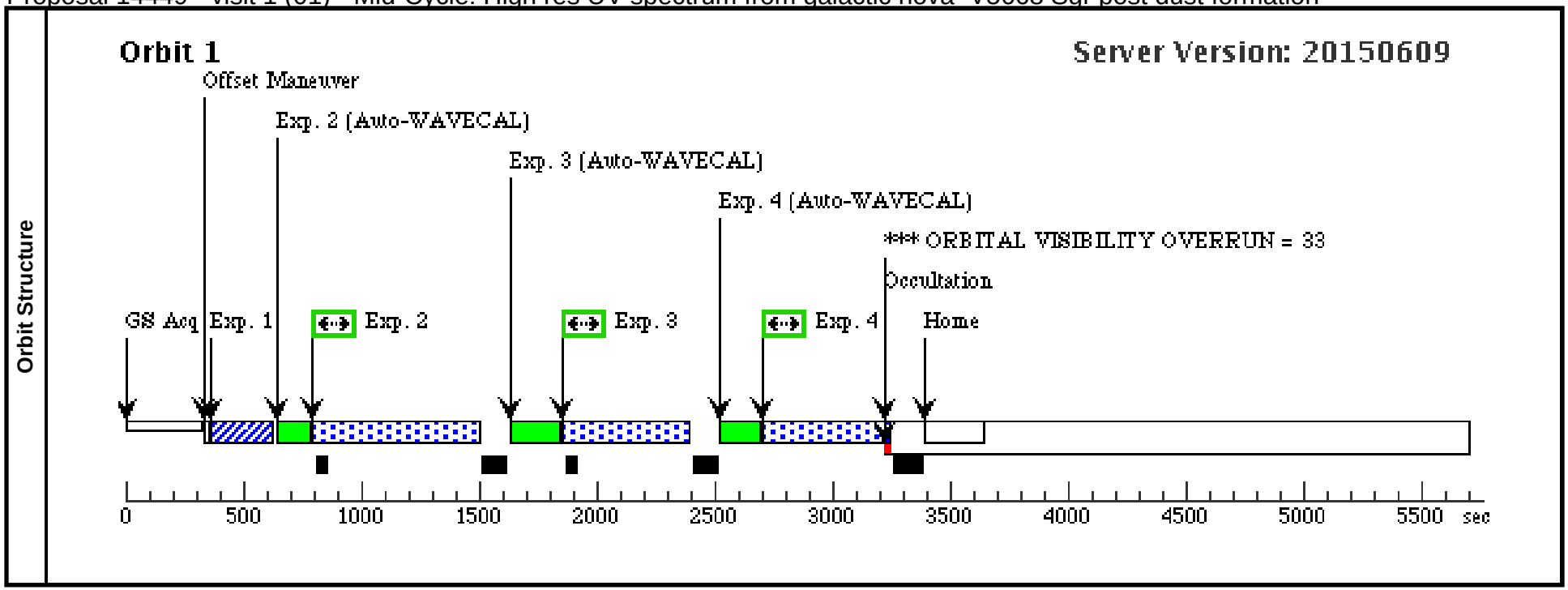
(visit 1 (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V5668SGR Alt Name1: NOVA-SGR2015B	RA: 18 36 56.8500 (279.2368750d) Dec: -28 55 39.80 (-28.92772d) Equinox: J2000		V=8.7+/-1.5 uvot uvm2 = 8.9+/-0.1	Reference Frame: ICRS

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.747963)	(1) V5668SGR	STIS/CCD, ACQ, F28X50OII	MIRROR	ACQTYPE=POINT	USE OFFSET V1AS AF; GS ACQ SCENARIO BASE1B3		1 Secs (1 Secs) *[==>]*	*[1]*
2	fuv (STIS.sp.747965)	(1) V5668SGR	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A		USE OFFSET V1AS AF		694 Secs (694 Secs) *[==>]*	*[1]*
3	nuv blue (STIS.sp.747966)	(1) V5668SGR	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A		USE OFFSET V1AS AF		527 Secs (527 Secs) *[==>]*	*[1]*
4	nuv red (STIS.sp.747967)	(1) V5668SGR	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A		USE OFFSET V1AS AF		527 Secs (527 Secs) *[==>]*	*[1]*


