12200 - STIS UV spectroscopy of a bright classical nova during its super soft X-ray phase

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

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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) NOVA-PYX-1890	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	26-Aug-2011 21:01:00.0	yes
02	(1) NOVA-PYX-1890	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	26-Aug-2011 21:01:07.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) NOVA-PYX-1890	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	26-Aug-2011 21:01:13.0	yes
99	(1) NOVA-PYX-1890	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	26-Aug-2011 21:01:21.0	yes

4 Total Orbits Used

ABSTRACT

We propose ToO observations of a bright classical nova (CN) in outburst using the STIS echelle to obtain ultraviolet spectroscopy while the source is X-ray luminous. The data will complement our existing ground based optical/infrared and Swift X-ray CN programs and provide continous spectral information from X-ray to the IR during this important X-ray phase for the first time. The UV spectroscopy is a critical bandpass that enables determination of ejecta physical properties, including the elemental abundances, mass, and structure. This information provides insight into the role of CNe in the isotopic enrichment of the interstellar medium, pre-solar grain abundances, details on the mass and composition of the underlying white dwarf, needed checks on hydrodynamic models of the outburst, and constraints on the relationship of CNe as SN Ia progenitors. UV data are key to these analyses, providing the only opportunity to observe strong carbon lines in these objects as well as direct measures of the interstellar reddening. With slit spectroscopy from ~ 1100-3100 Angstroms, HST is currently the only facility that can fill this important gap in the spectral energy distribution.

OBSERVING DESCRIPTION

We will observe a bright nova during its super soft source (SSS) X-ray phase as determined by Swift XRT monitoring. The program calls for three separate one orbit visits. The initial ToO trigger occurs when the source enters the SSS phase, e.g., the majority of photons have E ~< 1 keV and a Swift X-ray count rate ~> 0.1 ct/s. The second visit is initiated after the source has reached X-ray maximum and stabilized at an approximately constant level. The last visit is scheduled after the decline in the X-ray light curve indicating that nuclear burning has ended. This will give us UV spectra of the ejecta exposed to different photoionization levels.

In order to sample the full spectral range we will use the E140M and E230M gratings. The echelle is necessary to provide high resolution data while

also minimizing the flux on the MAMA detectors for this bright source. For each orbit we use the CCD and F28X50LP aperture to acquire the source. A 1 second exposure is sufficient to obtain enough S/N to acquire but if the source is too bright we will switch to the F20X50OII aperture. We will use the E140M and the E230M (lambda1978) to obtain the critical 1150-1700 Angstrom and 1600-2300 Angstrom spectra. In the first and second visits this will be supplmented with an additional E230M (lambda 2707) exposure to get the 2300-3100 Angstrom data. There will be no E230M (lambda 2707) during the third visit. The exposure times for each grating and position should be approximately equal in each visit, e.g. 360-590 seconds in visits 1 and 2 and longer 780-1050 second exposures in visit 3. The 0.2" X 0.2" slit will be used unless the nova is too bright in which case we will use an appropriate neutral density filter. This is unlikely as such novae are relatively rare. We will use visual photometry and Swift UVOT data to estimate the UV brightness before each visit to ensure the health of the MAMA detectors.

REAL TIME JUSTIFICATION

This is a Target of Opportunity program and thus will be scheduled once the PI identifies an acceptable target. The program also utilizes the STIS MAMA detectors so the observations must be taken in non-SAA impacted orbits.

Visit

Proposal 12200, Visit 01, completed Sat Aug 27 01:01:27 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 05-MAY-2011:00:00:00 AND 10-MAY-2011:00:00:00

Comments: First observation before visual maximum. T Pyx has reached V ~ 7.5 mag.

