11642 - FUV/X-ray absorption and emission line spectroscopy of the Galactic corona

Cycle: 17, Proposal Category: GO

(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) X-LMC-X-3	COS/FUV COS/NUV	4	24-Sep-2008 21:28:13.0	yes
02	(1) X-LMC-X-3	COS/FUV COS/NUV	3	24-Sep-2008 21:28:22.0	yes

7 Total Orbits Used

ABSTRACT

The Galactic corona is believed to play an essential role in the ``ecosystem'' of the Galaxy. But the extent and ionization state as well as the physical properties of the corona are yet to be determined. We request COS/HST observations to sample the intervening gas through the line absorptions of CIV, NV, SiIV, OI, SII, SiII, and FeII along the LMC X-3 sight line, toward which we have already detected OVI, OVII, and NeIX absorption lines

and NVII, OVII, OVIII, and NeIX emission lines with FUSE, Chandra, and Suzaku observations. We have developed a software tool to jointly analyze the far-UV/X-ray absorption and emission spectra. The requested observations will not only allow us to rigorously test our preliminary results based on the existing observations, but also enable us to examine various models (e.g., diffuse hot gas vs. conductive layers) and to constrain the spatial and thermal properties of the hot gas over a broad temperature range. The results will p!
rovide a unique calibration of our understanding of the corona.

OBSERVING DESCRIPTION

The main goals of this project are to test our preliminary results based on a multiwavelength campaign and to investigate the spatial and thermal properties of the Galactic hot gas. To this end, we seek to obtain high resolution spectra of LMC X-3 covering the high ionization as well as the low ionization species. Our previous studies predict column densities of C IV and N V to be 6E13 and 2.2E13 cm^-2, respectively, contained in the hot diffuse gas toward the LMC X-3 sight line. Detecting these lines is our fundamental requirement and also drives the requested S/N level.

LMC X-3 is mildly variable in UV wavelength band. We therefore use a spectrum with a typical flux obtained from one of the previous IUE observations as the input to the Exposure Time Calculator to estimate the ACQ-target-searching and ACQ-target-imaging time and to calculate the Buffer-time. The approved 7 orbits are split into two visits, in which the first 6 orbits use the COS/G130 grating to detect the N V absorption line while the seventh orbit uses the COS/G160 to detect the C IV line. With this exposure allocation, we expect to obtain a spectrum with S/N of 35 and 11 around N V and C IV wavelengths, respectively, which allows us to to detect these lines at >5sigma significant levels (with the expected column densities).

To reduce COS fixed-pattern noise but also to minimize the overhead times associated with the OSM movement at the same time, we use a grating at different central wevelengths in successive exposures to mimic the different FP-POS offsets. By doing this, we will also obtain a spectrum coving the entire wavelength range; the gaps at different wavelengths are also filled up with nearly even exposures.

Visit

Proposal 11642, Visit 01, implementation Thu Sep 25 01:28:27 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: ORIENT 135D TO 95 D

Comments: Find a UV source from the Galex survey, which may confuse the proposed target. So a visit orientation constraint is requested to exclude that source from the BOA.

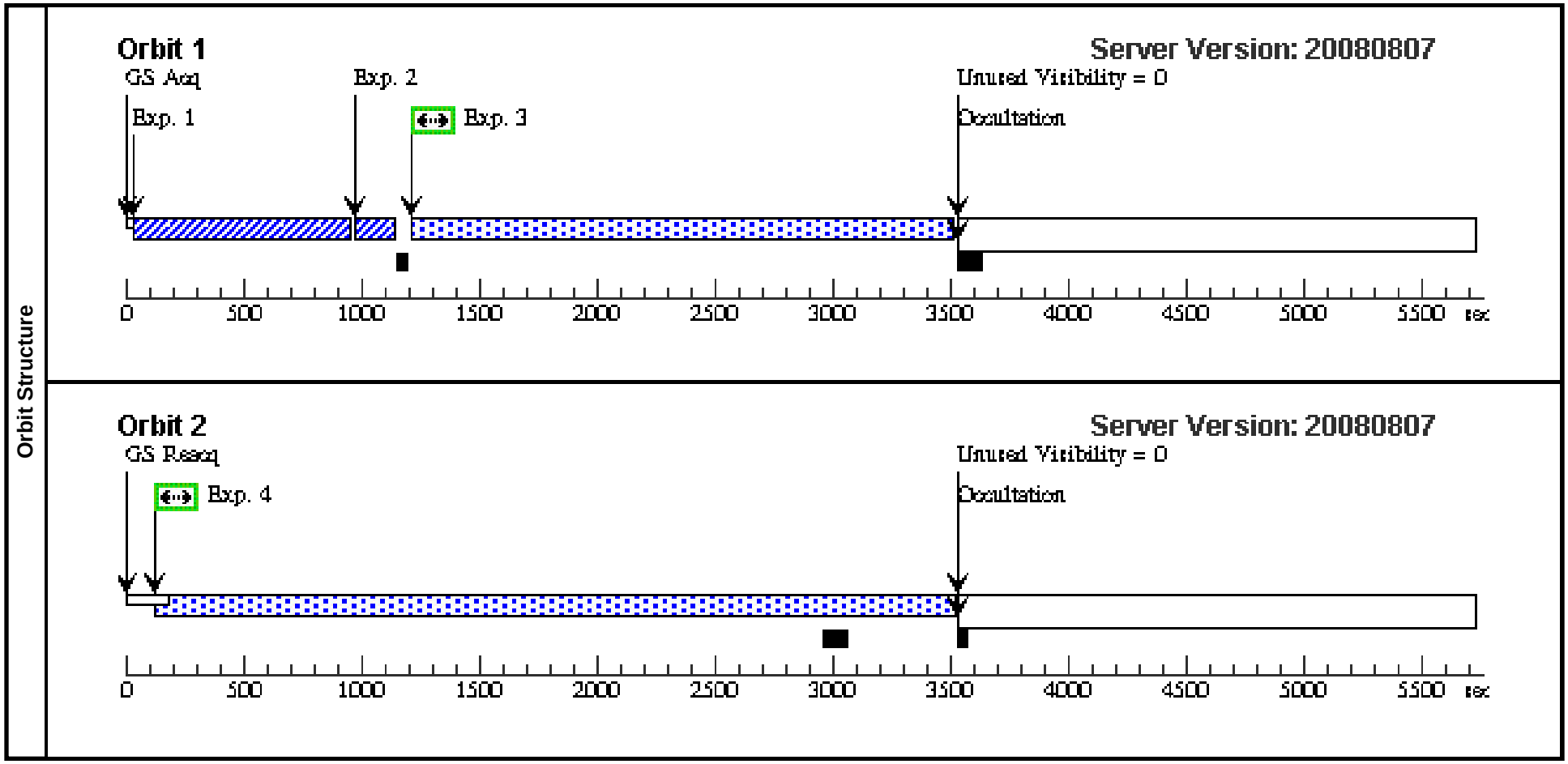
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	X-LMC-X-3	RA: 05 38 56.2300 (84.7342917d) Dec: -64 05 2.80 (-64.08411d) Equinox: J2000		V=17.2	Reference Frame: ICRS

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	ACQ-Search	(1) X-LMC-X-3	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	SCAN-SIZE=3; STEP-SIZE=1.767			38 Secs *[==>]*	 ***[1]***
Comments: COS84126									
2	ACQ-Image	(1) X-LMC-X-3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				38 Secs *[==>]*	 ***[1]***
3		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1318 A	BUFFER-TIME=21 41			2141 Secs *[==>]*	 ***[1]***
Comments: COS84127									
4		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=27 40			3270 Secs *[==>]*	 ***[2]***
Comments: COS84129									
5		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1300 A	BUFFER-TIME=23 40			3270 Secs *[==>]*	 ***[3]***
Comments: COS84130									
6		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=23 40			3270 Secs *[==>]*	 ***[4]***
Comments: COS84130									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GS Acq
Exp. 1
Exp. 2
Exp. 3
Unused Visibility = 0
Occultation
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1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 2
Server Version: 20080807
GS Reacq
Exp. 4
Unused Visibility = 0
Occultation
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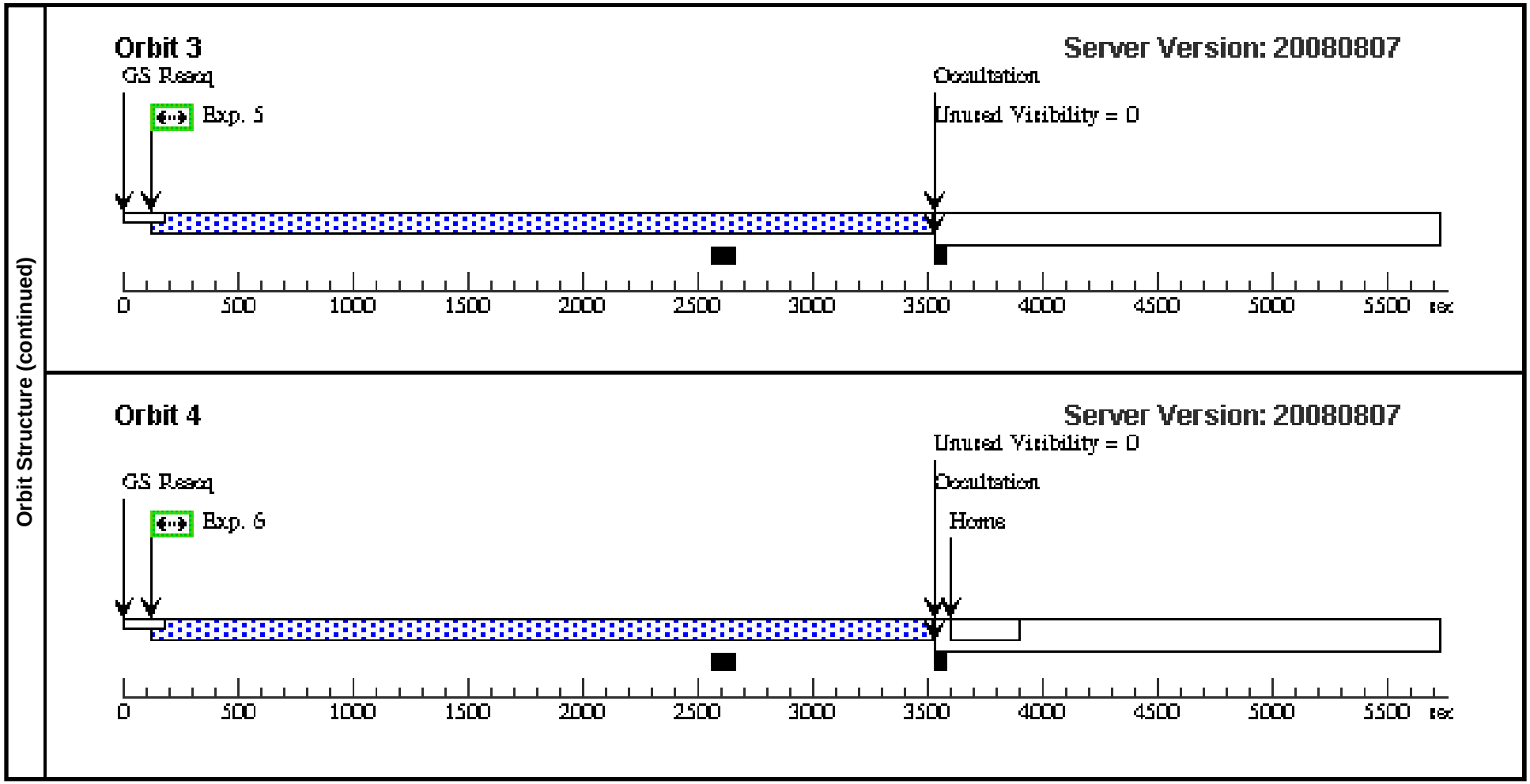
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec


Orbit Structure (continued)
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Server Version: 20080807
GS Reacq
Exp. 5
Occultation
Unused Visibility = 0
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1000
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2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 4
Server Version: 20080807
Unused Visibility = 0
GS Reacq
Exp. 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 11642, Visit 02, implementation Thu Sep 25 01:28:29 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: ORIENT 135D TO 95 D

Comments: Find a UV source from the Galex survey, which may confuse the proposed target. So a visit orientation constraint is requested to exclude that source from the BOA.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	X-LMC-X-3	RA: 05 38 56.2300 (84.7342917d) Dec: -64 05 2.80 (-64.08411d) Equinox: J2000		V=17.2	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

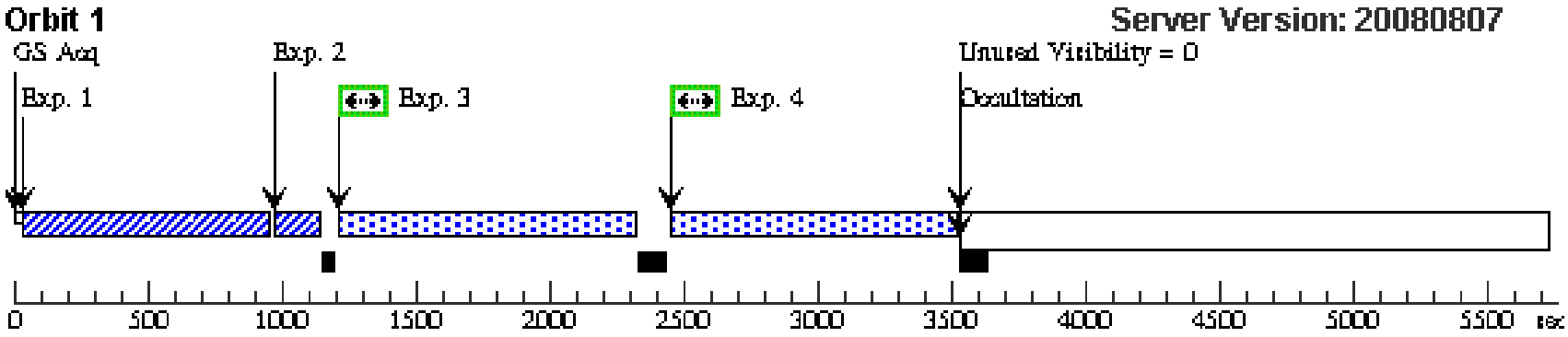
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ-Search	(1) X-LMC-X-3	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	SCAN-SIZE=3; STEP-SIZE=1.767			38 Secs *[==>]*	*[1]*
Comments: COS84126									
2	ACQ-Image	(1) X-LMC-X-3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				38 Secs *[==>]*	*[1]*
Comments: COS84126									
3		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1318 A	BUFFER-TIME=944			944 Secs *[==>]*	*[1]*
Comments: COS84133									
4		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=941			941 Secs *[==>]*	*[1]*
Comments: COS84133									
5		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1300 A	BUFFER-TIME=1507			1507 Secs *[==>]*	*[2]*
Comments: COS84135									
6		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1507			1507 Secs *[==>]*	*[2]*
Comments: COS84135									
7		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=575			675 Secs *[==>]*	*[3]*
Comments: COS84136; using exposure time - 100 s.									
8		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=575			675 Secs *[==>]*	*[3]*
Comments: COS84136; using exposure time - 100 s.									
9		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G160M 1611 A	BUFFER-TIME=575			675 Secs *[==>]*	*[3]*
Comments: COS84136; using exposure time - 100s.									

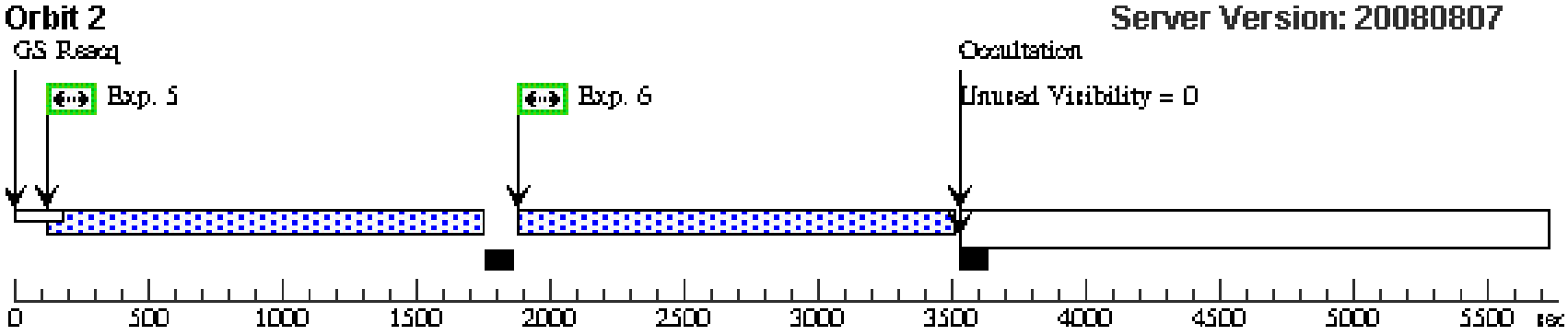
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
10		(1) X-LMC-X-3	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=575			675 Secs	
								[==>]	***[3]***

Comments: COS84136; using exposure time - 100s.

Orbit Structure





Orbit Structure (continued)