13183 - Monitoring the velocity of the interplanetary hydrogen

Cycle: 20, 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) UPWIND	STIS/FUV-MAMA	1	10-Apr-2013 21:00:55.0	yes
02	(2) UPWIND-COPY	STIS/FUV-MAMA	1	10-Apr-2013 21:01:02.0	yes

2 Total Orbits Used

ABSTRACT

We are proposing to use HST/STIS over a single orbit to make Lyman-alpha observations of the interplanetary hydrogen (IPH) during the March-April period of this year (2013). This special request is driven by the need to resolve the current controvery between Ulysses and IBEX results, to better characterize the trend of the IPH velocity with the solar cycle, and to provide new constraints on the state of the local interstellar medium. Monitoring the IPH velocity is a keystone to understand the dynamics of the heliosphere and the local interstellar medium. Results can be applied to the study of astrospheres.

OBSERVING DESCRIPTION

We propose to obtain 1 high-resolution profile of the background emission at Ly-alpha, in the upwind direction (lambda = 252.7, beta = -15.43 in celestial coordinates), with the echelle E140H grating associated with the long slit 52" x 0.5" and the FUV MAMA detectors. These observations will be the second one in a multi-cycle series to explore IPH properties, going from solar maximum toward the next minimum, tracking both long and short-term variations with a single-instrument as a baseline.

This is an unsupported mode that blends spectral features from different orders of the echelle grating but greatly increases the signal-to-noise ratio in the resulting spectrum. We have already made a detailed analysis of STIS observations made in 2001 with similar conditions, so we have a pipeline to process the data : it performs dark subtraction and flat field correction, then corrects a geometric distortion which affects the vertical alignment of spectral features by using the procedure developed by Malamuth (1997, 1998) and Welsh et al. (2001). Moreover we have identified contaminations by geocoronal oxygen and their locations in the orders of interest.

Malamuth, E., 1997, HST Proposal ID # 7788
Malamuth, E., et al. 1998, AAS, 193, 0815
Walsh, J.R., Goudfrooij, P., Malamuth, E. 2001, Instrument Science Report STIS 2001-02

REAL TIME JUSTIFICATION

We desire to obtain the maximum Doppler shift between the interplanetary and geocoronal emissions in order to maximize the separation between the IPH emission and the geocoronal background Ly-alpha contribution. This requires that the Earth moves toward the upwind direction, so the observation should occur in a window of 2 months centred around 1st April 2013.

We are also planning to make coordinated observations with SOHO/SWAN for cross-calibration with the intensity maps provided by SWAN. Because of antenna problems which significantly degrades the quality of SWAN data, the period between 26 March and 3 April should be avoided if possible.

ADDITIONAL COMMENTS

We need the time-tag mode in order to monitor the time-evolution of the signal, particularly the signal from the geocorona.

Visit

Proposal 13183, IPH_2013 (01), failed Thu Apr 11 01:01:09 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 01-MAR-2013:00:00:00 AND 30-APR-2013:00:00:00

Comments: Please schedule as close as possible to 1 April 2013.

We desire to obtain the maximum Doppler shift between the interplanetary and geocoronal emissions in order to maximize the separation between the IPH emission and the geocoronal background Ly-alpha contribution. This requires that the Earth moves toward the upwind direction, so the observation should occur in a window of 2 months centred around 1st April 2013.

We are also planning to make coordinated observations with SOHO/SWAN for cross-calibration with the intensity maps provided by SWAN. Because of antenna problems which significantly degrades the quality of SWAN data, the period between 26 March and 3 April should be avoided if possible. This has not been set as a timing requirement because we do not want to lose the opportunity of an observation around 1 April.

Diagnostics

(IPH_2013 (01)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(IPH_2013_exp1 (01.001)) Warning (Form): Sensitive exposures should have an ETC run number provided.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UPWIND	RA: 16 50 46.7511 (252.6947962d) Dec: -15 25 28.35 (-15.42454d) Equinox: J2000		V=18 SURF-LINE(1216)=2.+/-1.e-12, W-LINE(1216)=0.15+/-0.1	Reference Frame: ICRS

Comments: Upwind direction of the interplanetary hydrogen. To be observed with no stars brighter than V-Magnitude=18 in the aperture.

The coordinates have been slightly modified since the phase 1, to make sure that there will be no star in the field of view, whatever is the orientation of the slit. These new coordinates are reletively close but slightly different from the coordinates used for the phase 2 of observations made in 2012 (program 12800).

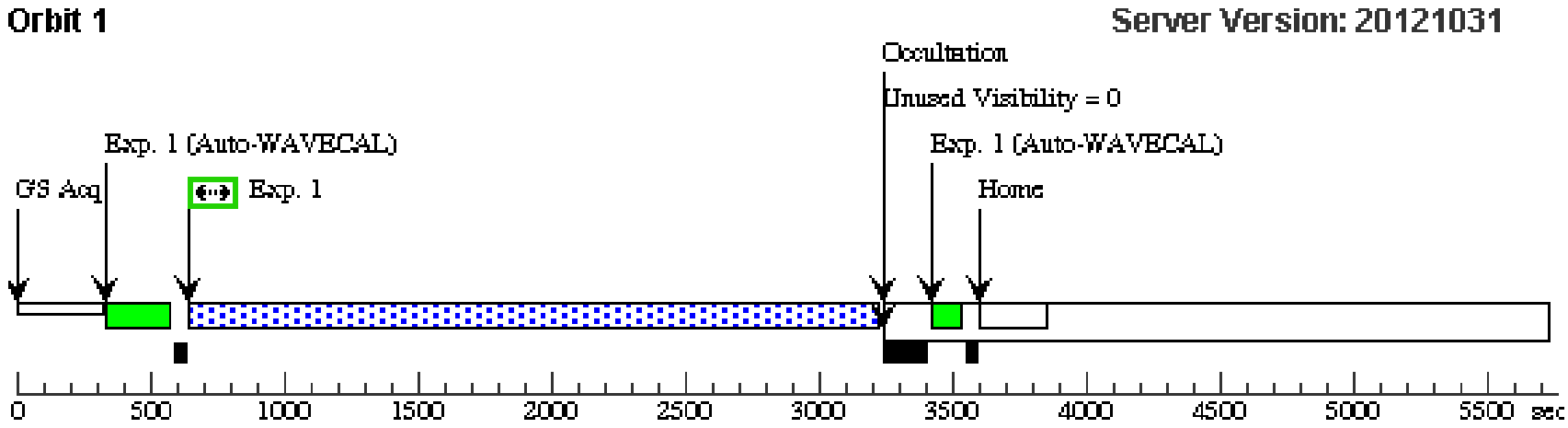
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	IPH_2013_exp1	(1) UPWIND	STIS/FUV-MAMA, TIME-TAG, 52X0.5	E140H 1234 A	BUFFER-TIME=4000	GS ACQ SCENARIO BASE1B3		2524 Secs *[==>]*	*[1]*

Comments: ETC can not be run because we are using an unsupported mode: E140H grating with the 52" x 0.5" slit.

With a signal-to-noise of about 10, the background noise is a significant issue for the data analysis. This is why it is really important and necessary to start the FUV-MAMA detectors just before the exposure, in order to reduce the background noise, especially the intermittent glow due to the dark current. (http://www.stsci.edu/hst/stis/documents/handbooks/currentIHB/c07_performance6.html#310668)

Orbit Structure



Visit

Proposal 13183, IPH_2013 (02), implementation Thu Apr 11 01:01:10 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: BETWEEN 01-MAR-2013:00:00:00 AND 30-APR-2013:00:00:00

Comments: This is a repeat of visit 01 which failed.

Please schedule as close as possible to 1 April 2013.

We desire to obtain the maximum Doppler shift between the interplanetary and geocoronal emissions in order to maximize the separation between the IPH emission and the geocoronal background Ly-alpha contribution. This requires that the Earth moves toward the upwind direction, so the observation should occur in a window of 2 months centred around 1st April 2013.

We are also planning to make coordinated observations with SOHO/SWAN for cross-calibration with the intensity maps provided by SWAN. Because of antenna problems which significantly degrades the quality of SWAN data, the period between 26 March and 3 April should be avoided if possible. This has not been set as a timing requirement because we do not want to lose the opportunity of an observation around 1 April.