Fixed Targets

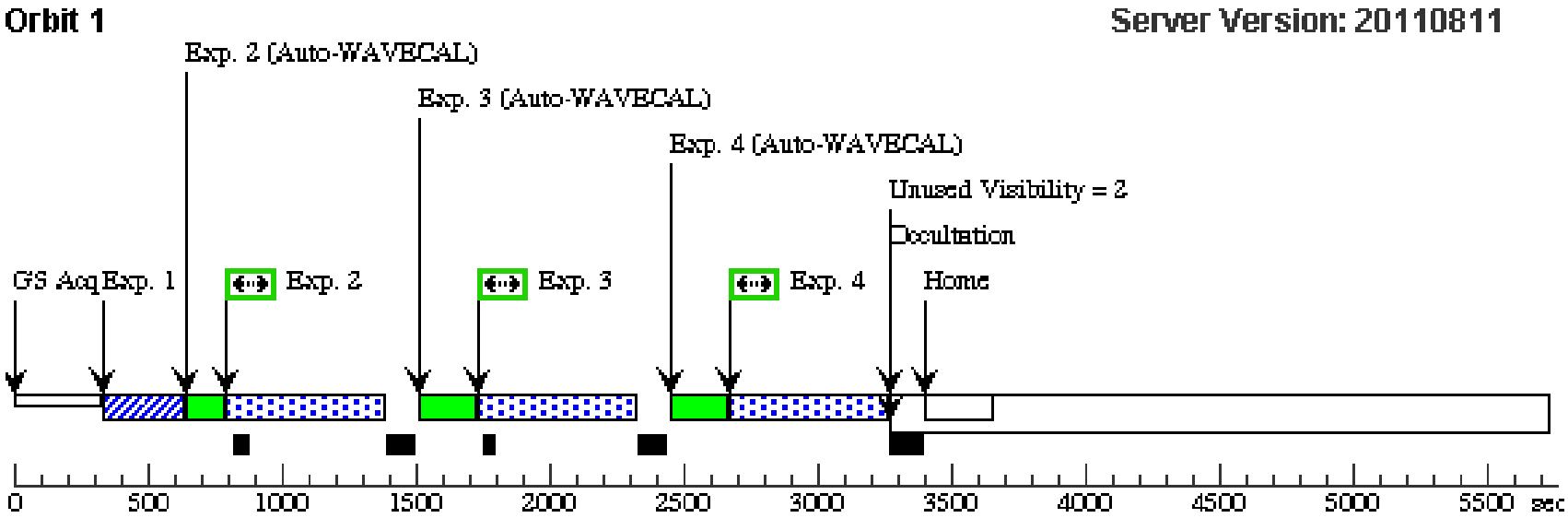
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NOVA-PYX-1890	RA: 09 04 41.5000 (136.1729167d)		V=6.5 +/-0.5	Reference Frame: ICRS
	Alt Name1: TPYX	Dec: -32 22 47.50 (-32.37986d)			
		Equinox: J2000			

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/[Actual Dur.]	Orbit
1	Visit1/ACQ	(1) NOVA-PYX-1890	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs	
								[==>]	***[1]***
2	Visit1/FUV	(1) NOVA-PYX-1890	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				360 Secs	
								[==>571.0 Secs]	***[1]***
3	Visit1/NUV 1978	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				360 Secs	
								[==>571.0 Secs]	***[1]***
4	Visit1/NUV 2707	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230H 2762 A				360 Secs	
								[==>571.0 Secs]	***[1]***

Orbit Structure



Visit

Proposal 12200, Visit 02, withdrawn Sat Aug 27 01:01:28 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 27-JUL-2011:00:00:00 AND 05-AUG-2011:00:00:00

Comments: Modified V2 for a brighter T Pyx than initially expected.

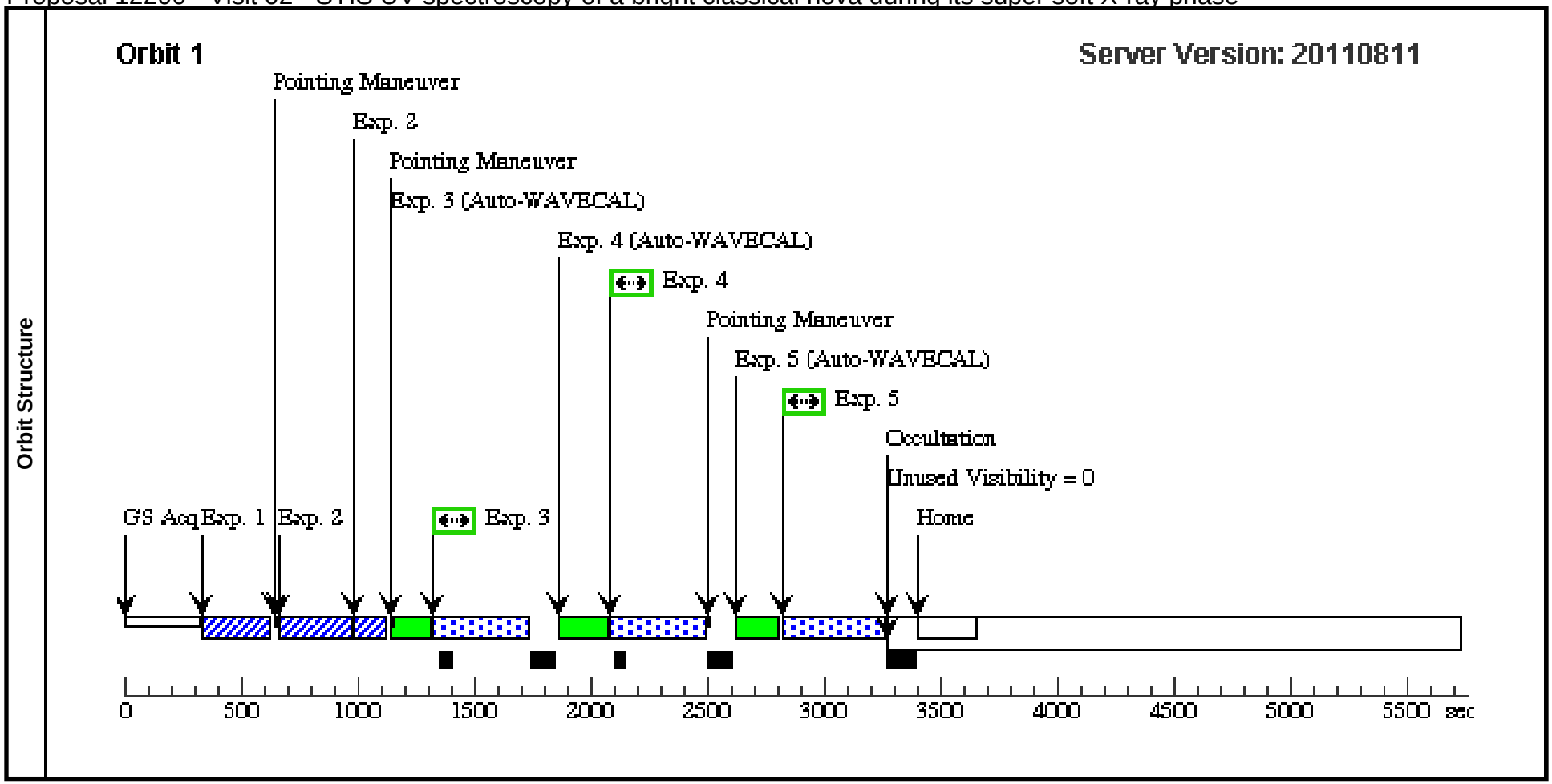
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NOVA-PYX-1890	RA: 09 04 41.5000 (136.1729167d)		V=6.5 +/-0.5	Reference Frame: ICRS
	Alt Name1: TPYX	Dec: -32 22 47.50 (-32.37986d)			
		Equinox: J2000			

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/[Actual Dur.]	Orbit
1		(1) NOVA-PYX-1890	STIS/CCD, ACQ, F25ND3	MIRROR				1 Secs	
								[==>]	***[1]***
2		(1) NOVA-PYX-1890	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1 Secs	
								[==>]	***[1]***
3		(1) NOVA-PYX-1890	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				250 Secs	
								[==>392.0 Secs]	***[1]***
4		(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				250 Secs	
								[==>392.0 Secs]	***[1]***
5		(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.05ND	E230M 2707 A				250 Secs	
								[==>392.0 Secs]	***[1]***


Orbit Structure
Orbit 1
Server Version: 20110811
Pointing Maneuver
Exp. 2
Pointing Maneuver
Exp. 3 (Auto-WAVECAL)
Exp. 4 (Auto-WAVECAL)
Exp. 4
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Exp. 5
Occultation
Unused Visibility = 0
GS Acq
Exp. 1
Exp. 2
Exp. 3
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 12200, Visit 03, implementation Sat Aug 27 01:01:29 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: AFTER 99 BY 50 D TO 120 D; BETWEEN 25-SEP-2011:00:00:00 AND 08-OCT-2011:00:00:00; ON HOLD

Comments: To be taken after the large decline from the optical "plateau" or pending an event in the X-ray, e.g. a unexpected rebrightening or final decline.

On Hold Comments: Target of Opportunity. Hold will be released when selected source fades from X-ray maximum as seen by Swift.

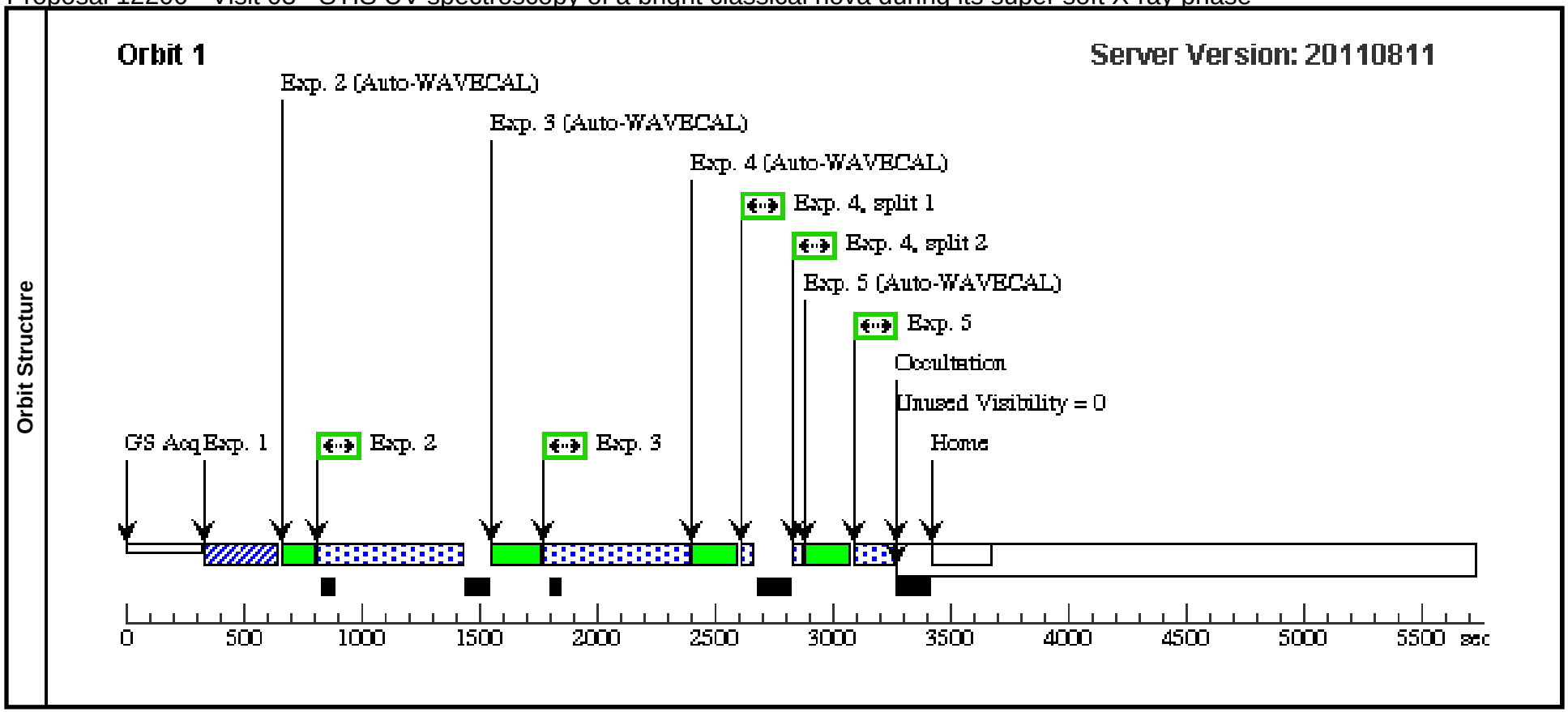
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NOVA-PYX-1890	RA: 09 04 41.5000 (136.1729167d)		V=6.5 +/-0.5	Reference Frame: ICRS
	Alt Name1: TPYX	Dec: -32 22 47.50 (-32.37986d)			
		Equinox: J2000			

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/[Actual Dur.]	Orbit
1	Visit3/ACQ	(1) NOVA-PYX-1890	STIS/CCD, ACQ, F25ND3	MIRROR				5 Secs	
								[==>]	***[1]***
2	Visit3/FUV	(1) NOVA-PYX-1890	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M				780 Secs	
				1425 A				*[==>600.0 Secs]*	***[1]***
3	Visit3/NUV #1	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M				780 Secs	
				1978 A				*[==>600.0 Secs]*	***[1]***
4	Visit3/Optical	(1) NOVA-PYX-1890	STIS/CCD, ACCUM, 0.2X0.2	G430L				5 Secs	
				4300 A				*[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
5	Visit 3/NUV #2	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M				155 Secs	
				2707 A				*[==>]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20110811
Exp. 2 (Auto-WAVECAL)
Exp. 3 (Auto-WAVECAL)
Exp. 4 (Auto-WAVECAL)
Exp. 4, split 1
Exp. 4, split 2
Exp. 5 (Auto-WAVECAL)
Exp. 5
Occultation
Unused Visibility = 0
GS Acq
Exp. 1
Exp. 2
Exp. 3
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Proposal 12200 - Visit 99 - STIS UV spectroscopy of a bright classical nova during its super soft X-ray phase

Visit

Proposal 12200, Visit 99, completed Sat Aug 27 01:01:30 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 25-JUL-2011:00:00:00 AND 05-AUG-2011:00:00:00

Comments: This is a substitute visit to replace the currently scheduled 2nd visit. The reason for this substitution is that T Pyx has undergone an unexpected dust formation event, the first in a recurrent nova. The formation of dust has cause the UV flux, as measured by Swift UVOT photometry, to plummet in the last few days. The decrease is sufficient to make parts of the current 2nd visit less than optimal, specifically the neutral density filter on the E230M (2707) exposure. If the second visit plan can be changed we would like to substitute this version to account for the significantly lower UV flux and include a few optical exposures since T Pyx can't currently be observed from the ground.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NOVA-PYX-1890	RA: 09 04 41.5000 (136.1729167d)		V=6.5 +/-0.5	Reference Frame: ICRS
	Alt Name1: TPYX	Dec: -32 22 47.50 (-32.37986d)			
		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/[Actual Dur.]	Orbit
1	V2/ACQ	(1) NOVA-PYX-1890	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs	
								[==>]	***[1]***
2	V2/FUV (STIS.sp.201006)	(1) NOVA-PYX-1890	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				285 Secs	
								[==>]	***[1]***
3	V2/NUVa (STIS.sp.201007)	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				285 Secs	
								[==>]	***[1]***
4	V2/NUVb (STIS.sp.201002)	(1) NOVA-PYX-1890	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230H 2762 A				35 Secs	
								[==>]	***[1]***
5	V2/Hbeta (STIS.sp.201003)	(1) NOVA-PYX-1890	STIS/CCD, ACCUM, 0.2X0.2	G430M 4961 A				1 Secs	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***
6	V2/HeII (STIS.sp.201005)	(1) NOVA-PYX-1890	STIS/CCD, ACCUM, 0.2X0.2	G430M 4706 A				1 Secs	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***
7	V2/Halpha (STIS.sp.201008)	(1) NOVA-PYX-1890	STIS/CCD, ACCUM, 0.2X0.2	G750M 6581 A				1 Secs	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***

Orbit Structure