15220 - Stars and gas in the most metal-deficient galaxies in the Universe.

Cycle: 25, Proposal Category: GO

(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) SDSSJ104457.79+035313.1	COS/FUV COS/NUV	1	25-May-2018 09:01:06.0	yes
02	(2) SDSSJ123048.61+120242.8	COS/FUV COS/NUV	1	25-May-2018 09:01:07.0	yes
03	(3) SDSSJ113202.11+572251.7	COS/FUV COS/NUV	1	25-May-2018 09:01:08.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(4) SDSSJ094416.59+541134.3	COS/FUV COS/NUV	1	25-May-2018 09:01:09.0	yes
05	(5) SDSSJ1119+5130	COS/FUV COS/NUV	1	25-May-2018 09:01:10.0	yes
06	(6) SDSSJ120122.32+021108.5	COS/FUV COS/NUV	2	25-May-2018 09:01:11.0	yes
07	(7) SDSSJ101624.51+375445.9	COS/FUV COS/NUV	1	25-May-2018 09:01:12.0	yes
08	(8) SDSSJ2230-0006	COS/FUV COS/NUV	1	25-May-2018 09:01:13.0	yes

9 Total Orbits Used

ABSTRACT

Improving our understanding of star formation at low metallicity is of large relevance for a variety of fields in astrophysics since it relates to multiple topical questions. These range from understanding the properties of galaxies that contributed to cosmic reionization to the evolution of metal poor massive stars that give rise to the formation of heavy binary black holes. Crucial are observational constraints for the theoretical predictions, which can be obtained from rest-frame UV spectra of local star-forming dwarf galaxies with ionized-gas oxygen abundances at the low-metallicity threshold of the nearby Universe.

While samples of UV spectra exist for galaxies in the metallicity range above 1/20 solar, only two useful spectra covering from H I Lyman-alpha (LyA, 1216 Ang) to C III] 1909 are available at lower metallicites. We propose COS G140L observations of eight extremely-metal poor galaxies (XMPGs) with He II emission that will: i) provide three more spectra with 12+log(O/H)=<7.4 (suitable targets at such low Z are hard to find), and ii) leverage existing WFC3 and Chandra images which are useful for discrimintating among different sources of ionization.

Combining this dataset with existing spectra at similar and higher metallicity will allow us to address three questions: 1) How does metallicity determine galaxy properties?, 2) Is narrow He II emission a good tracer of peculiar massive stars?, and 3) Can we probe star-formation at high redshift with UV lines other than LyA? Our study will provide valuable clues for interpreting rest-frame UV spectra of high-z galaxies that will challenge our understanding of star formation at low Z.

OBSERVING DESCRIPTION

We will use COS for our obsevations.

Target acquisition. We will acquire de the targets via acq/image exposures of bandpass = 1700 - 3200 Ang. and pixel-scale=0.024" / pixel, using the NUV channel, PSA, and either mirror A or B, depending on the target's brightness. We require S/N = 5.

Spectroscopy. We request G140L spectroscopy with cenwave = 1105 in order to cover the observed-frame wavelength range ~1121 to ~2148 Ang. at a spectral resolution of FWHM = 0.82 Ang. or 150 km/s at 1640 Ang. We plan to use: four focal plane positions in order to ensure the highest possible SNR; the flash = yes setting, and the time-tag mode.

Orbits. We request one pointing per target. The number of orbits is driven by the requirement that SNR = 5 at 1640 * (1 + z), which corresponds to the observed wavelength of the He II 1640 line. This amounts to 9 orbits of HST. For the four targets with available G140L or G160M data, we calculate the number of orbits based on these data. For the rest of targets, we use a starburst99 (s99) model spectrum (SSP, 3 Myr, Z=0.001, no-rotation, high-mass loss) normalized to the AB magnitude in the U-band of SDSS DR12, or if available, the NUV AB magnitude of GALEX. The AB magnitudes correspond to similar pointings and apertures than COS. To each s99 model, we add a He II 1640 emission line with 10 times the reddening-corrected flux measured for the He II 4686 emission line using SDSS DR12 data. We then apply to s99 models the redshift and foreground reddening of the target. We use our spectra and standard background levels as input to the target acquisition and spectroscopic ETCs. For each target, the number of orbits equals the sum of the science exposure time, guide star + target acquisition times, and overhead time. This number takes into consideration the visibility times given in table 6.1 of HST's primer, which depend on the declination of the targets. In addition, for the first orbit of each visit, it includes: 6 min of guide star acquisition + 3 min of image target acquisition + 5 min of overhead for the first science exposure = 840 s. For subsequent orbits in the visit it includes: 4 min of guide star re-acquisition + 2 min for science exposures = 360 s.