Diagnostics

(IPH_2013 (02)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(IPH_2013_exp1 (02.001)) Warning (Form): Sensitive exposures should have an ETC run number provided.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	UPWIND-COPY	RA: 16 50 46.7511 (252.6947962d) Dec: -15 25 42.35 (-15.42843d) Equinox: J2000		V=18 SURF-LINE(1216)=2.+/-1.e-12, W-LINE(1216)=0.15+/-0.1	Reference Frame: ICRS

Comments: Upwind direction of the interplanetary hydrogen. To be observed with no stars brighter than V-Magnitude=18 in the aperture.

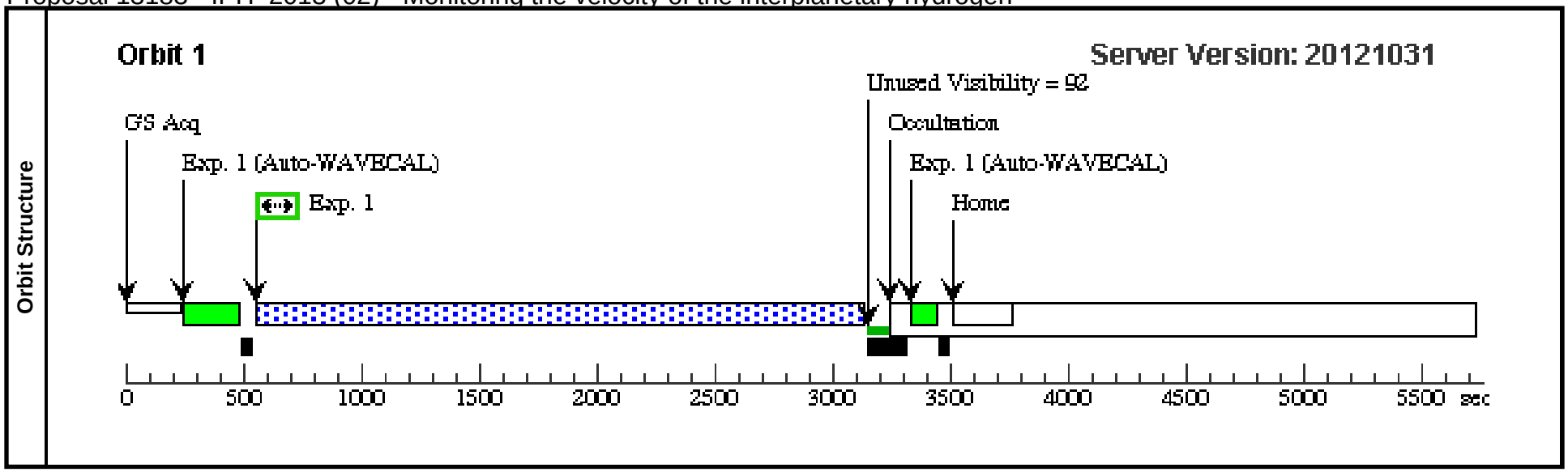
The coordinates have been slightly modified since the phase 1, to make sure that there will be no star in the field of view, whatever is the orientation of the slit. These new coordinates are reletively close but slightly different from the coordinates used for the phase 2 of observations made in 2012 (program 12800).

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	IPH_2013_exp1	(2) UPWIND-COPY	STIS/FUV-MAMA, TIME-TAG, 52X0.5	E140H 1234 A	BUFFER-TIME=4000	GSPAIR S8OT0001 20F10000000000F0; GS ACQ SCENARIO SINGLE		2524 Secs *[==>]*	***[1]***

Comments: ETC can not be run because we are using an unsupported mode: E140H grating with the 52" x 0.5" slit.

With a signal-to-noise of about 10, the background noise is a significant issue for the data analysis. This is why it is really important and necessary to start the FUV-MAMA detectors just before the exposure, in order to reduce the background noise, especially the intermittent glow due to the dark current. (http://www.stsci.edu/hst/stis/documents/handbooks/currentIHB/c07_performance6.html#310668)


Orbit Structure
Orbit 1
Server Version: 20121031
Unused Visibility = 92
GS Acq
Exp. 1 (Auto-WAVECAL)
Exp. 1
Occultation
Exp. 1 (Auto-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec