13452 - Coupling the emission of ionizing radiation and Lyman alpha

Cycle: 21, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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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) GALEX0330-2816 (2) GALEX0330-2816-OFFSET	COS/FUV COS/NUV	2	21-Jun-2013 22:26:23.0	yes
02	(3) GALEX1420+5247 (4) GALEX1420+5247-OFFSET	COS/FUV COS/NUV	2	21-Jun-2013 22:26:35.0	yes
03	(5) GALEX0333-2821 (6) GALEX0333-2821-OFFSET	COS/FUV COS/NUV	2	21-Jun-2013 22:26:46.0	yes
04	(7) GALEX1000+0157 (8) GALEX1000+0157-OFFSET	COS/FUV COS/NUV	2	21-Jun-2013 22:26:55.0	yes

8 Total Orbits Used

ABSTRACT

The class of objects that reionized intergalactic hydrogen remains an observational and theoretical problem that is in contention for being the most prominent puzzle piece in contemporary astrophysics. The current consensus - determined almost entirely by ruling out bright active galaxies - is that the process was possibly begun and almost certainly finished by faint, lower-mass galaxies forming their early generations of stars. Recent observations of z~3 galaxies may even have identified the analog populations.

However understanding how the emitted ionizing power of galaxies is causally related to their (robustly determined) physical properties is not a study that can be performed at high-z: neither the spatial information nor the standard multi-wavelength diagnostics are available. Moreover, on a case-by-case basis, the intervening IGM absorption is impossible to determine. These considerations have spawned a number of detailed studies with UV space telescopes, the synthesis of which however is that a characteristic population of Lyman continuum (LyC) emitting objects has not yet been identified. We show in this proposal that we have identified a characteristic trait in galaxy spectra that is highly indicative of LyC emission, by combining (a) high-z phenomenological studies, (b) new high-resolution UV spectra of local galaxies, and (c) sophisticated models of radiation transport. Believing that we have determined the signature, we propose to test the new hypothesis with deep spectroscopic observations with HST/COS under the Cycle 21 UV initiative.

OBSERVING DESCRIPTION

This programme will observe FOUR star-forming galaxies with COS in both NUV imaging and FUV spectroscopic modes. 8 orbits are allocated; 2 each per galaxy, and hence there are four visits.

Our main science goal is to obtain deep spectra in the G140L setting, which transmits the restframe far ultraviolet and most importantly the redshifted Lyman continuum.

We have already observed these targets with COS (FUV/G160M setting; GO 12269), and hence benefit from much experience.

All the targets are too faint in the UV for target acquisition to be done on-source. We therefore (in 12269) selected only objects with nearby stars that were bright enough in the UV for acquisition in the NUV. We subsequently perform a blind offset. In the list of Fixed Targets, <GALEX_ID> refers

to the science target, and <GALEX_ID>-OFFSET refers to the coordinates of the stars.

G140L observations use all four different FP-POS settings, TIME-TAG mode, and FLASH to improve wavelength calibration. These galaxies are particularly faint, so the BUFFER TIME turns out consistently to be ~29,000 sec. We simply set it to something longer than the visit : I.e. 10,000 sec.

For the acquisition stars, the NUV fluxes have been measured in the COS images. These fluxes are then used to as input to the ETC to estimate the countrate. 3 acquisitions are performed with MIRROR A, and one with MIRROR B. After performing the offset, we will take a 100 second NUV image of the target for wavelength zeropoint purposes. The rest of the 2 orbits is used for G140L spectroscopy, and exposure times in the 4 FP-POS settings maximized.

Visit

Proposal 13452, 0330-2816 (CS Style) (01) Sat Jun 22 02:27:03 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(0330-2816 (CS Style) (01)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

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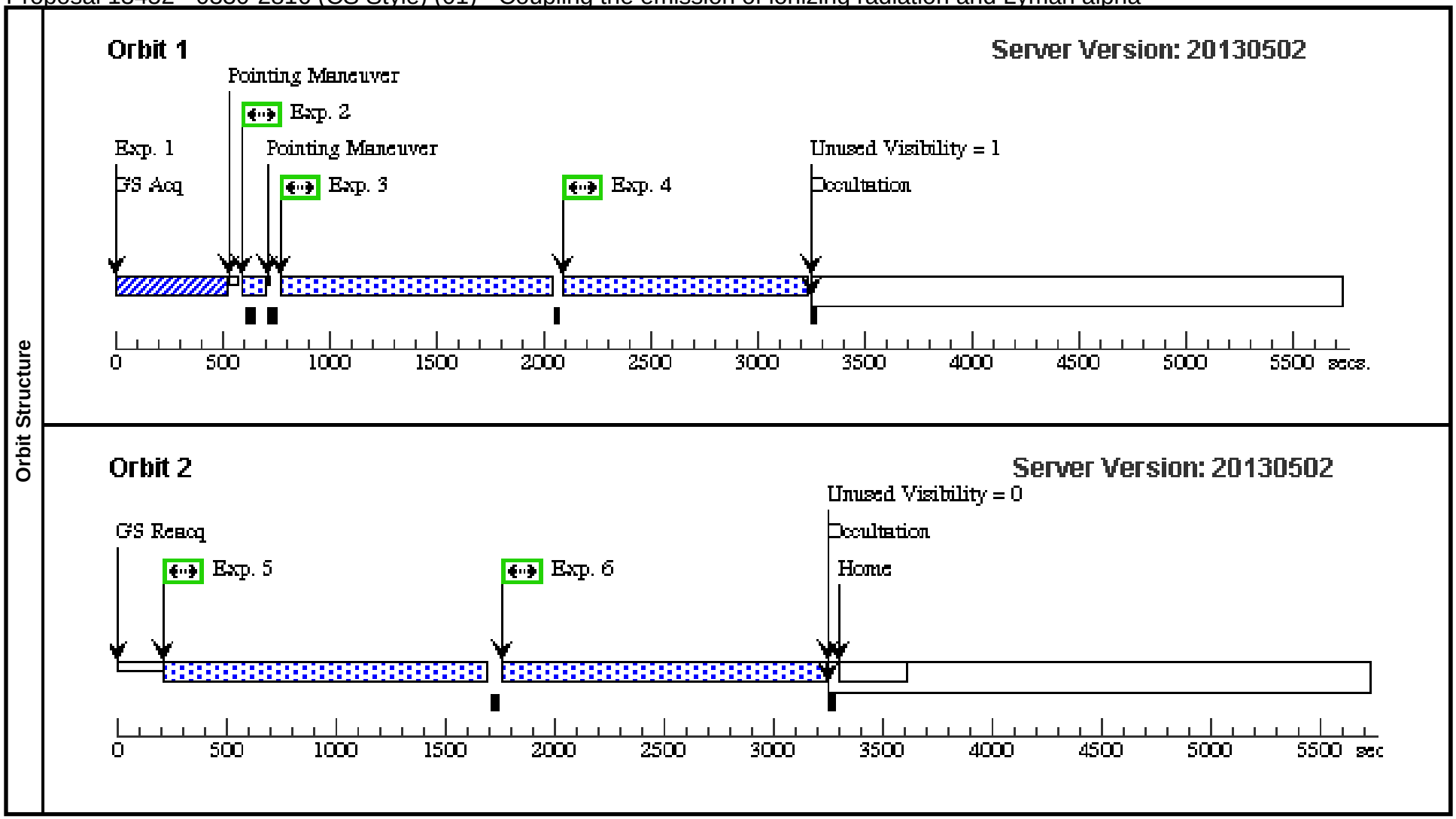
(0330-2816 (CS Style) (01)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GALEX0330-2816	Offset from GALEX0330-2816-OFFSET RA Offset: 0.0034684499 Degrees Dec Offset: -79.268039999 Arcsec		V=21.110+/-0.200	Offset Position (GALEX0330-2816)
(2)	GALEX0330-2816-OFFSET Alt Name1: S33T005015	RA: 03 30 56.1603 (52.7340012d) Dec: -28 15 27.00 (-28.25750d) Equinox: J2000		V=16.8+/-0.200	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	Acquisition (COS.im.515150)	(2) GALEX0330-2816-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				60 Secs (60 Secs) *[==>]*	***[1]***
2	NUV Image (COS.im.515201)	(1) GALEX0330-2816	COS/NUV, ACCUM, PSA	MIRRORA				100 Secs (100 Secs) *[==>]*	***[1]***
3	FUV spectroscopy 1 (COS.sp.515144)	(1) GALEX0330-2816	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=1; SEGMENT=BOTH; BUFFER-TIME=10000			1091 Secs (1091 Secs) *[==>]*	***[1]***
4	FUV spectroscopy 2 (COS.sp.515144)	(1) GALEX0330-2816	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=2; SEGMENT=BOTH; BUFFER-TIME=10000			1091 Secs (1091 Secs) *[==>]*	***[1]***
5	FUV spectroscopy 3 (COS.sp.515144)	(1) GALEX0330-2816	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=3; SEGMENT=BOTH; BUFFER-TIME=10000			1426 Secs (1426 Secs) *[==>]*	***[2]***
6	FUV spectroscopy 4 (COS.sp.515144)	(1) GALEX0330-2816	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=4; SEGMENT=BOTH; BUFFER-TIME=10000			1426 Secs (1426 Secs) *[==>]*	***[2]***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Pointing Maneuver
Exp. 2
Exp. 1
GS Acq
Pointing Maneuver
Exp. 3
Exp. 4
Unused Visibility = 1
Occultation
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1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20130502
Unused Visibility = 0
GS Reacq
Occultation
Exp. 5
Exp. 6
Home
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2000
2500
3000
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4000
4500
5000
5500
sec

Visit

Proposal 13452, 1420+5247 (CS Style) (02) Sat Jun 22 02:27:08 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(1420+5247 (CS Style) (02)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

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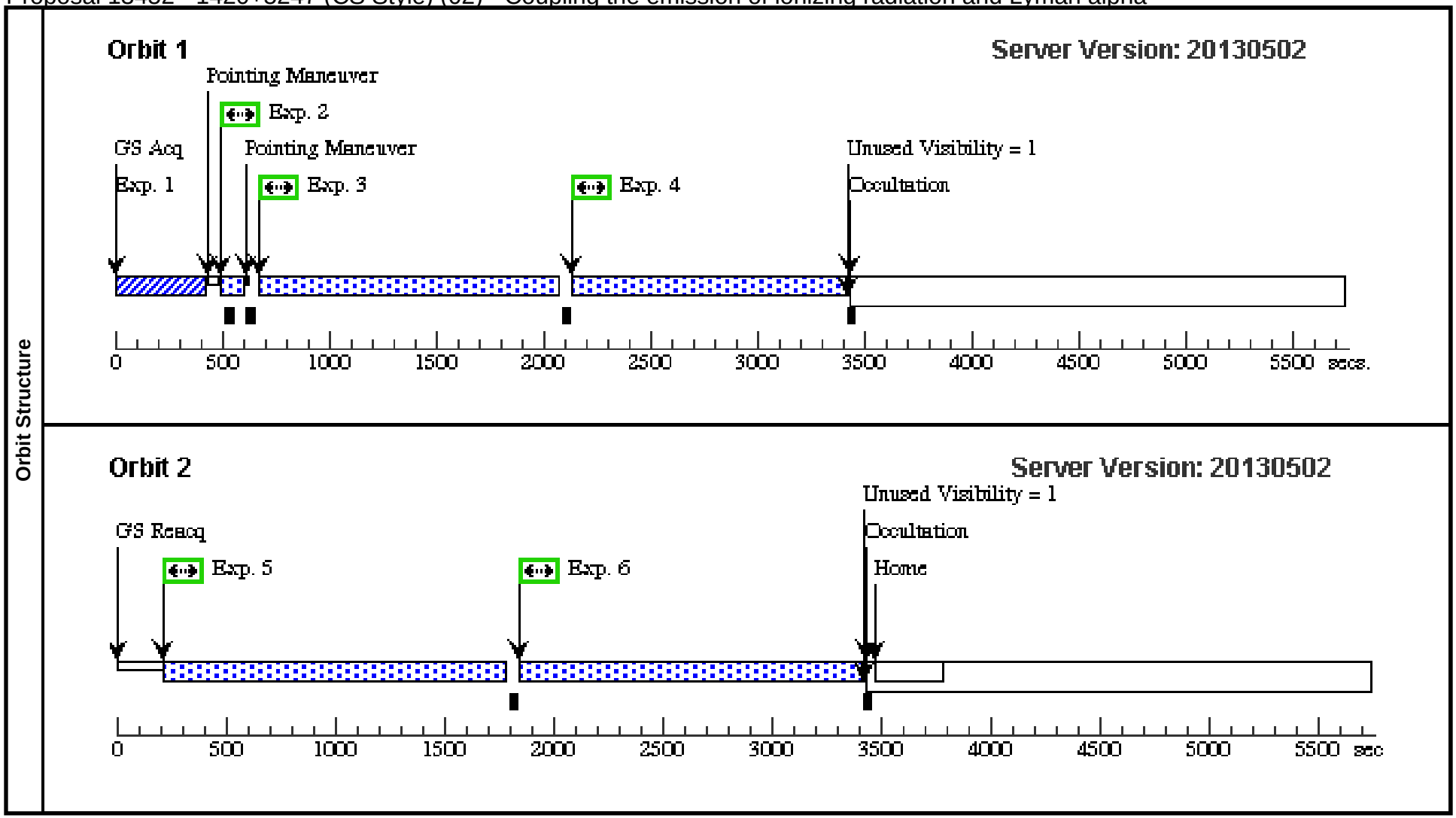
(1420+5247 (CS Style) (02)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	GALEX1420+5247	Offset from GALEX1420+5247-OFFSET RA Offset: -0.04277486 Degrees Dec Offset: 58.47576 Arcsec		V=21.1+/-0.200	Offset Position (GALEX1420+5247)
(4)	GALEX1420+5247-OFFSET Alt Name1: N5MV000310	RA: 14 20 41.9984 (215.1749933d) Dec: +52 46 58.30 (52.78286d) Equinox: J2000		V=14.18+/-0.200	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	Acquisition (COS.im.515151)	(4) GALEX1420+5247-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs) *[==>]*	***[1]***
2	NUV Image (COS.im.515202)	(3) GALEX1420+5247	COS/NUV, ACCUM, PSA	MIRRORA				100 Secs (100 Secs) *[==>]*	***[1]***
3	FUV spectroscopy 1 (COS.sp.515145)	(3) GALEX1420+5247	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=1; SEGMENT=BOTH; BUFFER-TIME=10000			1224 Secs (1224 Secs) *[==>]*	***[1]***
4	FUV spectroscopy 2 (COS.sp.515145)	(3) GALEX1420+5247	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=2; SEGMENT=BOTH; BUFFER-TIME=10000			1224 Secs (1224 Secs) *[==>]*	***[1]***
5	FUV spectroscopy 3 (COS.sp.515145)	(3) GALEX1420+5247	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=3; SEGMENT=BOTH; BUFFER-TIME=10000			1514 Secs (1514 Secs) *[==>]*	***[2]***
6	FUV spectroscopy 4 (COS.sp.515145)	(3) GALEX1420+5247	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=4; SEGMENT=BOTH; BUFFER-TIME=10000			1514 Secs (1514 Secs) *[==>]*	***[2]***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Exp. 1
Pointing Maneuver
Exp. 3
Exp. 4
Unused Visibility = 1
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4500
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secs.
Orbit 2
Server Version: 20130502
Unused Visibility = 1
GS Reacq
Occultation
Exp. 5
Exp. 6
Home
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2000
2500
3000
3500
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4500
5000
5500
sec

Visit

Proposal 13452, 0333-2821 (CS Style) (03) Sat Jun 22 02:27:10 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(0333-2821 (CS Style) (03)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

(0333-2821 (CS Style) (03)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

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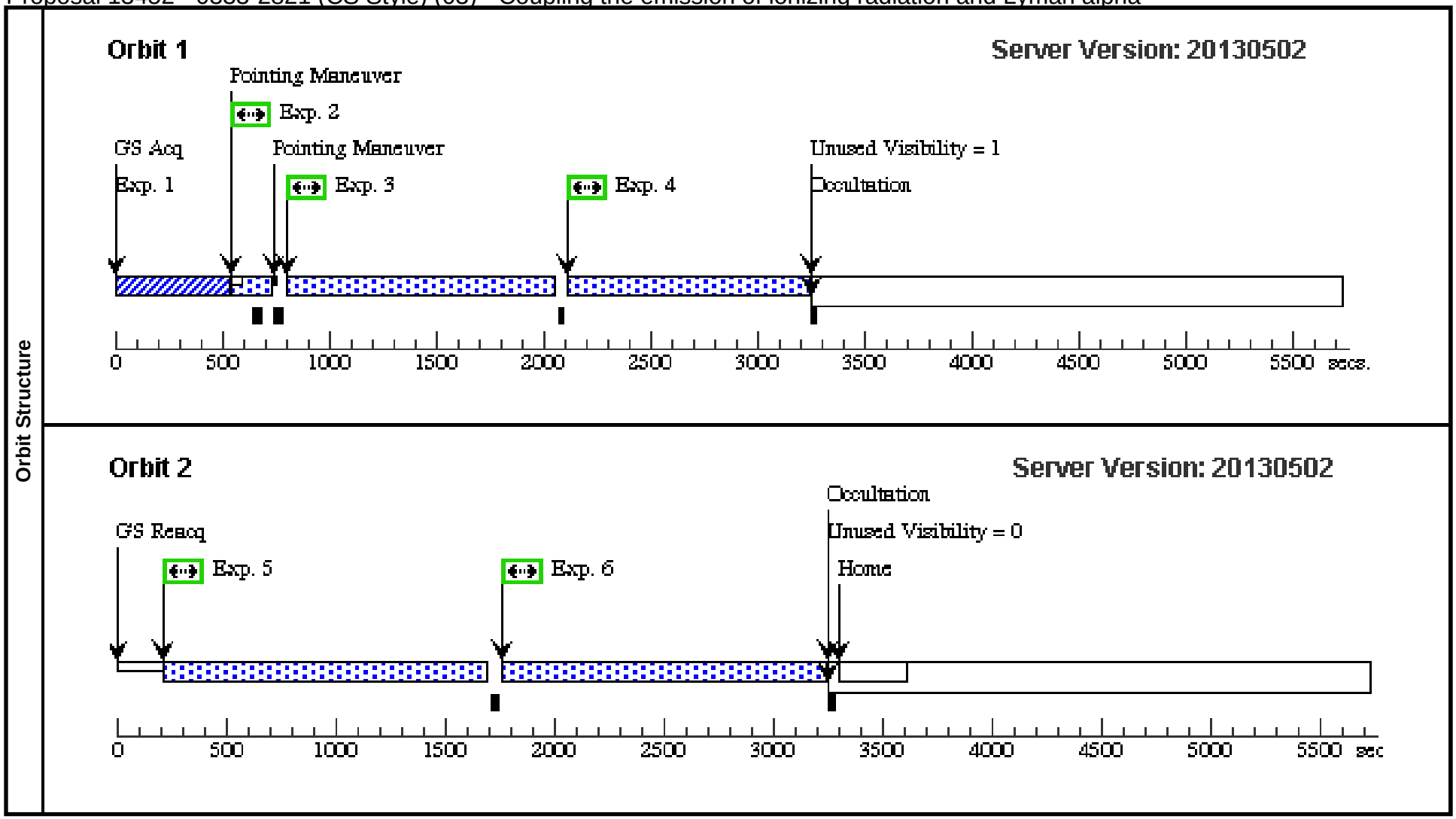
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	GALEX0333-2821	Offset from GALEX0333-2821-OFFSET RA Offset: -0.03256064 Degrees Dec Offset: -24.14 Arcsec		V=21.080+/-0.200	Offset Position (GALEX0333-2821)
(6)	GALEX0333-2821-OFFSET Alt Name1: S33T000300	RA: 03 33 9.9160 (53.2913167d) Dec: -28 21 3.49 (-28.35097d) Equinox: J2000		V=11.7+/-0.200	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	Acquisition (COS.im.515155)	(6) GALEX0333-2821-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				51 Secs (51 Secs) *[==>]*	***[1]***
2	NUV Image (COS.im.515203)	(5) GALEX0333-2821	COS/NUV, ACCUM, PSA	MIRRORA				100 Secs (100 Secs) *[==>]*	***[1]***
3	FUV spectroscopy 1 (COS.sp.515146)	(5) GALEX0333-2821	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=1; SEGMENT=BOTH; BUFFER-TIME=10000			1075 Secs (1075 Secs) *[==>]*	***[1]***
4	FUV spectroscopy 2 (COS.sp.515146)	(5) GALEX0333-2821	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=2; SEGMENT=BOTH; BUFFER-TIME=10000			1075 Secs (1075 Secs) *[==>]*	***[1]***
5	FUV spectroscopy 3 (COS.sp.515146)	(5) GALEX0333-2821	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=3; SEGMENT=BOTH; BUFFER-TIME=10000			1426 Secs (1426 Secs) *[==>]*	***[2]***
6	FUV spectroscopy 4 (COS.sp.515146)	(5) GALEX0333-2821	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=4; SEGMENT=BOTH; BUFFER-TIME=10000			1426 Secs (1426 Secs) *[==>]*	***[2]***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GS Acq
Exp. 1
Pointing Maneuver
Exp. 3
Exp. 4
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secs.
Orbit 2
Server Version: 20130502
Occultation
GS Reacq
Unused Visibility = 0
Exp. 5
Exp. 6
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sec

Visit

Proposal 13452, 1000+0157 (CS Style) (04) Sat Jun 22 02:27:12 GMT 2013

Diagnostic Status: Warning

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

Diagnostics

(1000+0157 (CS Style) (04)) Warning (Orbit Planner): NO PLATE ID SPECIFIED FOR FIXED TARGET

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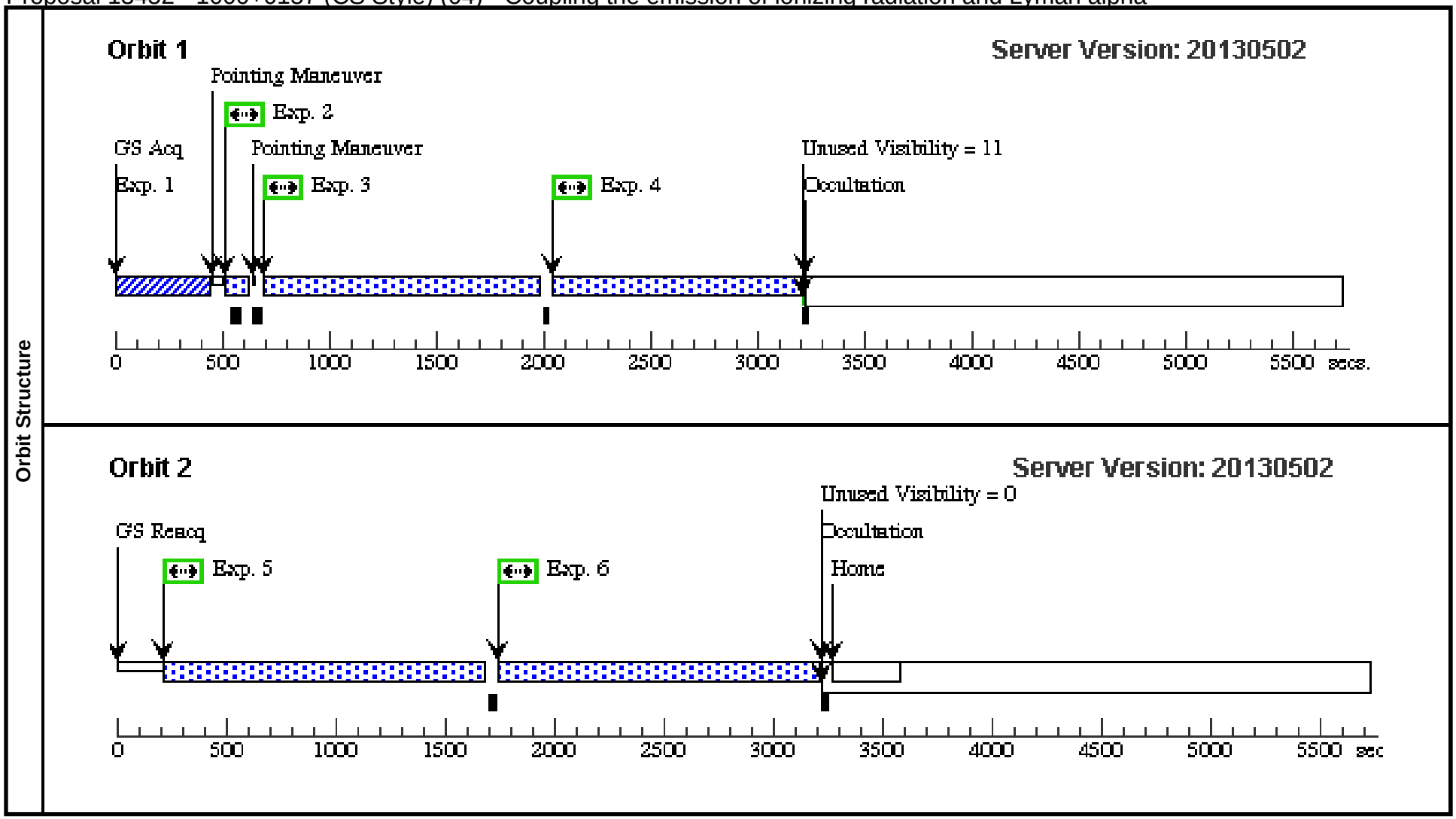
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	GALEX1000+0157	Offset from GALEX1000+0157-OFFSET RA Offset: 0.01042814 Degrees Dec Offset: -107.978479999 Arcsec		V=20.7+/-0.1	Offset Position (GALEX1000+0157)
(8)	GALEX1000+0157-OFFSET Alt Name1: N6SV002695	RA: 10 00 25.2509 (150.1052121d) Dec: +01 58 52.03 (1.98112d) Equinox: J2000		V=17.74+/-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	Acquisition (COS.im.515153)	(8) GALEX1000+0157-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				19 Secs (19 Secs) *[==>]*	***[1]***
2	NUV Image (COS.im.515204)	(7) GALEX1000+0157	COS/NUV, ACCUM, PSA	MIRRORA				100 Secs (100 Secs) *[==>]*	***[1]***
3	FUV spectroscopy 1 (COS.sp.515147)	(7) GALEX1000+0157	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=1; SEGMENT=BOTH; BUFFER-TIME=10000			1111 Secs (1111 Secs) *[==>]*	***[1]***
4	FUV spectroscopy 2 (COS.sp.515147)	(7) GALEX1000+0157	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=2; SEGMENT=BOTH; BUFFER-TIME=10000			1111 Secs (1111 Secs) *[==>]*	***[1]***
5	FUV spectroscopy 3 (COS.sp.515147)	(7) GALEX1000+0157	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=3; SEGMENT=BOTH; BUFFER-TIME=10000			1414 Secs (1414 Secs) *[==>]*	***[2]***
6	FUV spectroscopy 4 (COS.sp.515147)	(7) GALEX1000+0157	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FLASH=YES; FP-POS=4; SEGMENT=BOTH; BUFFER-TIME=10000			1414 Secs (1414 Secs) *[==>]*	***[2]***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Exp. 1
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Exp. 3
Exp. 4
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secs.
Orbit 2
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GS Reacq
Occultation
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Exp. 6
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