Orbit Structure
Orbit 1
Server Version: 20150609
Offset Maneuver
Exp. 2 (Auto-WAVECAL)
Exp. 3 (Auto-WAVECAL)
Exp. 4 (Auto-WAVECAL)
*** ORBITAL VISIBILITY OVERRUN = 33
Occultation
GS Acq
Exp. 1
Exp. 2
Exp. 3
Exp. 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14449, SCIENCETARGET-BOP-ONLY (1B), implementation Sat Oct 24 01:08:59 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: This visit is for BOP checking the safe target only and should not execute onboard HST.

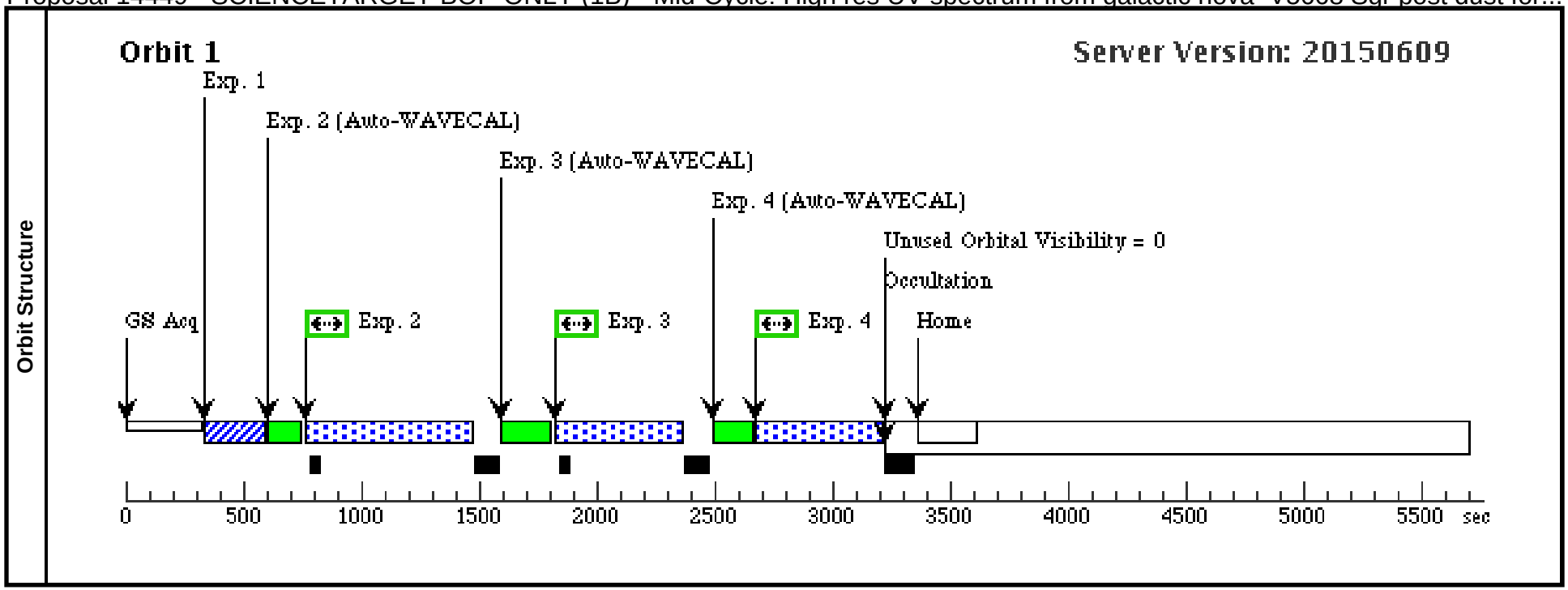
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V5668SGR Alt Name1: NOVA-SGR2015B	RA: 18 36 56.8500 (279.2368750d) Dec: -28 55 39.80 (-28.92772d) Equinox: J2000		V=8.7+/-1.5 uvot uvm2 = 8.9+/-0.1	Reference Frame: ICRS
(2)	V5668SGR-SAFE-TARGET Alt Name1: NOVA-SGR2015B	Offset from V5668SGR RA Offset: -0.56 Secs Dec Offset: -6.374 Arcsec		V=8.7+/-1.5	Offset Position (V5668SGR-SAFE-TARGET)

Comments: This target is a blank piece of sky which is the bright object safe pointing and is 9.751 arcsec away at PA 229.2 degrees from V5668SGR.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.747963)	(2) V5668SGR-SAFE-TARGET	STIS/CCD, ACQ, F28X50OII	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	*[1]*
2	fuv (STIS.sp.747965)	(2) V5668SGR-SAFE-TARGET	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				694 Secs (694 Secs) *[==>]*	*[1]*
3	nuv blue (STIS.sp.747966)	(2) V5668SGR-SAFE-TARGET	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				527 Secs (527 Secs) *[==>]*	*[1]*
4	nuv red (STIS.sp.747967)	(2) V5668SGR-SAFE-TARGET	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				527 Secs (527 Secs) *[==>]*	*[1]*


Orbit Structure
Orbit 1
Server Version: 20150609
Exp. 1
Exp. 2 (Auto-WAVECAL)
Exp. 3 (Auto-WAVECAL)
Exp. 4 (Auto-WAVECAL)
Unused Orbital Visibility = 0
Occultation
GS Acq
Exp. 2
Exp. 3
Exp. 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14449, S/C visit (1A), implementation Sat Oct 24 01:08:59 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: S/C

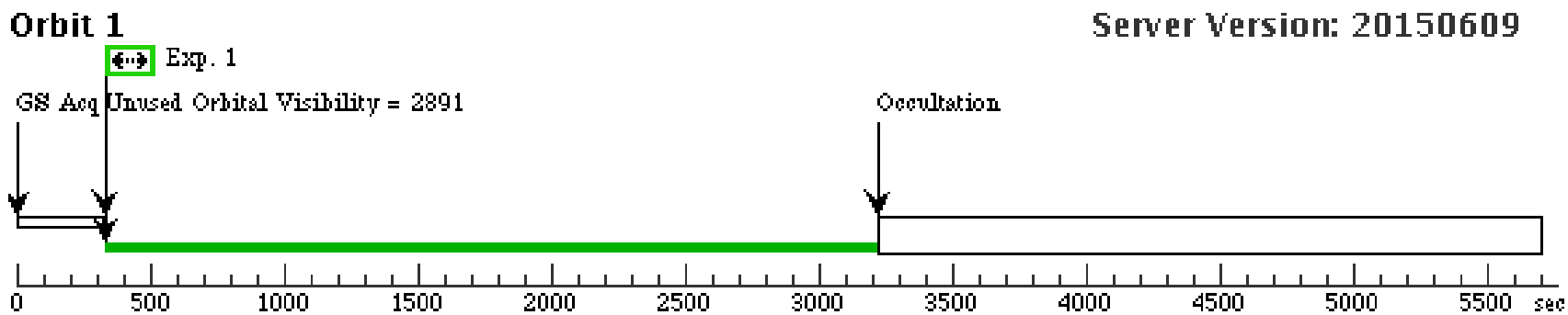
Special Requirements: (none)

Comments: This visit allocates and sets up the safe position offset slot for visit 14449 01 which will use that slot.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	V5668SGR Alt Name1: NOVA-SGR2015B	RA: 18 36 56.8500 (279.2368750d) Dec: -28 55 39.80 (-28.92772d) Equinox: J2000		V=8.7+/-1.5 uvot uvm2 = 8.9+/-0.1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) V5668SGR	S/C, DATA, V1			POS TARG -213.6324,-224.7879; SAVE OFFSET V1 ASAF; SPEC COM INSTR ECSLOTSET; GS ACQ SCENARIO BASE1B3; QESIPARM ANGLE 229.2; QESIPARM DIST 9.751		5 Secs (5 Secs) *[==>]*	*[1]*

Orbit Structure