Visit

Proposal 15220, Visit 01, completed Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

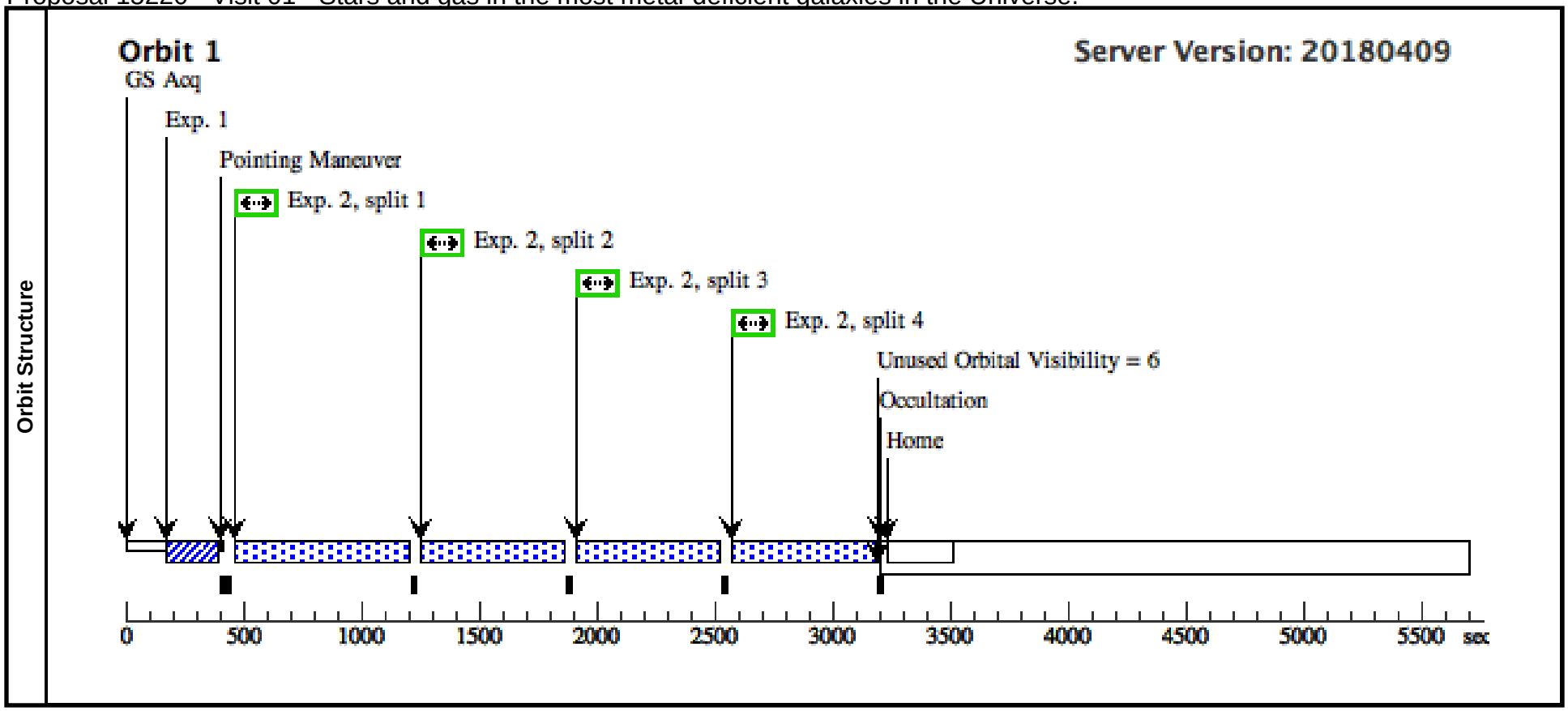
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSSJ104457.79+035313.1 Alt Name1: GALEXJ104457.8+035313	RA: 10 44 57.7900 (161.2407917d) Dec: +03 53 13.10 (3.88697d) Equinox: J2000	Redshift: 0.012873	V=17.75 F1500 (COS) = 1.5e-15 erg/s/cm 2	Reference Frame: ICRS

Comments: We give the same coordinates as for the COS G140L observations of PID 13312.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1005211)	(1) SDSSJ104457.79+035313.1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				0.6 Secs (0.6 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1005187)	(1) SDSSJ104457.79+035313.1	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=11736; FLASH=YES; FP-POS=ALL			223.25 Secs (2220.8 Secs) *[==>555.2 Secs (Split 1)]* *[==>555.2 Secs (Split 2)]* *[==>555.2 Secs (Split 3)]* *[==>555.2 Secs (Split 4)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20180409
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Unused Orbital Visibility = 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15220, Visit 02, completed Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

