14036 - Post-equinox Uranus aurorae during a strong magnetosphere-solar wind shock interaction

Cycle: 22, Proposal Category: GO/DD

(UV Initiative)

(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) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:35.0	yes
02	(1) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:37.0	yes
03	(1) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:38.0	yes
04	(1) URANUS	COS/FUV COS/NUV	1	15-Oct-2014 21:17:39.0	yes
05	(1) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:40.0	yes
06	(1) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:42.0	yes
07	(1) URANUS	STIS/FUV-MAMA	1	15-Oct-2014 21:17:43.0	yes

7 Total Orbits Used

ABSTRACT

HST recently succeeded to re-detect Uranus aurorae with imaging and spectroscopy in 2011 (sampling solar wind shock interactions) and 2012 (sampling two planetary rotations), when the planet was near-equinox. The detected emissions (4 positive detections to date) both differ from the Uranian aurorae detected by Voyager 2 in 1986, at solstice, from those detected in a single HST image in 1998, and from other well-known planetary aurorae. Their characteristics suggested a different control of solar wind and planetary rotation on auroral processes than that known at other planets. The morphology of the aurorae seemingly evolves along the Uranian orbital revolution as a function of the topology of open/closed field lines imposed by the tilt between the magnetic axis and the solar wind flow. Uranus passed equinox 7 years ago and now gradually reaches an intermediate equinox-to-solstice configuration which deserves to be fully analyzed. The purpose of this proposal is to enlarge the set of positive detections and to sample the auroral processes and associated magnetospheric dynamics at relevant timescales (1/3 rotation to ~1 week/~10 rotations) in the present equinox-to-solstice configuration. To increase the probability of auroral brightening triggered by magnetospheric compressions, observations will again be scheduled during active solar wind conditions predicted for late Oct. 2014, with a validated methodology used for previous observations. Additional objectives include the extended study of airglow, the characterization of the extended neutral corona and the investigation of the atmospheric hydrocarbon photochemistry.

OBSERVING DESCRIPTION

Uranus will be observed through a sequence of 7 HST orbits distributed along approximately a week sampling the arrival at Uranus of an interplanetary shock, so far predicted to reach the planet on 31 Oct. 2014. The arrival time of the interplanetary shock will be checked (and further refined) by iterative runs of robust MHD propagation codes.

The proposed observations will consist of 6 STIS orbits, with TIME-TAG imaging using the clear and SRF2 filters, and 1 COS orbit, with TIME-TAG spectroscopy using the FUV G140L gratings. STIS will track the reflected solar emission, airglow and auroral emissions. COS will additionally attempts to detect atmospheric absorption or emission by hydrocarbons.

We request the COS orbit to imediatly follow or preceed one STIS orbit, to help the analysis of COS spectra with STIS images.

Visit

Proposal 14036, Visit 01, scheduling Thu Oct 16 01:17:44 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 31-OCT-2014:23:30:00 AND 01-NOV-2014:00:30:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit 01 originally needs to be scheduled at t0 +/- 0.05days, where t0 = 304.3 DOY 2014.
revised : Thus, I suggest to schedule visit 1 it just before the SAA passage : 308:23:31:55 309:00:23:41

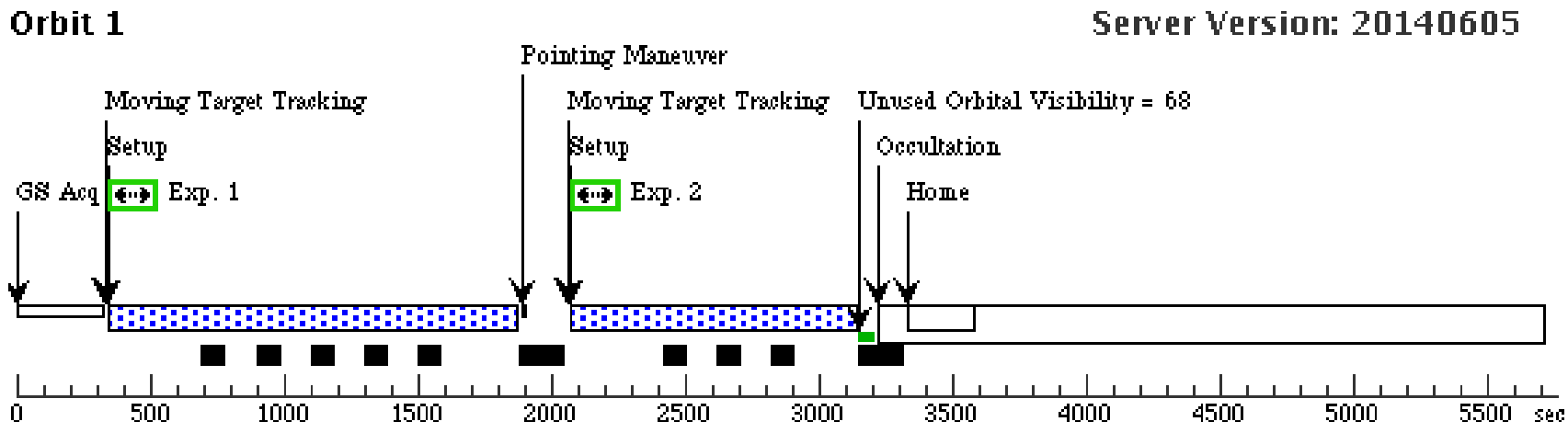
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3; GS ACQ SCENARIO BASE1B3	Sequence 1-2 Non-Int in Visit 01	1360 Secs (1360 Secs) [==>]	[1]
	Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.								
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 01	900 Secs (900 Secs) [==>]	[1]
	Comments: Expand exposure time if possible.								

Orbit Structure



Visit

Proposal 14036, Visit 02, scheduling Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 01-NOV-2014:23:30:00 AND 02-NOV-2014:01:00:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit 02 originally needs to be scheduled at t0 + 1.94 days +/- 0.05days.
revised : 305:14:19:43 305:15:11:05

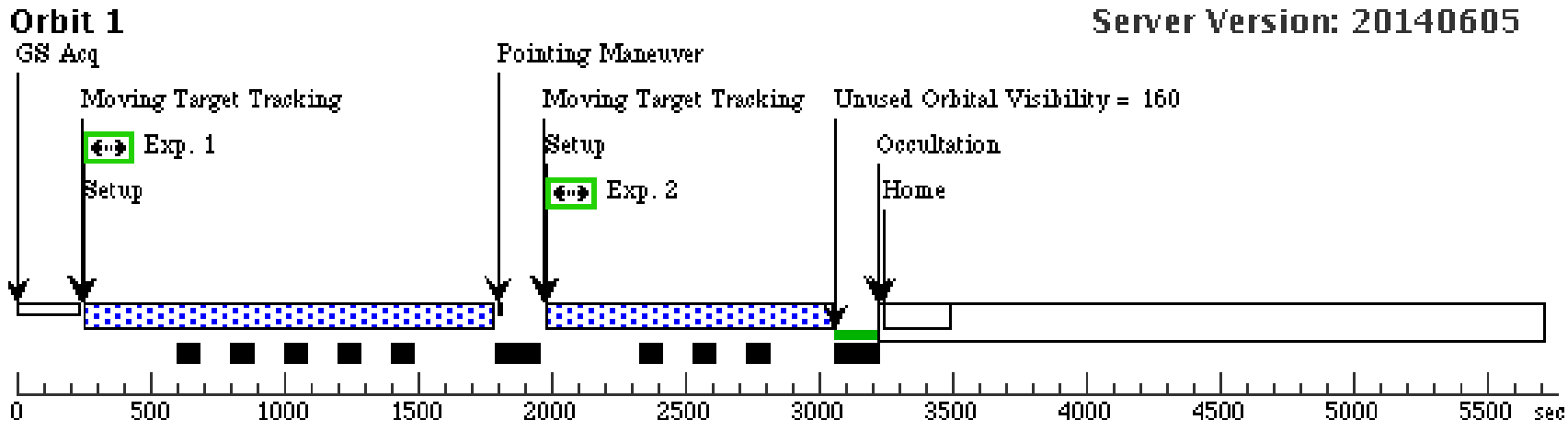
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3; GS ACQ SCENARIO ONEB1B3	Sequence 1-2 Non-Int in Visit 02	1360 Secs (1360 Secs) *[==>]*	*[1]*
Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.									
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 02	900 Secs (900 Secs) *[==>]*	*[1]*
Comments: Expand exposure time if possible.									

Orbit Structure



Visit

Proposal 14036, Visit 03, scheduling Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 02-NOV-2014:14:00:00 AND 02-NOV-2014:15:00:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit 03 originally needs to be scheduled at t0 + 2.30 days +/- 0.05days.

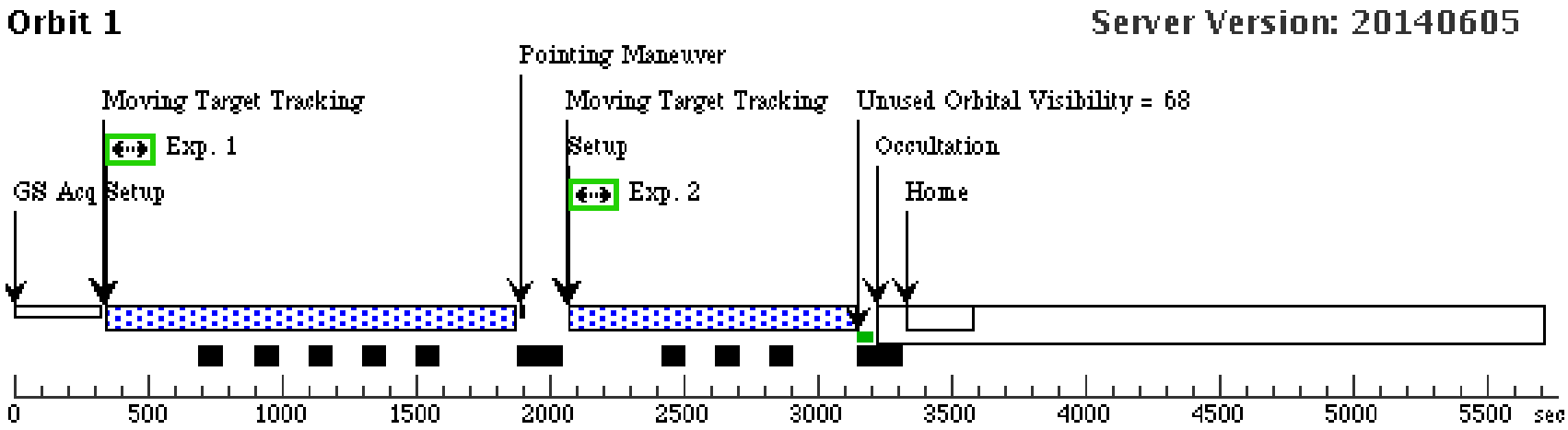
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3; GS ACQ SCENARIO BASE1B3	Sequence 1-2 Non-Int in Visit 03	1360 Secs (1360 Secs) *[==>]*	*[1]*
	Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.								
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 03	900 Secs (900 Secs) *[==>]*	*[1]*
	Comments: Expand exposure time if possible.								

Orbit Structure



Visit

Proposal 14036, Visit 04, scheduling Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: AFTER 03 BY .5 Orbits TO 1.5 Orbits; VISIBILITY INTERVAL 51 M

Comments: Visit 04 originally needs to be scheduled at t0 + 2.35 days +/- 0.05days.
It is important to attempt to have Visit 04 (spectroscopy) just consecutive to Visit 03 (imaging).

Diagnostics

(Visit 04) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

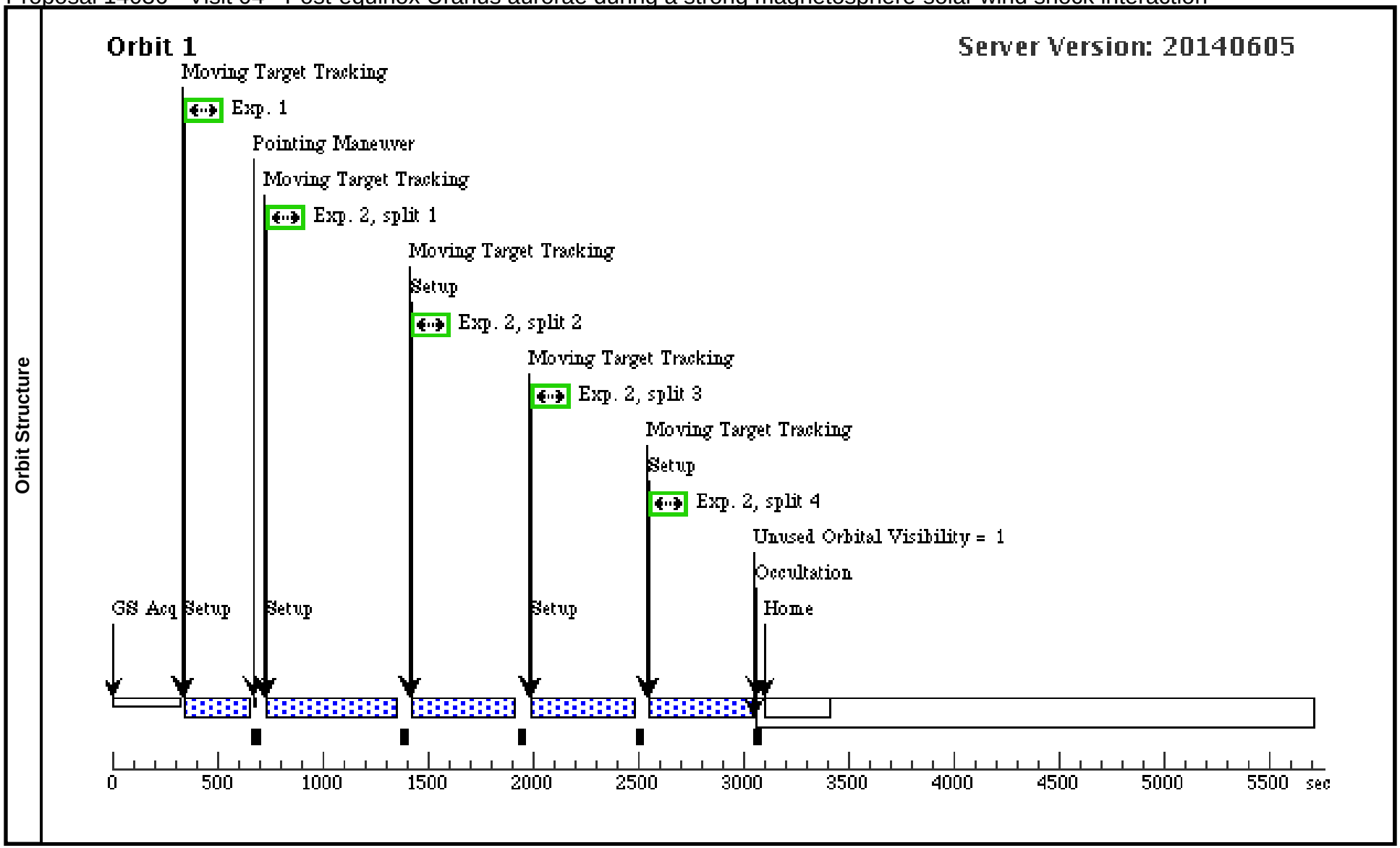
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(640548)	(1) URANUS	COS/NUV, ACCUM, BOA	MIRRORA		GS ACQ SCENARIO BASE1B3	Sequence 1-2 Non-Int in Visit 04	1 Secs (1 Secs) *[==>]*	 ***[1]***
2	(637746)	(1) URANUS	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=2180; FP-POS=ALL; EXTENDED=YES		Sequence 1-2 Non-Int in Visit 04	439 Secs (1756 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***

Comments: In the ETC calculation, we used a real STIS FUV spectrum of Uranus, for which the solar light contribution was then linearly extrapolated between 1650A and 2250A (to reach 1e-15 erg/cm2/s/A/arcsec2).

Expand exposure time as much as possible.


Orbit Structure
Orbit 1
Server Version: 20140605
Moving Target Tracking
Exp. 1
Pointing Maneuver
Moving Target Tracking
Exp. 2, split 1
Moving Target Tracking
Setup
Exp. 2, split 2
Moving Target Tracking
Exp. 2, split 3
Moving Target Tracking
Setup
Exp. 2, split 4
Unused Orbital Visibility = 1
Occultation
GS Acq
Setup
Setup
Setup
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14036, Visit 05, scheduling Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 05-NOV-2014:20:00:00 AND 05-NOV-2014:21:00:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit originally 05 needs to be scheduled at t0 + 5.35 days +/- 0.05days.
revised : 309:12:16:10 309:13:08:03

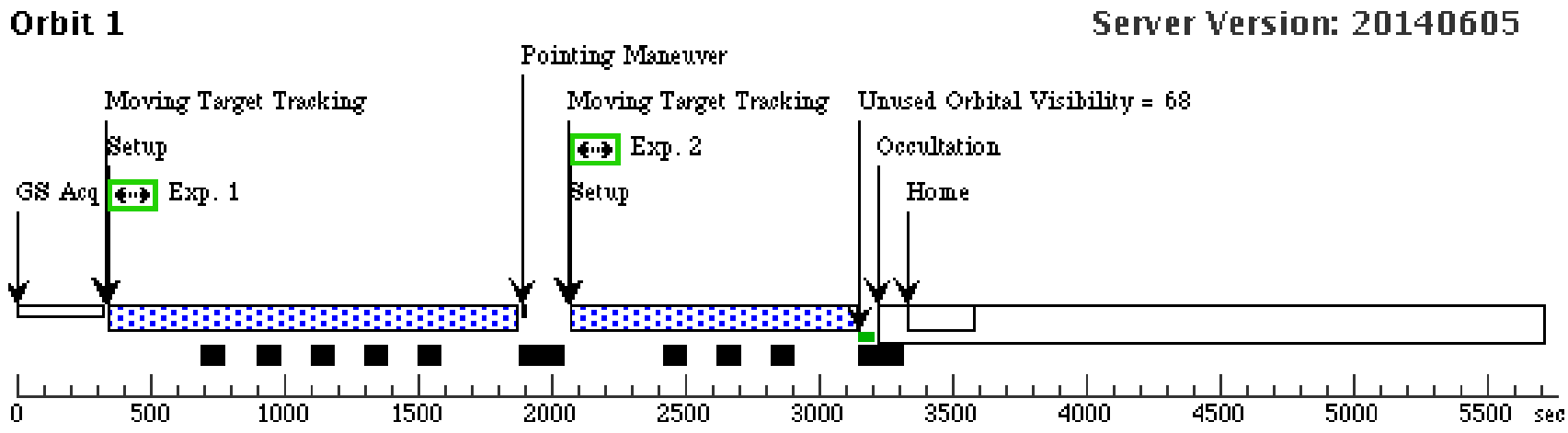
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3; GS ACQ SCENARIO BASE1B3	Sequence 1-2 Non-Int in Visit 05	1360 Secs (1360 Secs) *[==>]*	*[1]*
Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.									
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 05	900 Secs (900 Secs) *[==>]*	*[1]*
Comments: Expand exposure time if possible.									

Orbit Structure



Visit

Proposal 14036, Visit 06, implementation Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 22-NOV-2014:14:45:00 AND 22-NOV-2014:15:15:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit 06 originally needs to be scheduled at t1 +/- 0.2 days, where t1 = 329.8 DOY 2014 (the estimate of t1 may be slightly updated during the coming week with the propagation of newly available solar wind data at Earth).

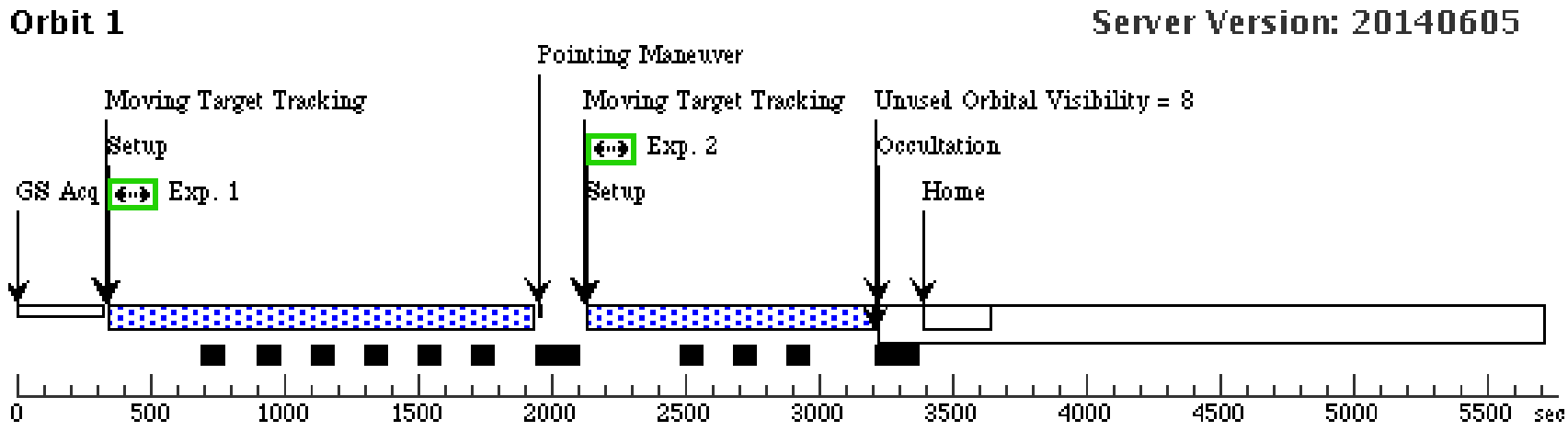
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 06	1420 Secs (1420 Secs) *[==>]*	*[1]*
	Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.								
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 06	900 Secs (900 Secs) *[==>]*	*[1]*
	Comments: Expand exposure time if possible.								

Orbit Structure



Visit

Proposal 14036, Visit 07, implementation Thu Oct 16 01:17:45 GMT 2014

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 24-NOV-2014:05:00:00 AND 27-NOV-2014:06:00:00

Comments: The filters and integration times are similar to those used in proposal 13012.

Visit 07 originally needs to be scheduled at t1 +2.45 +/- 0.05 days.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	URANUS	STD=URANUS				EARTH

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Clear image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, 25MAMA	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 07	1420 Secs (1420 Secs) [==>]	[1]
Comments: A POS TARG of -3arcsec in AXIS2 will move Uranus' signal away from the repeller wire shadow.									
2	Filtered image (189449)	(1) URANUS	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=200	POS TARG null,-3	Sequence 1-2 Non-Int in Visit 07	900 Secs (900 Secs) [==>]	[1]
Comments: Expand exposure time if possible.									

Orbit Structure