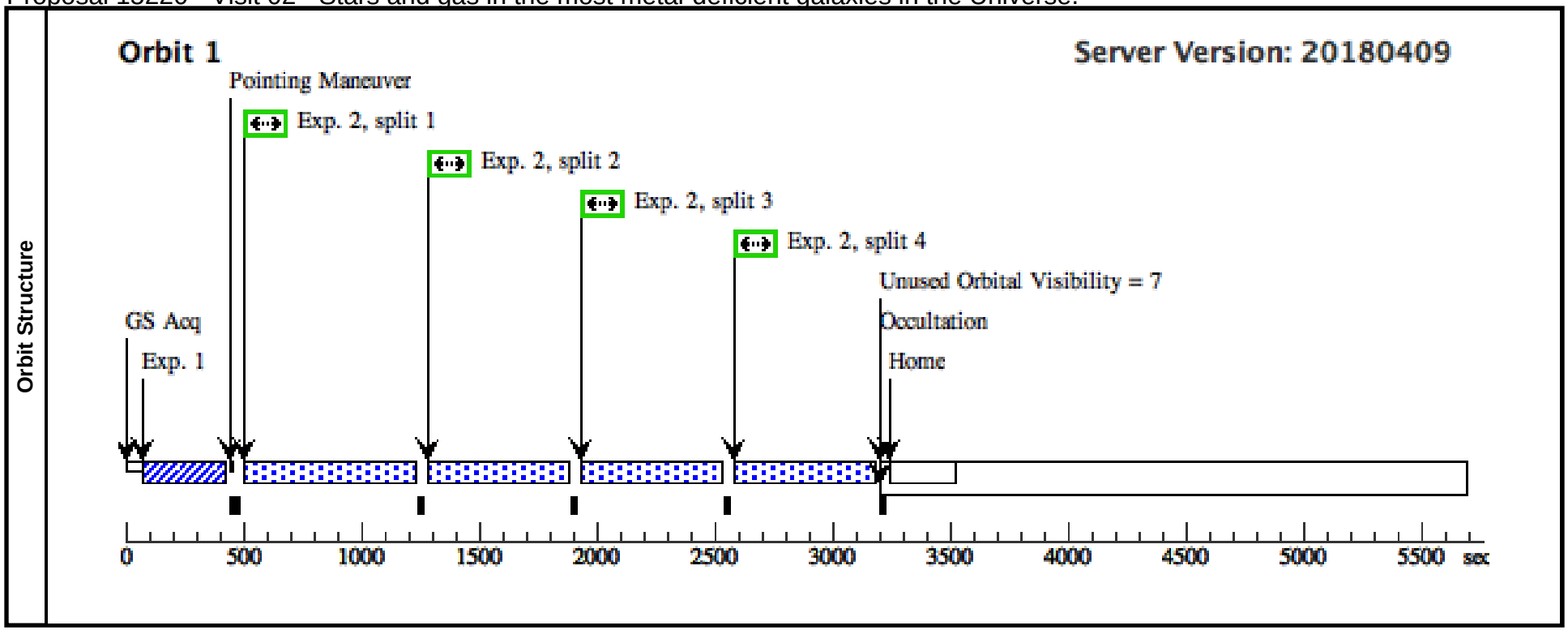
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SDSSJ123048.61+120242.8 Alt Name1: RC2-A1228+12 Alt Name2: GALEXJ123048.6+120243	RA: 12 30 48.6000 (187.7025000d) Dec: +12 02 42.82 (12.04523d) Equinox: J2000	Redshift: 0.0041830	V=16.70 F1650 (COS) = 1.5e-15 erg/s/cm 2	Reference Frame: ICRS

Comments: We give the same coordinates as for the COS G160M observations of PID 14168.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1012819)	(2) SDSSJ123048.61+120242.8	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				20 Secs (20 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1005301)	(2) SDSSJ123048.61+120242.8	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=13603; FLASH=YES; FP-POS=ALL			272.75 Secs (2190.8 Secs) *[==>547.7 Secs (Split 1)]* *[==>547.7 Secs (Split 2)]* *[==>547.7 Secs (Split 3)]* *[==>547.7 Secs (Split 4)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20180409
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Unused Orbital Visibility = 7
Occultation
Home
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15220, Visit 03, implementation

Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

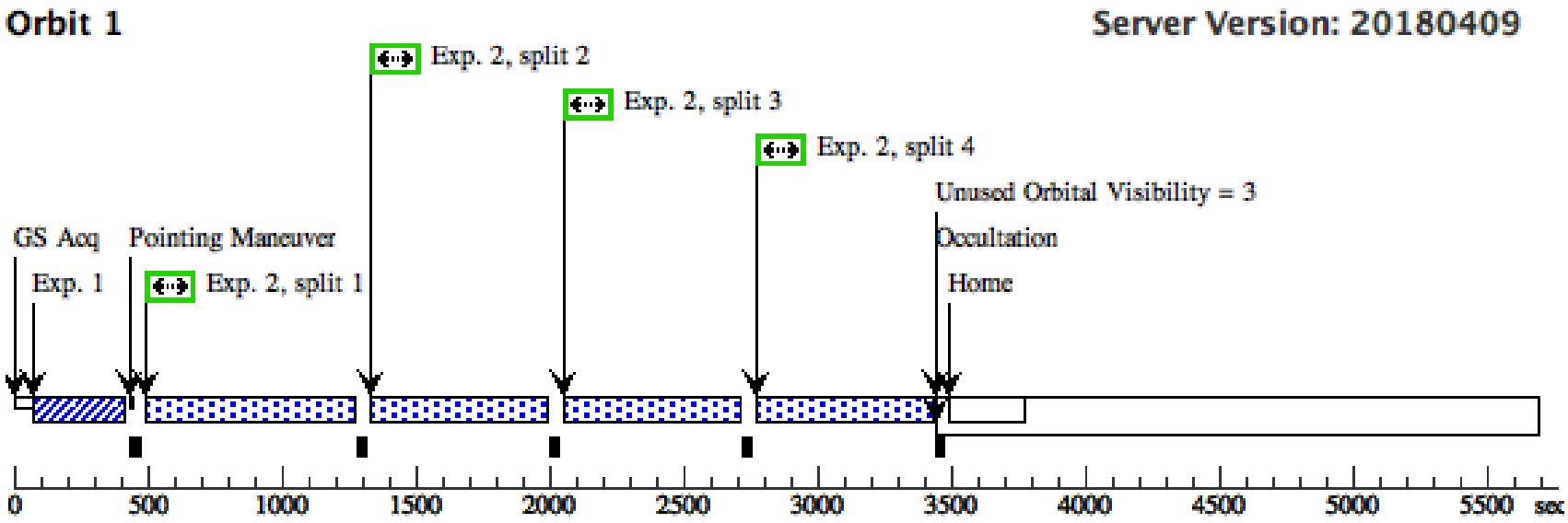
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SDSSJ113202.11+572251.7 Alt Name1: SBS-1129+576	RA: 11 32 2.6440 (173.0110167d) Dec: +57 22 36.39 (57.37678d) Equinox: J2000	Redshift: 0.0052240	V=16.18 NUV (GALEX) AB = 17.29	Reference Frame: ICRS

Comments: We give the same coordinates as for the COS G160M observations of PID 14679.
Category=GALAXY
Description=[DWARF COMPACT]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1012820)	(3) SDSSJ113202.11+572251.7	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	*[1]*
2	(COS.sp.1012689)	(3) SDSSJ113202.11+572251.7	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5291; FLASH=YES; FP-POS=ALL			127.5 Secs (2414 Secs) *[==>603.5 Secs (Split 1)]* *[==>603.5 Secs (Split 2)]* *[==>603.5 Secs (Split 3)]* *[==>603.5 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15220, Visit 04, implementation

Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

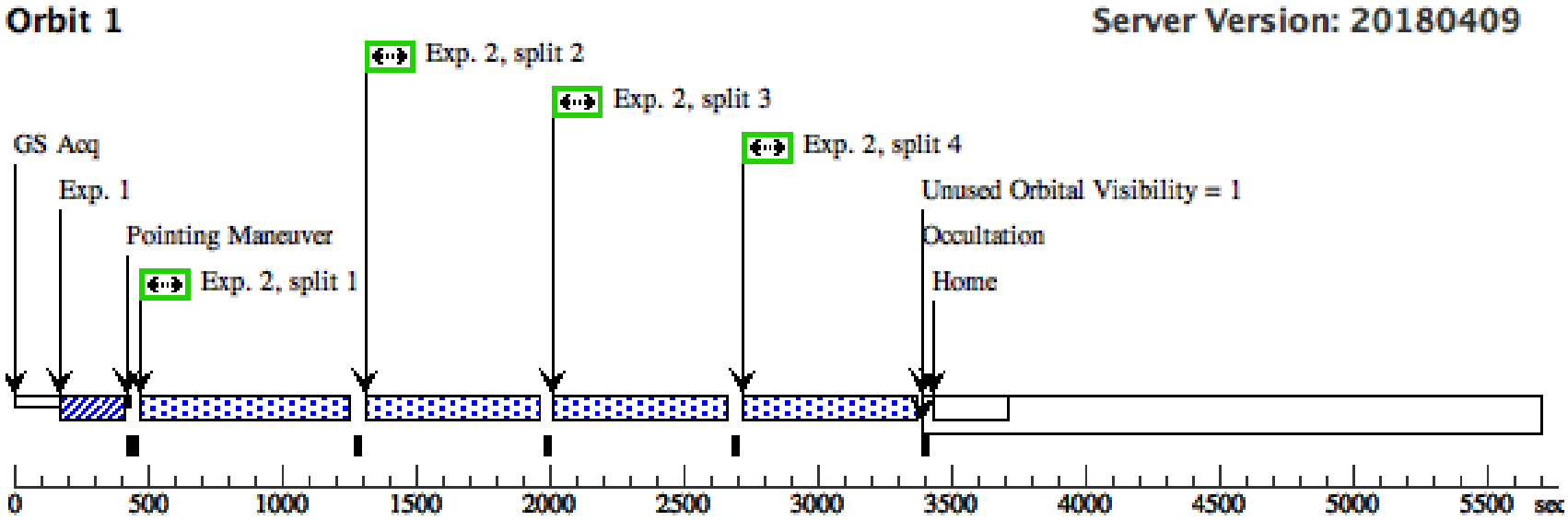
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SDSSJ094416.59+541134.3 Alt Name1: SBS-0940+544 Alt Name2: GALEXJ094416.9+541129	RA: 09 44 16.5900 (146.0691250d) Dec: +54 11 34.39 (54.19289d) Equinox: J2000	Redshift: 0.005406	V=19.00 U (SLOAN) AB = 19.41	Reference Frame: ICRS

Comments: We give SDSS coordinates
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1005229)	(4) SDSSJ094416.59+541134.3	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				9 Secs (9 Secs) *[==>]*	*[1]*
2	(COS.sp.1012744)	(4) SDSSJ094416.59+541134.3	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=11052; FLASH=YES; FP-POS=ALL			307.75 Secs (2402.8 Secs) *[==>600.7 Secs (Split 1)]* *[==>600.7 Secs (Split 2)]* *[==>600.7 Secs (Split 3)]* *[==>600.7 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15220, Visit 05, implementation

Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

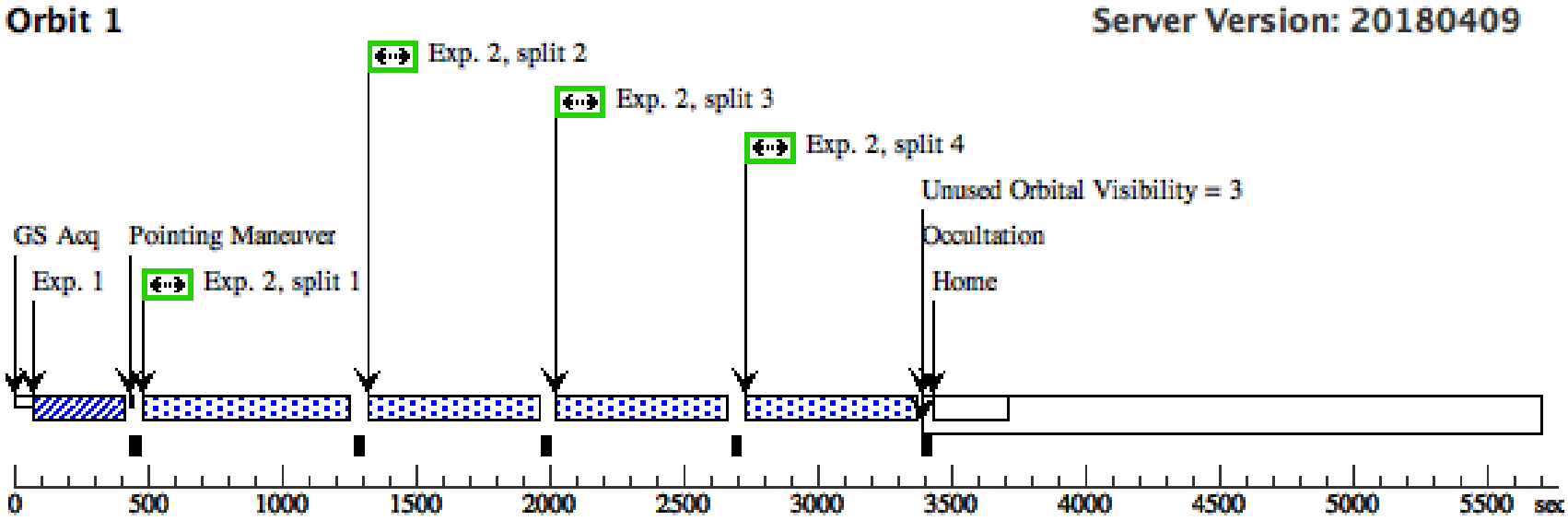
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SDSSJ1119+5130 Alt Name1: RC2-A1116+51 Alt Name2: GALEXASC-J111934.25+513012.2	RA: 11 19 34.1300 (169.8922083d) Dec: +51 30 12.48 (51.50347d) Equinox: J2000	Redshift: 0.0044760	V=16.80 U (SLOAN) AB = 17.18	Reference Frame: ICRS

Comments: We give coordinates of the ULX in Tab.3 of Preswitch+13.
We verified the coordinates on WFC3 images.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1005258)	(5) SDSSJ1119+5130	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				13 Secs (13 Secs) *[==>]*	*[1]*
2	(COS.sp.1012716)	(5) SDSSJ1119+5130	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=5080; FLASH=YES; FP-POS=ALL			102 Secs (2364 Secs) *[==>591.0 Secs (Split 1)]* *[==>591.0 Secs (Split 2)]* *[==>591.0 Secs (Split 3)]* *[==>591.0 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15220, Visit 06, completed Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

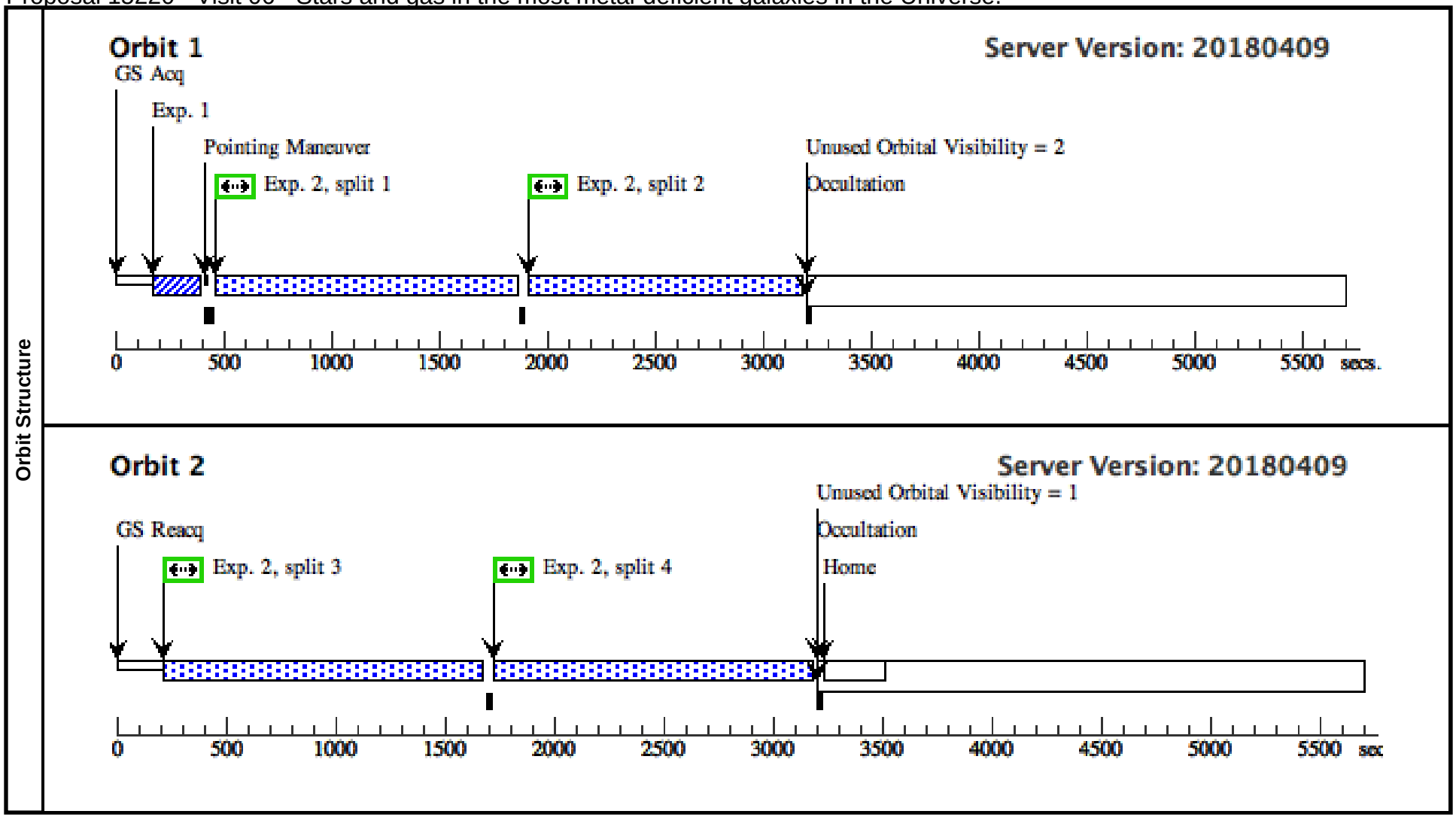
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	SDSSJ120122.32+021108.5 Alt Name1: SHOC-357	RA: 12 01 22.3100 (180.3429583d) Dec: +02 11 8.20 (2.18561d) Equinox: J2000	Redshift: 0.0032890	V=17.67 F1500 (COS) =0.5e-15 erg/s/cm 2	Reference Frame: ICRS

Comments: We give the same coordinates as for the COS G140L observations of PID 13312.
Category=GALAXY
Description=[DWARF COMPACT]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1005209)	(6) SDSSJ120122.32+021108.5	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				2.5 Secs (2.5 Secs)	
								[==>]	***[1]***
2	(COS.sp.1005205)	(6) SDSSJ120122.32+021108.5	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=12766; FLASH=YES; FP-POS=ALL			1200 Secs (5244 Secs)	
								[==>1217.0 Secs (Split 1)] *[==>1217.0 Secs (Split 2)]*	***[1]***
								[==>1405.0 Secs (Split 3)] *[==>1405.0 Secs (Split 4)]*	***[2]***


Orbit Structure
Orbit 1
Server Version: 20180409
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Unused Orbital Visibility = 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20180409
Unused Orbital Visibility = 1
GS Reacq
Occultation
Exp. 2, split 3
Exp. 2, split 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15220, Visit 07, completed Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

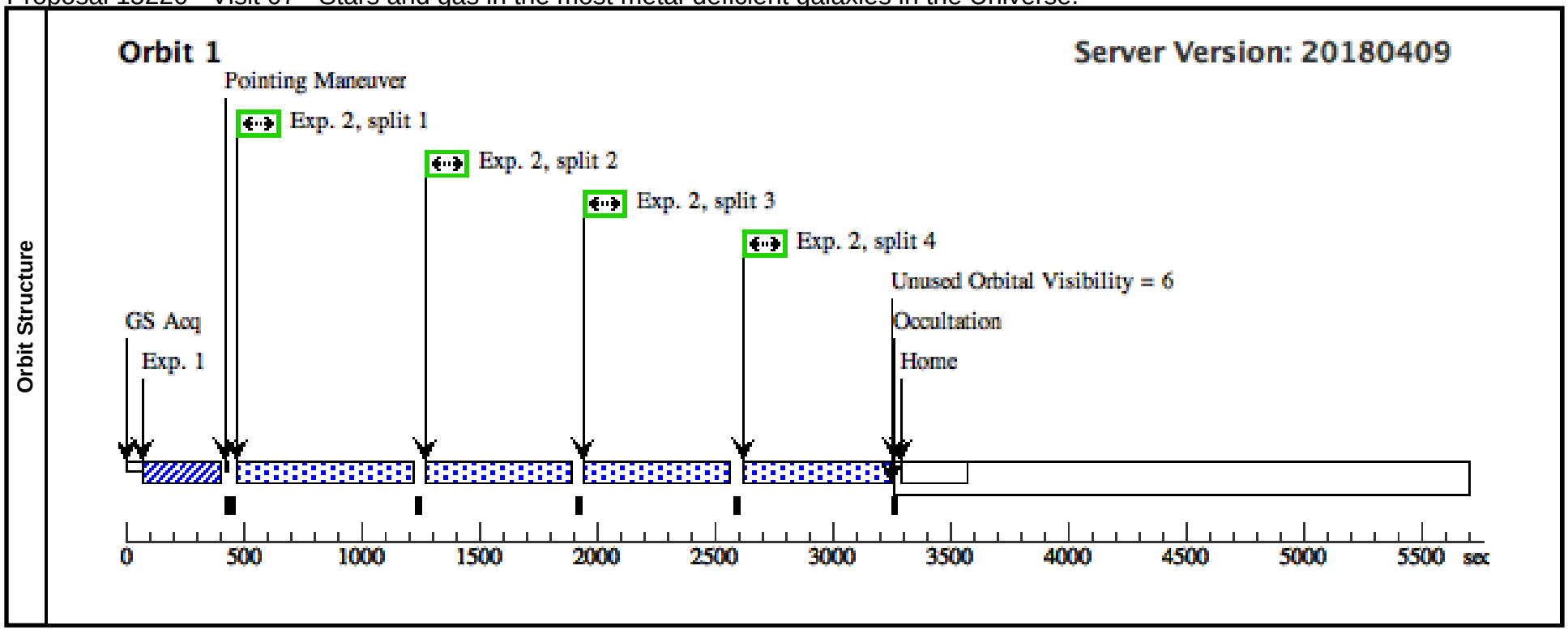
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	SDSSJ101624.51+375445.9 Alt Name1: KUG-1013+381 Alt Name2: GALEX-J101624.4+375445	RA: 10 16 24.5180 (154.1021583d) Dec: +37 54 45.97 (37.91277d) Equinox: J2000	Redshift: 0.0039120	V=16.04 F1680 (COS) = 0.5e-14 erg/s/cm 2	Reference Frame: ICRS

Comments: We give the same coordinates as for the COS G160M observations of PID 14120.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1012821)	(7) SDSSJ101624.51+375445.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				8 Secs (8 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1005310)	(7) SDSSJ101624.51+375445.9	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=13122; FLASH=YES; FP-POS=ALL			61.8 Secs (2267.2 Secs) *[==>566.8 Secs (Split 1)]* *[==>566.8 Secs (Split 2)]* *[==>566.8 Secs (Split 3)]* *[==>566.8 Secs (Split 4)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20180409
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Unused Orbital Visibility = 6
GS Acq
Exp. 1
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15220, Visit 08, completed Fri May 25 13:01:14 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

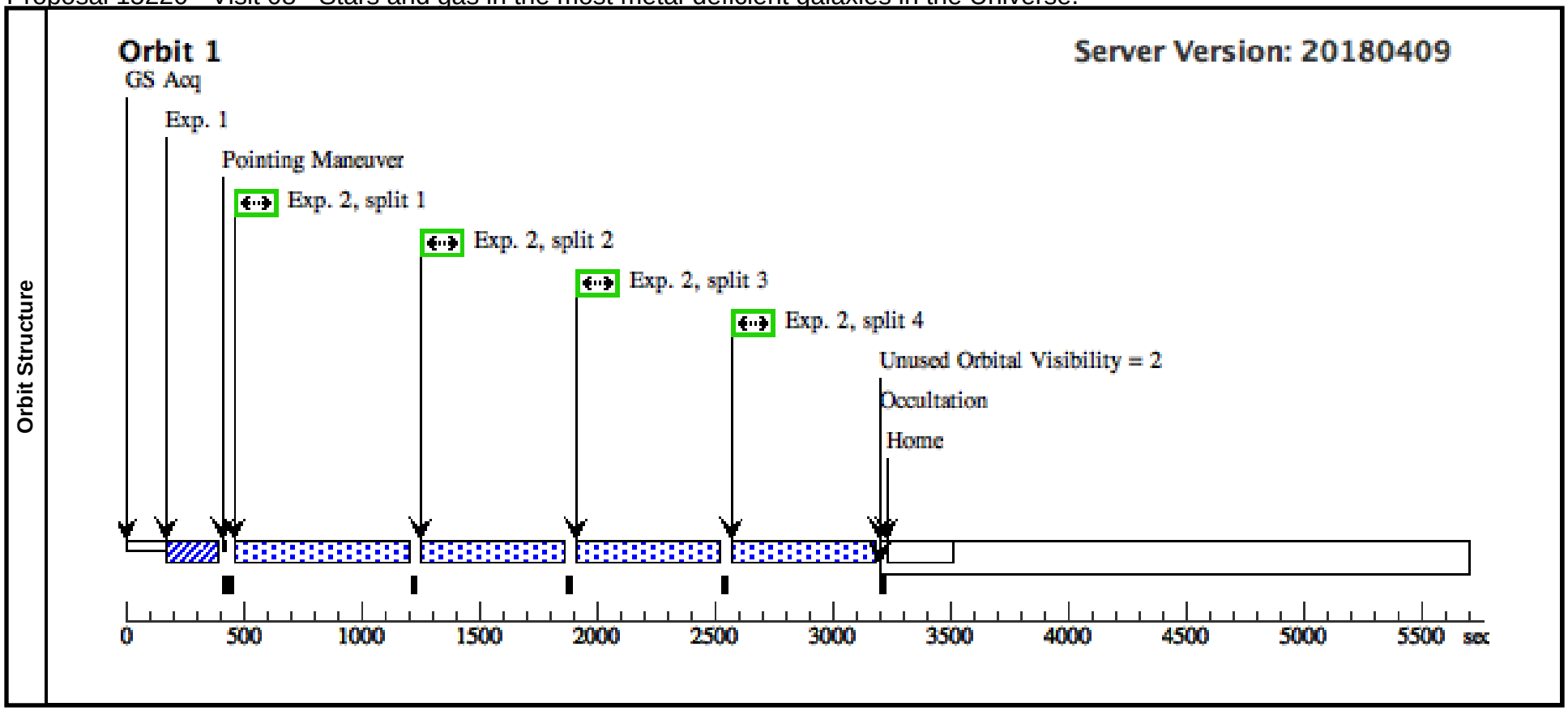
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(8)	SDSSJ2230-0006 Alt Name1: GALEX-J223036.8-000636	RA: 22 30 36.8000 (337.6533333d) Dec: -00 06 37.00 (-.11028d) Equinox: J2000	Redshift: 0.0051700	V=16.98 NUV (GALEX) AB = 18.59	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the GALEX database.
Category=GALAXY
Description=[DWARF COMPACT]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1005283)	(8) SDSSJ2230-0006	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				2.6 Secs (2.6 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1005273)	(8) SDSSJ2230-0006	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=9590; FLASH=YES; FP-POS=ALL			318 Secs (2224 Secs) *[==>556.0 Secs (Split 1)]* *[==>556.0 Secs (Split 2)]* *[==>556.0 Secs (Split 3)]* *[==>556.0 Secs (Split 4)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20180409
GS Acq
Exp. 1
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Exp. 2, split 3
Exp. 2, split 4
Unused Orbital Visibility = 2
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec