15193 - Addressing Ionization and Depletion in the ISM of Nearby Star-Forming Galaxies

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) M83-OBJECT-1 (2) M83-OBJECT-2	COS/FUV COS/NUV	2	05-Jul-2019 10:00:44.0	yes
02	(3) NGC3690-OBJECT-1	COS/FUV COS/NUV	4	05-Jul-2019 10:00:46.0	yes
52	(3) NGC3690-OBJECT-1	COS/FUV COS/NUV	4	05-Jul-2019 10:00:47.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(4) NGC4214-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:00:49.0	yes
04	(5) NGC4449-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:00:50.0	yes
54	(5) NGC4449-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:00:52.0	yes
94	(5) NGC4449-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:00:53.0	yes
05	(6) NGC4670-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:00:55.0	yes
06	(7) NGC5253-OBJECT-1 (8) NGC5253-OBJECT-2	COS/FUV COS/NUV	5	05-Jul-2019 10:00:57.0	yes
56	(8) NGC5253-OBJECT-2	COS/FUV COS/NUV	3	05-Jul-2019 10:01:00.0	yes
07	(9) IZW18-OBJECT-1	COS/FUV COS/NUV	1	05-Jul-2019 10:01:01.0	yes
08	(10) SBS1415+437-OBJECT-1	COS/FUV COS/NUV	3	05-Jul-2019 10:01:02.0	yes
58	(10) SBS1415+437-OBJECT-1	COS/FUV COS/NUV	3	05-Jul-2019 10:01:03.0	yes
09	(11) SBS0335-052-OBJECT-1	COS/FUV COS/NUV	4	05-Jul-2019 10:01:05.0	yes
59	(11) SBS0335-052-OBJECT-1	COS/FUV COS/NUV	4	05-Jul-2019 10:01:06.0	yes

38 Total Orbits Used

ABSTRACT

Measuring galaxy metallicity with cosmic time is of paramount importance to understand galaxy formation. ISM abundances are typically determined using emission-line spectroscopy of HII regions. However, HII regions may be self-enriched and not typical of the whole galaxy. This is particularly true for star-forming galaxies (SFGs) where the bulk of metals may be in the neutral gas. Quantifying metals in the ISM is thus important to assess how reliably HII regions trace galaxy abundances at any redshift. We were awarded 34 HST orbits (Cycle 17) to measure abundances in the neutral ISM of 9 nearby SFGs using absorption lines in the COS G130M/1291 spectra of bright UV background sources within the galaxy itself. We found metallicities that differ by up to ~ 2 dex depending on the element. These variations could be real or due to observational effects. Here we request 22 orbits in the new G130M/1222 and in G160M/1623 to access new FUV spectral transitions that will help us characterize ionized-gas contamination and dust depletion, and ultimately nail down the abundances of the different elements. These new data will nicely complement our Cycle 17 COS and Gemini/GMOS IFU programs, the latter aimed at deriving nebular abundances along the same COS sightlines. This first detailed and spatially-accurate comparison between neutral- and ionized-gas abundances in local (z~0) SFGs will provide crucial insights into the metallicity of galaxies at any redshift. If this UV spectroscopic study is not undertaken before HST ceases operation, the (in)homogeneity of the ISM in galaxies of the local Universe will continue to remain uncertain for at least another decade.

OBSERVING DESCRIPTION

We propose to perform COS/FUV spectroscopic follow-up observations of several point-like sources within 9 nearby star-forming galaxies previously targeted with COS G130M @ 1291 A to infer the metal content of their neutral ISM and compare it to the abundances in the HII regions. The complementary observations here proposed will provide tighter constraints to the observational effects affecting our ISM abundances, particularly ionization and depletion, but also hidden saturation and edge-detector effects.

The newer G130M @ 1222 A setting available to GOs starting from Cycle 20 will cover the 1060-1150 A spectral region (this setting places Ly_alpha in the detector gap; however, this is not an issue, since we will use the HI column densities from our previous observations to infer abundances). COS is currently the only HST (and space-based) instrument that can perform medium-resolution spectroscopy below ~ 1150 A. The bluer G130M @ 1055 A setting (900-1200 A) would have been preferred for our COS follow-up if it was not for its much lower effective area (a factor ~ 100 lower than for the standard 1291 A setting) that makes the integration times prohibitive. We will also efficiently extend the spectral coverage of our sightlines to the redder 1430-1800 A spectral range by using the G160M @ 1623 A setting. In many cases these additional observations are easily included within the 1 orbit already allocated for target acquisition and G130M observations because of short integration times. Averaging over bright and faint targets, the overall increment in the number of additional orbits requested to include G160M is only ~ 30%. This number would triple if the observations in G160M @ 1623 A would be done independently (14 orbits).

COS is a spectrograph optimized for observations of point sources. Observations of extended sources may thus be degraded in terms of resolution and this may compromise our abundance analysis. However, we are confident that this is not a problem for the observations here proposed. We will use the same sightlines towards UV-bright sources that we carefully selected for our Cycle 17 program. Most of these sources resulted in a COS/FUV G130M resolution of ~ 18 km/s (typical of point sources) once their intrinsic spatial extension was considered. Only a few of the targets were slightly extended (~ 0.3"-0.5") and resulted in a final spectral resolution of ~ 20-30 km/s. From our past FUSE and COS experience, this resolution is still well suited for the kind of ISM analysis that we are proposing here with COS (see, e.g., Aloisi et al. 2003 and James et al. 2014).

The exposure times for the Phase 1 are based on the same assumptions used to prepare the Phase 2 of our COS observations in Cycle 17 (program ID: 11579). In that case, the ACS/SBC pre-acquisition images were used in conjunction with archival WFPC2 and ACS/WFC images in other filters to isolate the brightest UV point-like sources, estimate their brightness and infer their spectral type from their color for usage in the ETC calculations (the foreground reddening from NED was also considered for this purpose). For this proposal, the flux of the targets was normalized to the flux observed at 1350 A in our COS G130M @ 1291 A spectra, instead of using the photometry from our pre-imaging effort.

The COS spectroscopic ETC was used to estimate exposure times necessary to reach a S/N ~ 10 at 1350 A for G130M@1222 A, and at 1550 A for G160M@1623 A. Our experience suggests that this is a minimum requirement to estimate column densities with uncertainties <|0.1 dex through a multi-component fitting technique. We conservatively considered an HST orbit lasting 54 minutes minus overheads as suggested by the APT: guide star (re-)acquisition (5-6 min), target acquisition (5-6 min), and exposure overheads including FP-POS split (2-12 min). Taking into account all the pointings for all the galaxies in the sample, this amounts to 17 orbits in COS/FUV G130M @ 1222 A and 5 additional orbits in COS/FUV G160M @ 1623 A, for a total of 22 orbits. (For I Zw 18 G160M @ 1623 A observations already exist in the HST archive.)

The ETC reported no warnings for violations of the local and/or global bright object limits, so we expect the targets to be safe to observe (as also already confirmed by our G130M @ 1291 A observations). The spectroscopic exposures in each pointing will be executed with FP-split to mitigate flat-fielding uncertainties and improve the S/N. Since the targets of each pointing will be faint point-like sources we will use the same target acquisition (TA) strategy performed before, i.e., a standard peak-up TA in NUV imaging mode.

The spectroscopic data will be analyzed using the Fitlyman package in MIDAS, which fits individual absorption lines with Voigt profiles taking into account constraints from atomic physics and the spectral resolution of the data. For an accurate analysis we will thus need to know the actually achieved resolution and line-spread function (LSF). We will calibrate this similarly to what already done for the COS spectra acquired in G130M @

1291 A, i.e., we will use the TA images to estimate the intrinsic UV extension of the sources to convolve with the LSF of the COS/FUV spectroscopic observations.

This study has not been possible with any other previous space-based mission or instrument. The unique FUV capabilities of COS on HST, coupled with the ground-based Gemini IFU capabilities that will constrain the metals in the nebular gas along the same sightlines, will now finally provide the opportunity to probe this subject with a completely new approach. If this UV study is not completed now that HST is available, many of the key questions related to the evolution of metals with cosmic time will continue to remain unanswered for at least another decade if not longer.

Coordinated Observations

Justify Duplications

The same

Visit

Proposal 15193, Visit 01, completed Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

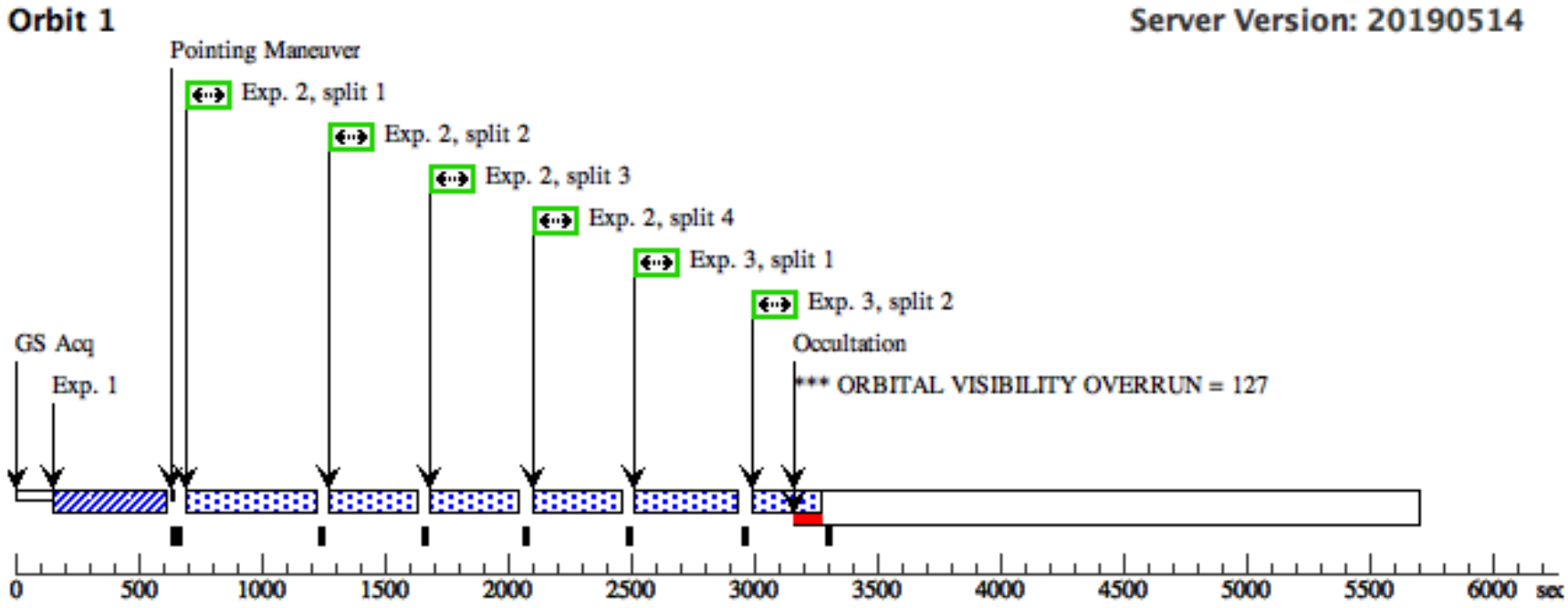
Fixed Targets

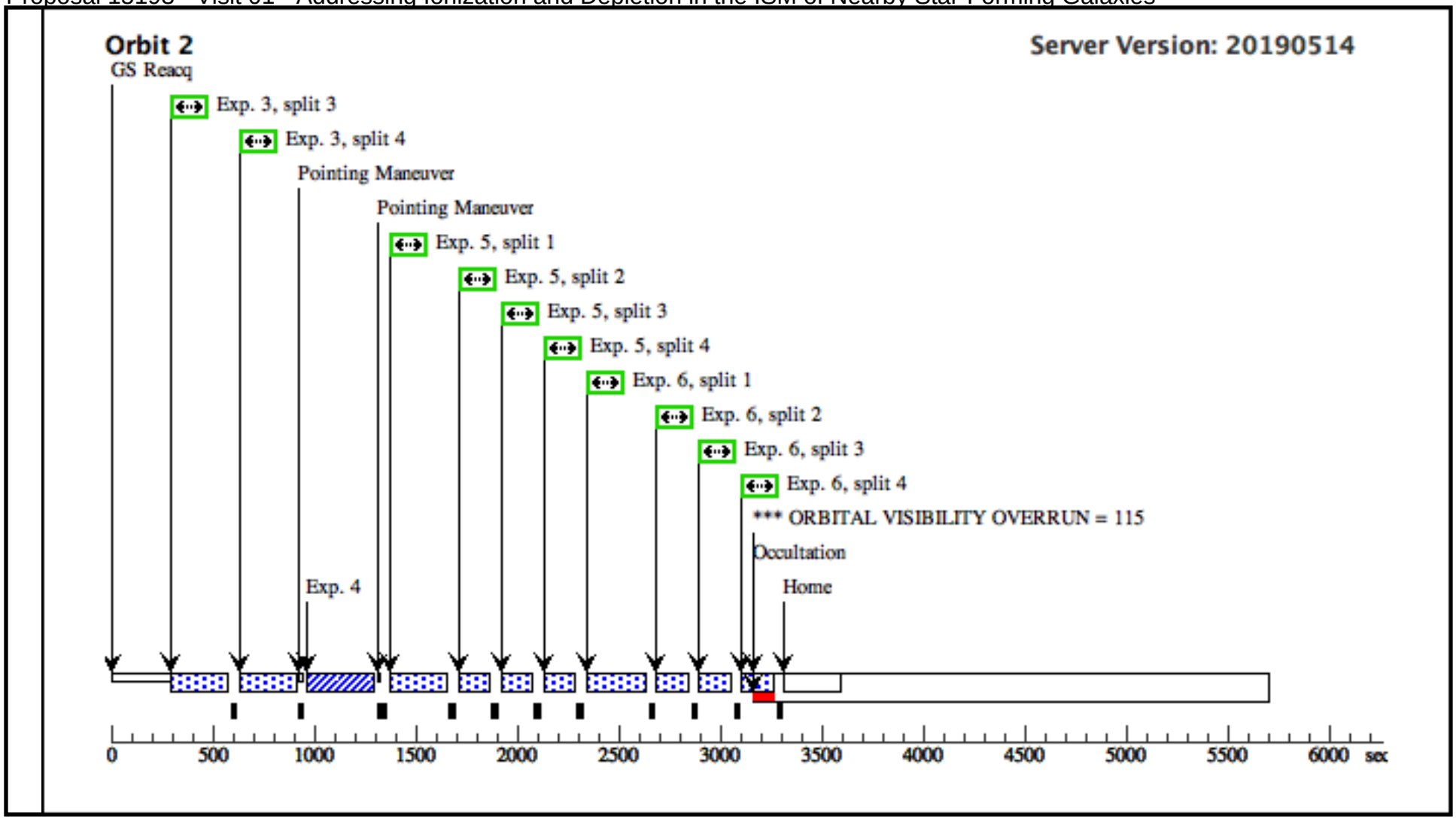
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M83-OBJECT-1	RA: 13 37 0.4581 (204.2519088d) Dec: -29 51 54.58 (-29.86516d) Equinox: J2000		V=7.5+/-0.1	Reference Frame: ICRS
Comments: The coordinates for this target were obtained from a HLA image which is based on 2MASS astrometry. *Category=STELLAR CLUSTER* *Description=[KNOT, STAR FORMING REGION, YOUNG ASSOCIATION]* *Extended=NO*					
(2)	M83-OBJECT-2	RA: 13 37 0.5081 (204.2521171d) Dec: -29 52 1.22 (-29.86701d) Equinox: J2000		V=7.5+/-0.1	Reference Frame: ICRS
Comments: The coordinates for this target were obtained from a HLA image which is based on 2MASS astrometry. *Category=STELLAR CLUSTER* *Description=[KNOT, STAR FORMING REGION, YOUNG ASSOCIATION]* *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_m83_object1_ta_image (COS.ta.1047936)	(1) M83-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				84 Secs (84 Secs) *[==>]*	*[1]*
2	cos_m83_object1_g160m_1623 (COS.sp.1048531)	(1) M83-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=4736; FP-POS=ALL			310 Secs (1240 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
3	cos_m83_object1_g130m_1222 (COS.sp.1048530)	(1) M83-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=3007; FP-POS=ALL			229 Secs (916 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]* *[2]*
4	cos_m83_object2_ta_image (COS.ta.1047935)	(2) M83-OBJECT-2	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				49 Secs (49 Secs) *[==>]*	*[2]*
5	cos_m83_object2_g130m_1222 (COS.sp.1048533)	(2) M83-OBJECT-2	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=787; FP-POS=ALL			95 Secs (380 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[2]*
6	cos_m83_object2_g160m_1623 (COS.sp.1048532)	(2) M83-OBJECT-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=1705; FP-POS=ALL			105 Secs (420 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[2]*

Orbit Structure




Orbit 2
Server Version: 20190514
GS Reacq
Exp. 3, split 3
Exp. 3, split 4
Pointing Maneuver
Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Exp. 6, split 1
Exp. 6, split 2
Exp. 6, split 3
Exp. 6, split 4
*** ORBITAL VISIBILITY OVERRUN = 115
Occultation
Home
Exp. 4
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 02, failed Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

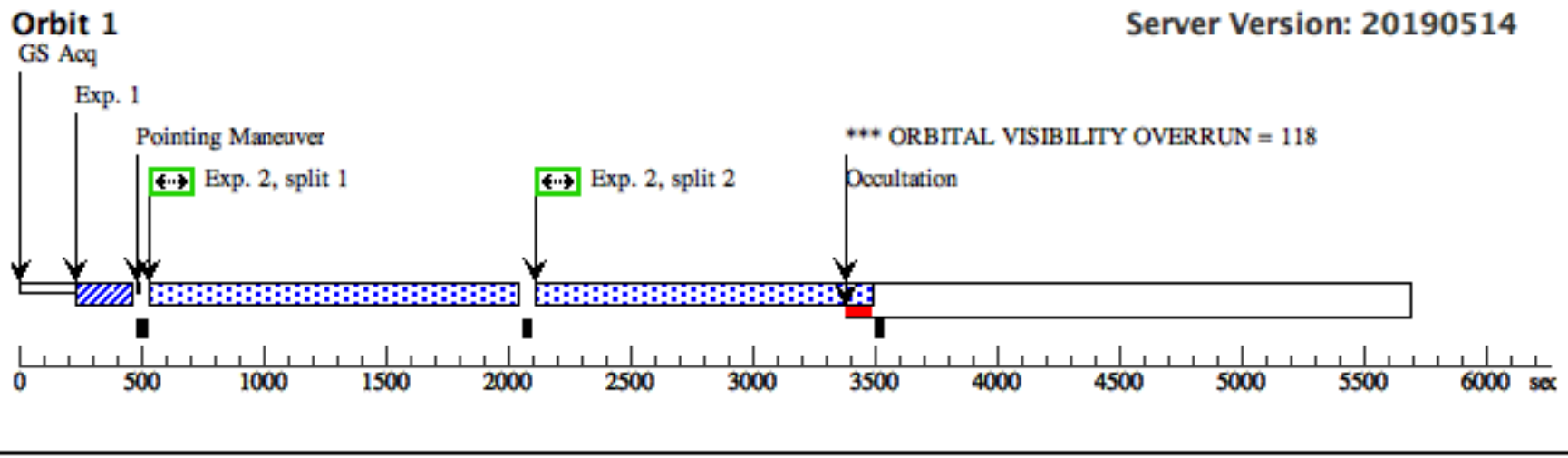
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC3690-OBJECT-1	RA: 11 28 29.1490 (172.1214542d) Dec: +58 33 41.01 (58.56139d) Equinox: J2000		V=12.0+/-0.1	Reference Frame: ICRS

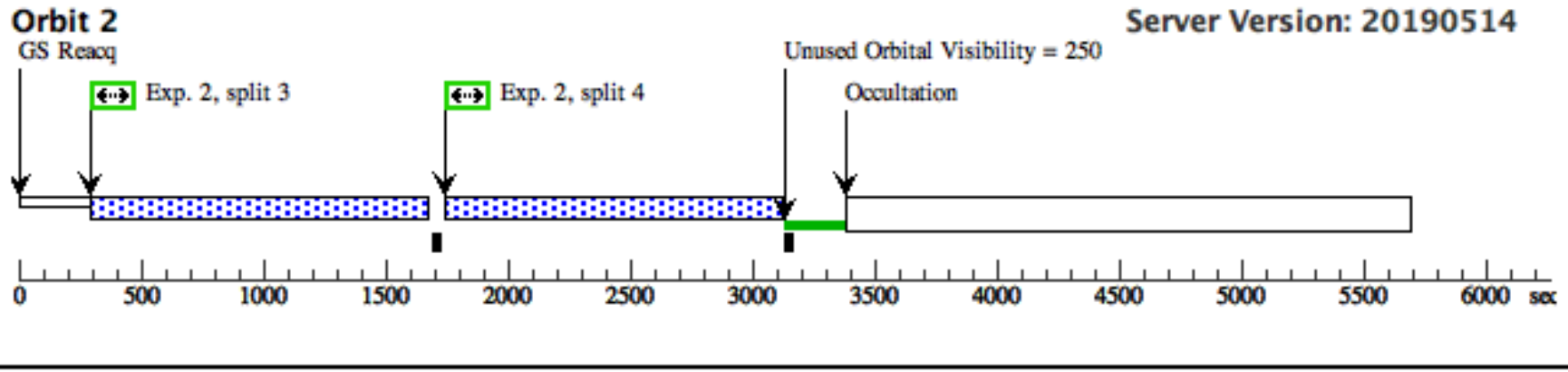
Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

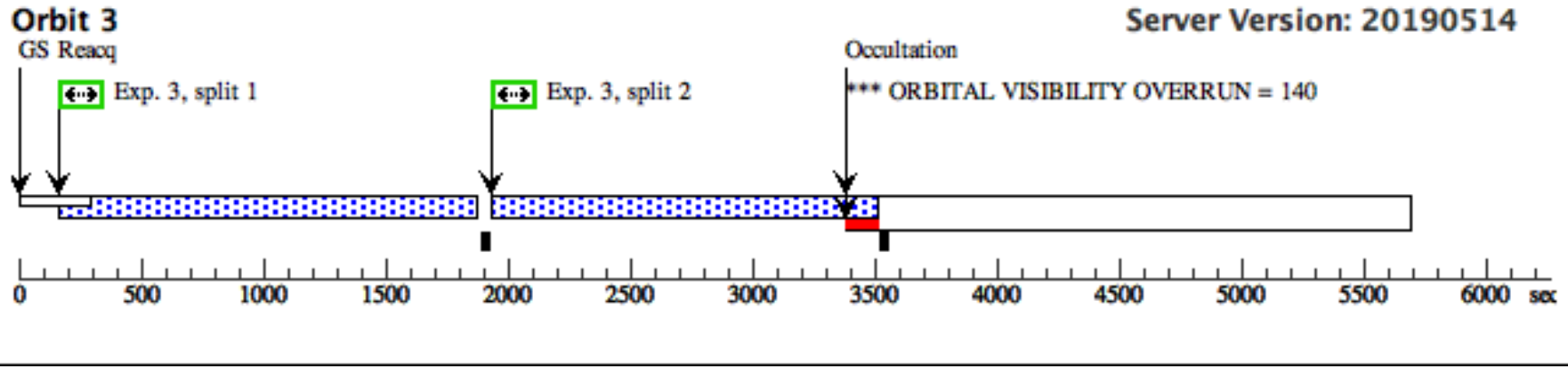
Exposures

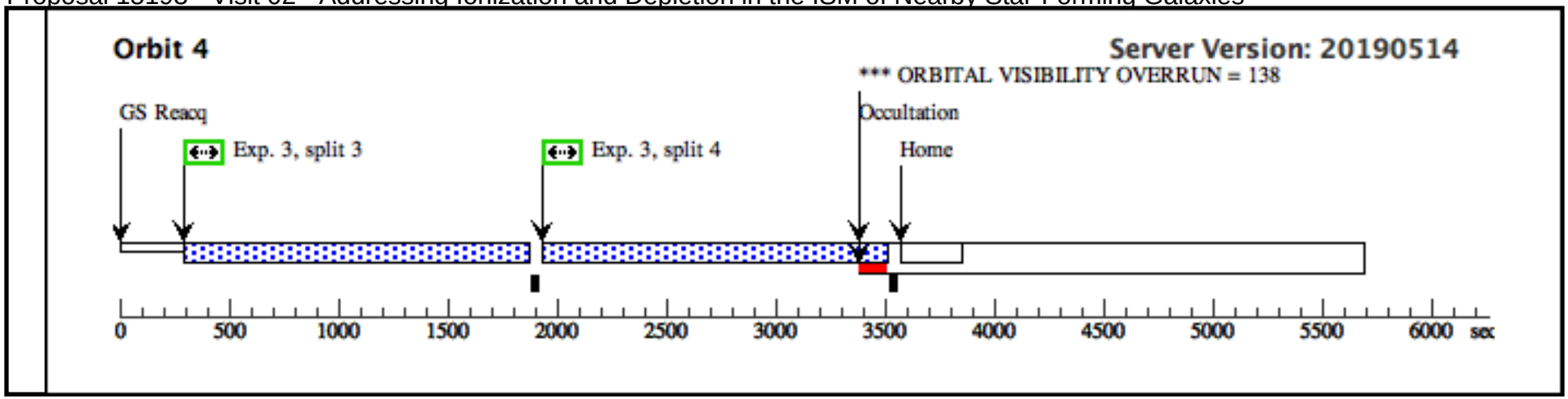
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_ngc3690_object1_ta_image (COS.ta.1047937)	(3) NGC3690-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs)	
								[==>]	***[1]***
2	cos_ngc3690_object1_g130m_1222 (COS.sp.1048534)	(3) NGC3690-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=8115; FP-POS=ALL			1329 Secs (5316 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***
								[==>(Split 3)] *[==>(Split 4)]*	***[2]***
3	cos_ngc3690_object1_g160m_1623 (COS.sp.1048535)	(3) NGC3690-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12739; FP-POS=ALL			1523 Secs (6092 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[3]***
								[==>(Split 3)] *[==>(Split 4)]*	***[4]***

Orbit Structure








Orbit 4
Server Version: 20190514
*** ORBITAL VISIBILITY OVERRUN = 138
GS Reacq
Exp. 3, split 3
Exp. 3, split 4
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 52, completed Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 52) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 52) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 52) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

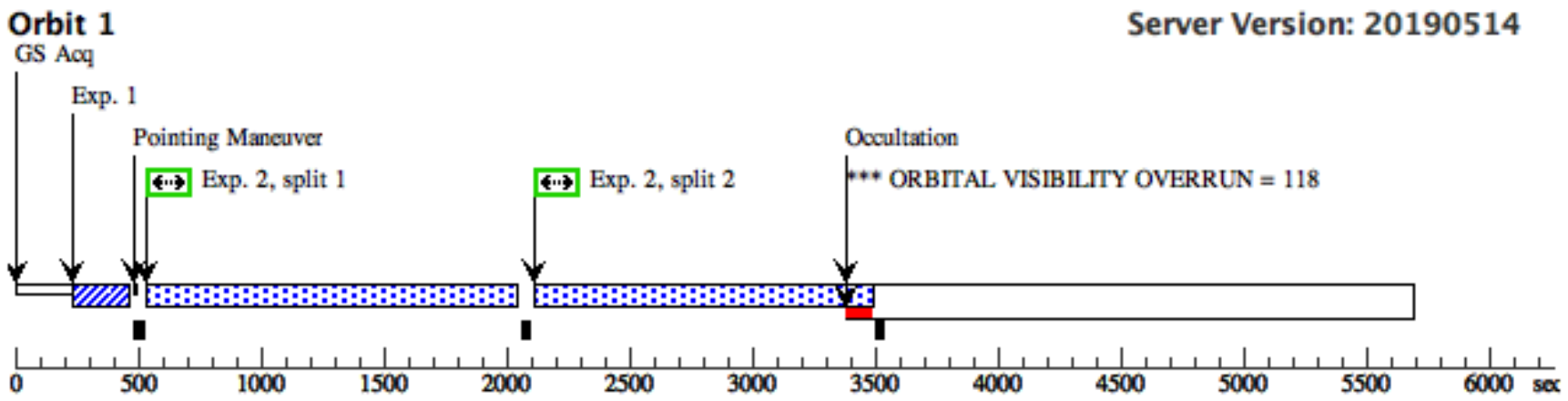
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	NGC3690-OBJECT-1	RA: 11 28 29.1490 (172.1214542d) Dec: +58 33 41.01 (58.56139d) Equinox: J2000		V=12.0+/-0.1	Reference Frame: ICRS

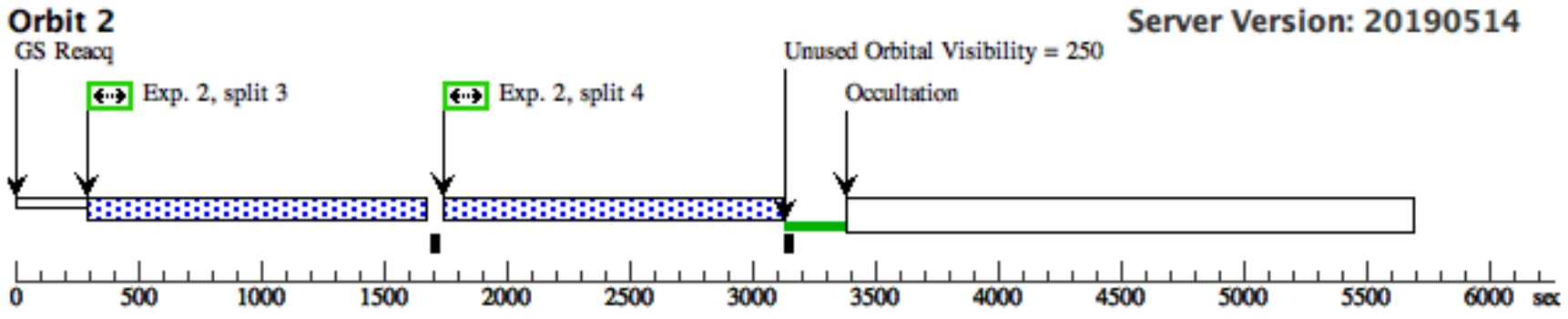
Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

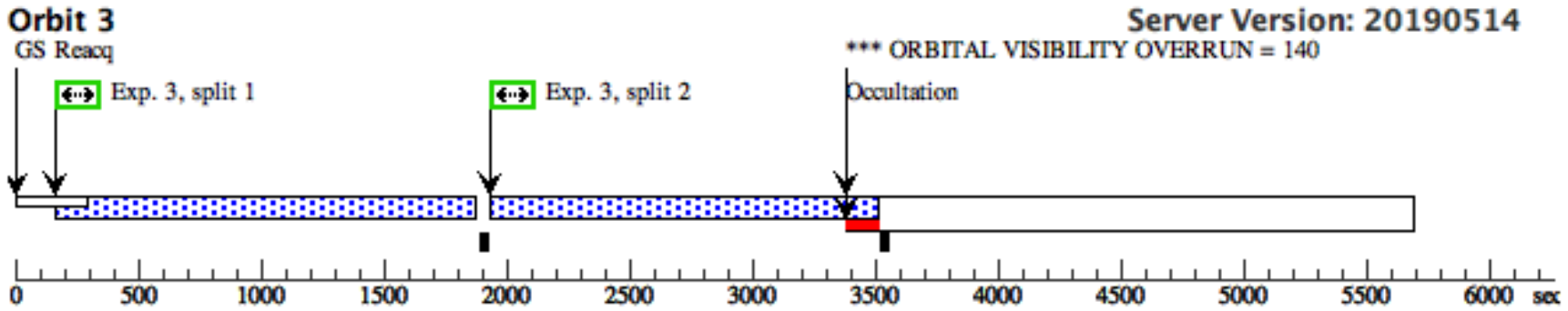
Exposures

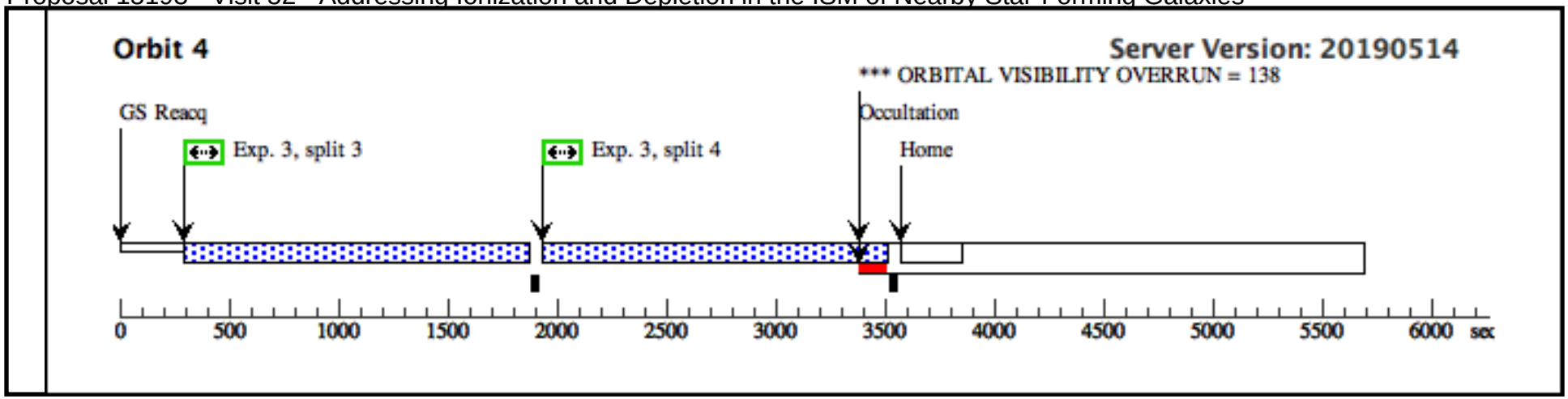
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_ngc3690_object1_ta_image (COS.ta.1047937)	(3) NGC3690-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs)	
								[==>]	***[1]***
2	cos_ngc3690_object1_g130m_1222 (COS.sp.1048534)	(3) NGC3690-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=8115; FP-POS=ALL			1329 Secs (5316 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***
								[==>(Split 3)] *[==>(Split 4)]*	***[2]***
3	cos_ngc3690_object1_g160m_1623 (COS.sp.1048535)	(3) NGC3690-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12739; FP-POS=ALL			1523 Secs (6092 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[3]***
								[==>(Split 3)] *[==>(Split 4)]*	***[4]***

Orbit Structure








Orbit 4
Server Version: 20190514
*** ORBITAL VISIBILITY OVERRUN = 138
GS Reacq
Exp. 3, split 3
Exp. 3, split 4
Occultation
Home
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1500
2000
2500
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Visit

Proposal 15193, Visit 03, completed Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

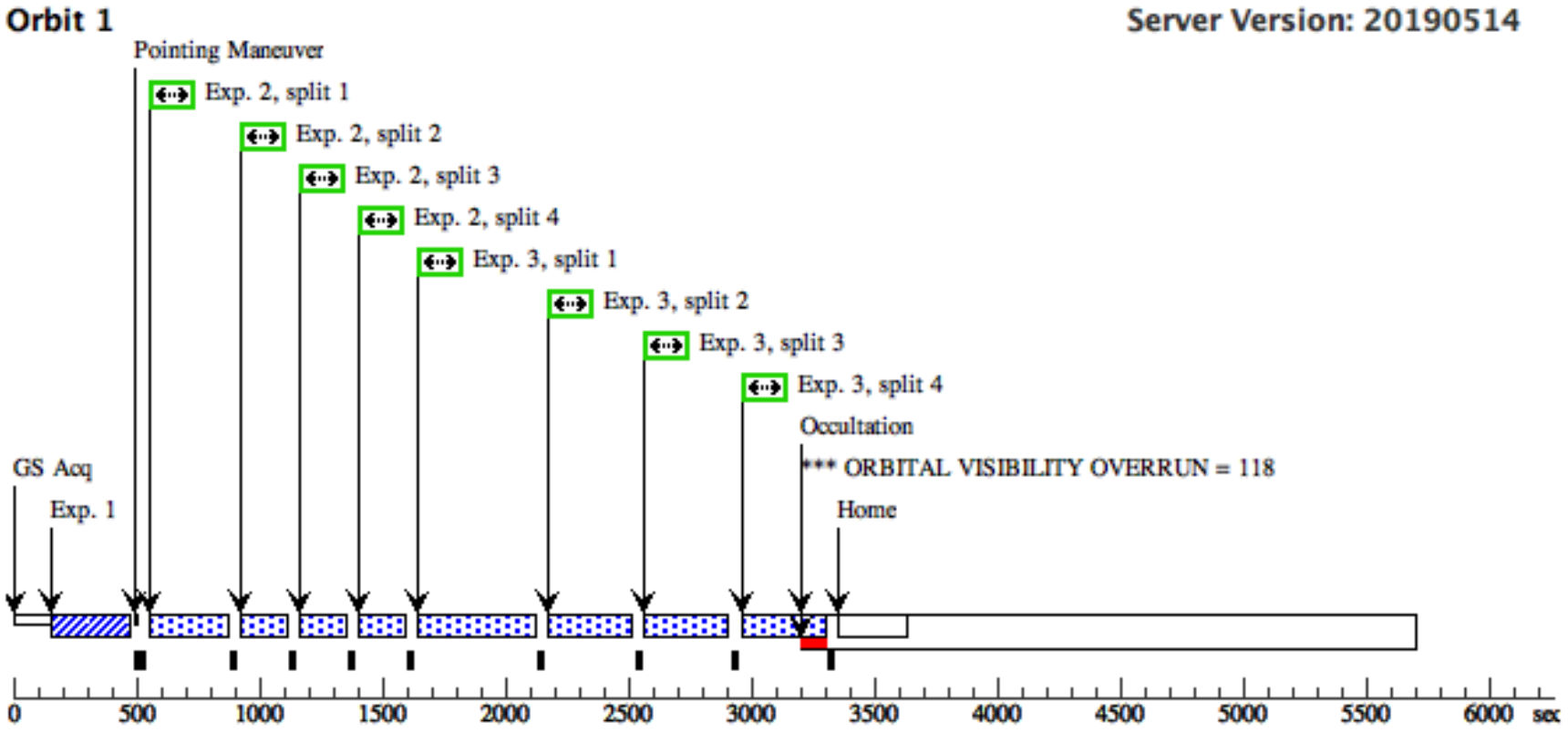
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	NGC4214-OBJECT-1	RA: 12 15 39.4800 (183.9145000d) Dec: +36 19 35.36 (36.32649d) Equinox: J2000		V=9.8+/-0.1	Reference Frame: ICRS

Comments: Coordinates for this target have now been changed from the previous Visit 31 coordinates. The renewed coordinates were obtained from the ACS-SBC pre-imaging observations.
Category=GALAXY
Description=[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_ngc4214_object1_ta_image (COS.ta.1047938)	(4) NGC4214-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				15 Secs (15 Secs) *[==>]*	*[1]*
2	cos_ngc4214_object1_g130m_1222 (COS.sp.1048537)	(4) NGC4214-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1225; FP-POS=ALL			135 Secs (540 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
3	cos_ngc4214_object1_g160m_1623 (COS.sp.1048536)	(4) NGC4214-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=3466; FP-POS=ALL			289 Secs (1156 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15193, Visit 04, failed

Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

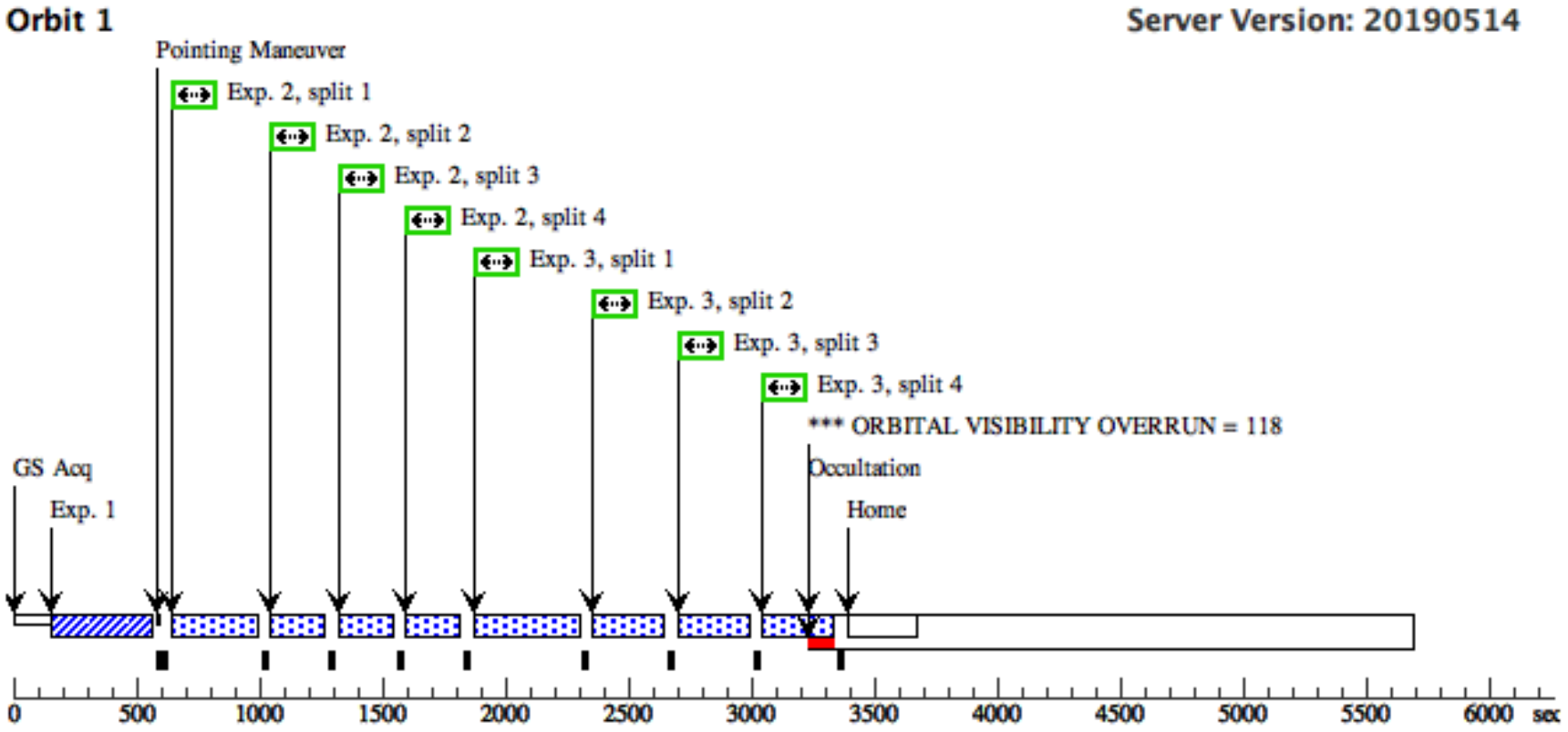
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	NGC4449-OBJECT-1	RA: 12 28 11.0890 (187.0462042d) Dec: +44 05 37.06 (44.09363d) Equinox: J2000		V=9.6+/-0.1	Reference Frame: ICRS

Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[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_ngc4449_object1_ta_image (COS.ta.1047939)	(5) NGC4449-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs (60 Secs) *[==>]*	*[1]*
2	cos_ngc4449_object1_g130m_1222 (COS.sp.1048538)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=3480; FP-POS=ALL			170 Secs (680 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
3	cos_ngc4449_object1_g160m_1623 (COS.sp.1048539)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=4459; FP-POS=ALL			241 Secs (964 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15193, Visit 54, failed

Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 54) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

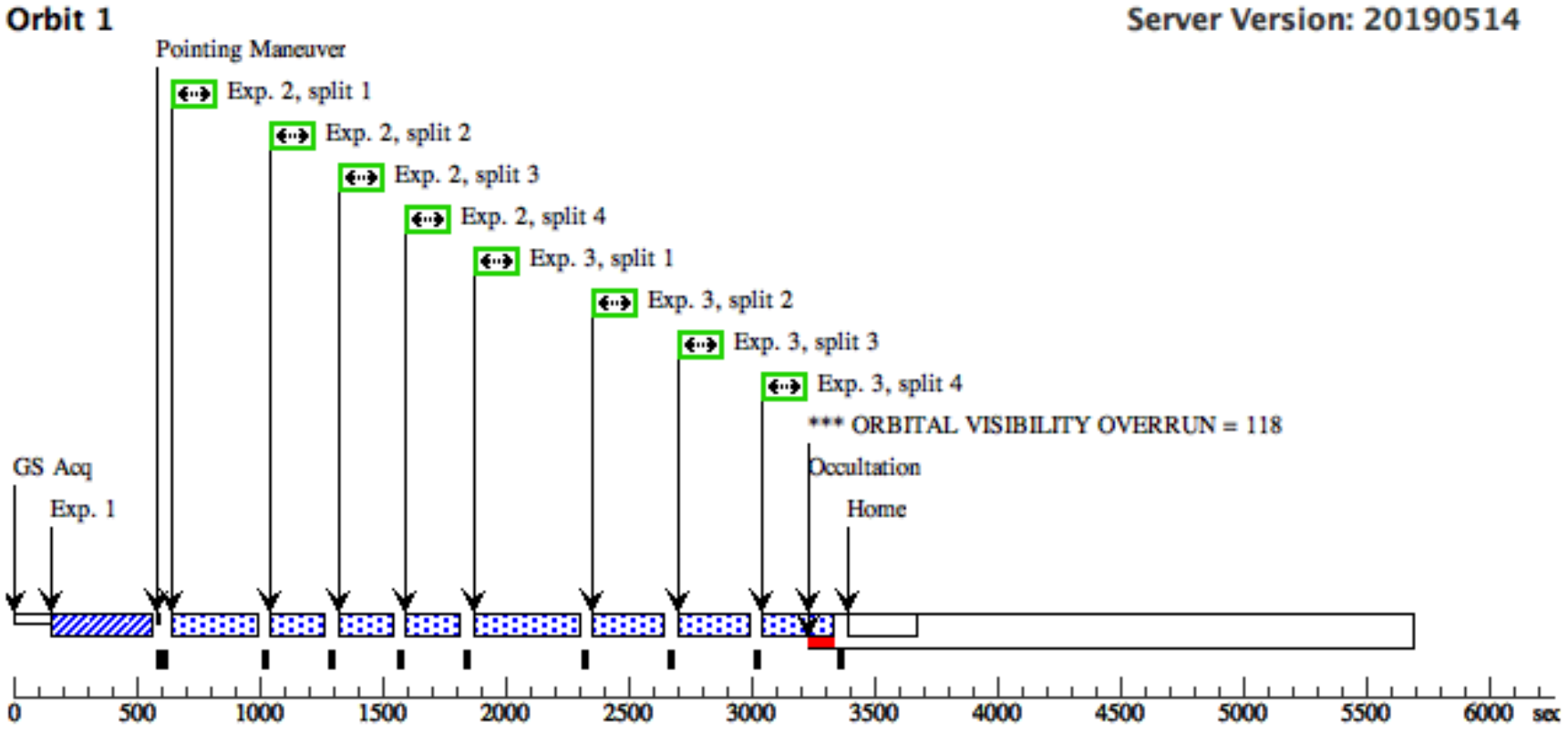
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	NGC4449-OBJECT-1	RA: 12 28 11.0890 (187.0462042d) Dec: +44 05 37.06 (44.09363d) Equinox: J2000		V=9.6+/-0.1	Reference Frame: ICRS

Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[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_ngc4449_object1_ta_image (COS.ta.1047939)	(5) NGC4449-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs (60 Secs) *[==>]*	*[1]*
2	cos_ngc4449_object1_g130m_1222 (COS.sp.1048538)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=3480; FP-POS=ALL			170 Secs (680 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
3	cos_ngc4449_object1_g160m_1623 (COS.sp.1048539)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=4459; FP-POS=ALL			241 Secs (964 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15193, Visit 94 Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 94) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

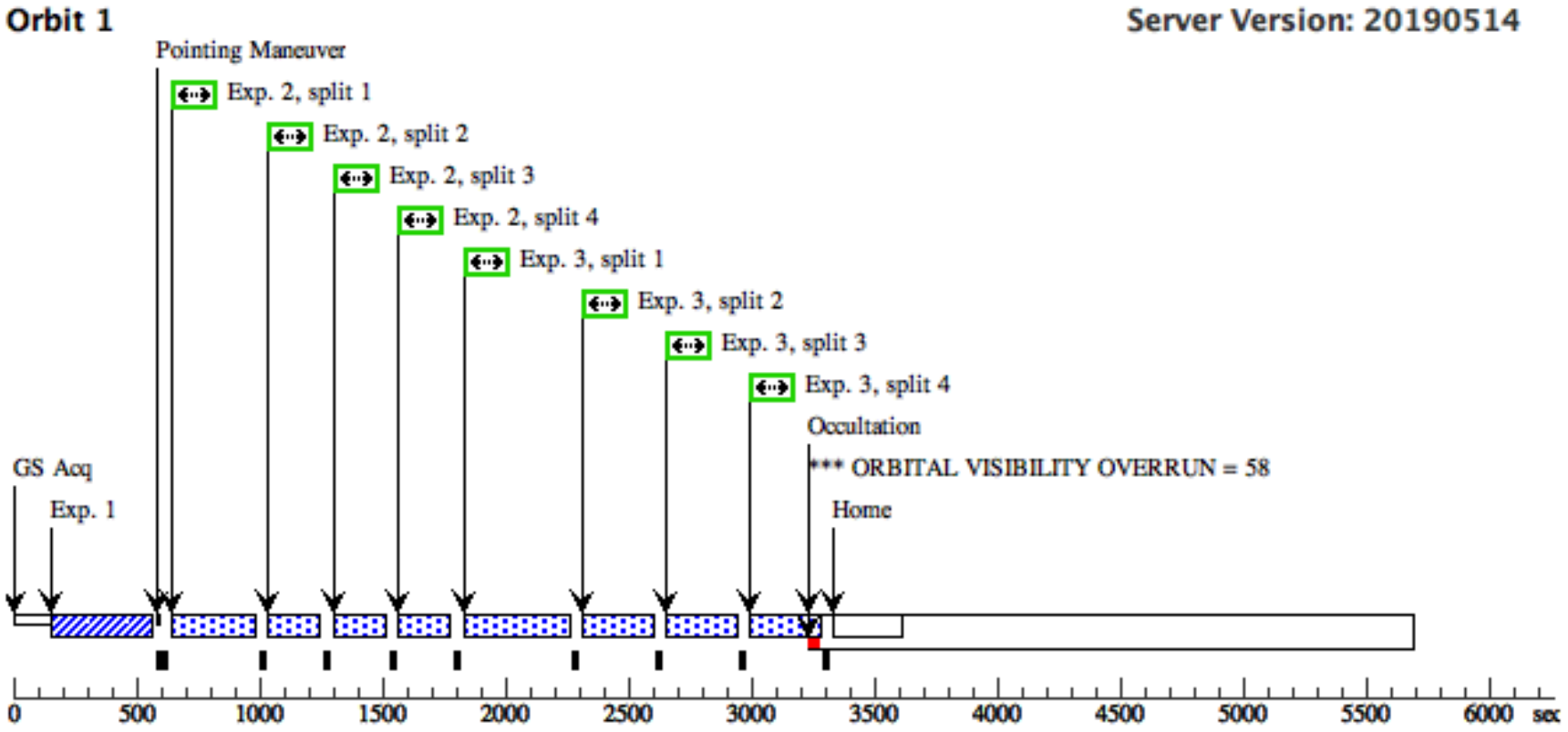
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	NGC4449-OBJECT-1	RA: 12 28 11.0890 (187.0462042d) Dec: +44 05 37.06 (44.09363d) Equinox: J2000		V=9.6+/-0.1	Reference Frame: ICRS

Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[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_ngc4449_object1_ta_image (COS.ta.1047939)	(5) NGC4449-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs (60 Secs) *[==>]*	*[1]*
2	cos_ngc4449_object1_g130m_1222 (COS.sp.1048538)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=3480; FP-POS=ALL			160 Secs (640 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
3	cos_ngc4449_object1_g160m_1623 (COS.sp.1048539)	(5) NGC4449-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=4459; FP-POS=ALL			236 Secs (944 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15193, Visit 05, completed Fri Jul 05 14:01:07 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: This visit needs to be modified after the analysis of the data from Visit 5.

Diagnostics

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

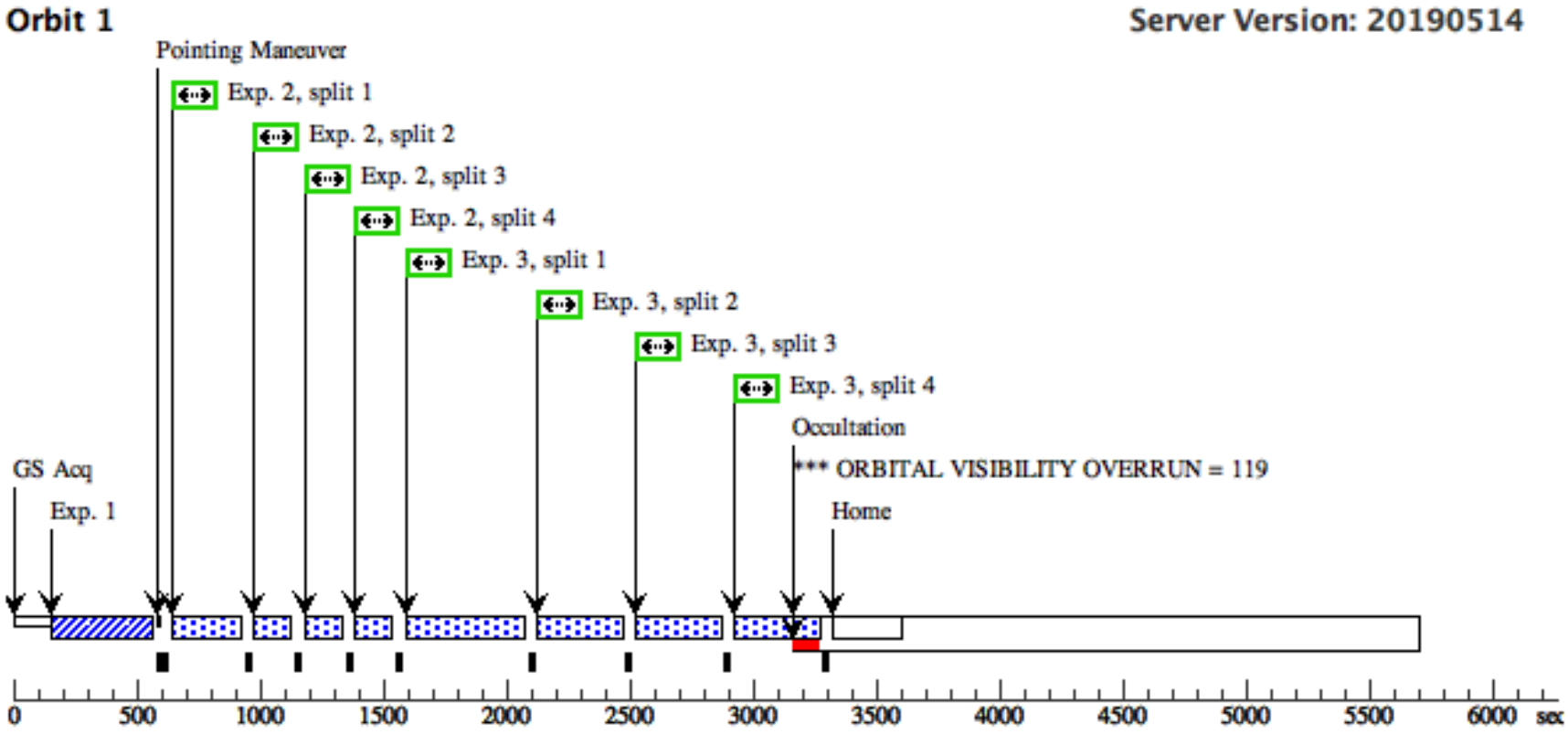
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	NGC4670-OBJECT-1	RA: 12 45 17.2650 (191.3219375d) Dec: +27 07 32.13 (27.12559d) Equinox: J2000		V=12.7+/-0.1	Reference Frame: ICRS

Comments: This object was selected by looking at ACS/SBC images of visit 5, and its coordinates were inferred from WFPC2 images taken from the HLA archive (i.e., with corrected WCS).
Category=GALAXY
Description=[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_ngc4670_object1_ta_image (COS.ta.1047940)	(6) NGC4670-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				60 Secs (60 Secs) *[==>]*	 ***[1]***
2	cos_ngc4670_object1_g130m_1222 (COS.sp.1048541)	(6) NGC4670-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1593; FP-POS=ALL			100 Secs (400 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***
3	cos_ngc4670_object1_g160m_1623 (COS.sp.1048540)	(6) NGC4670-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=4335; FP-POS=ALL			293 Secs (1172 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 15193, Visit 06, failed Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 06) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

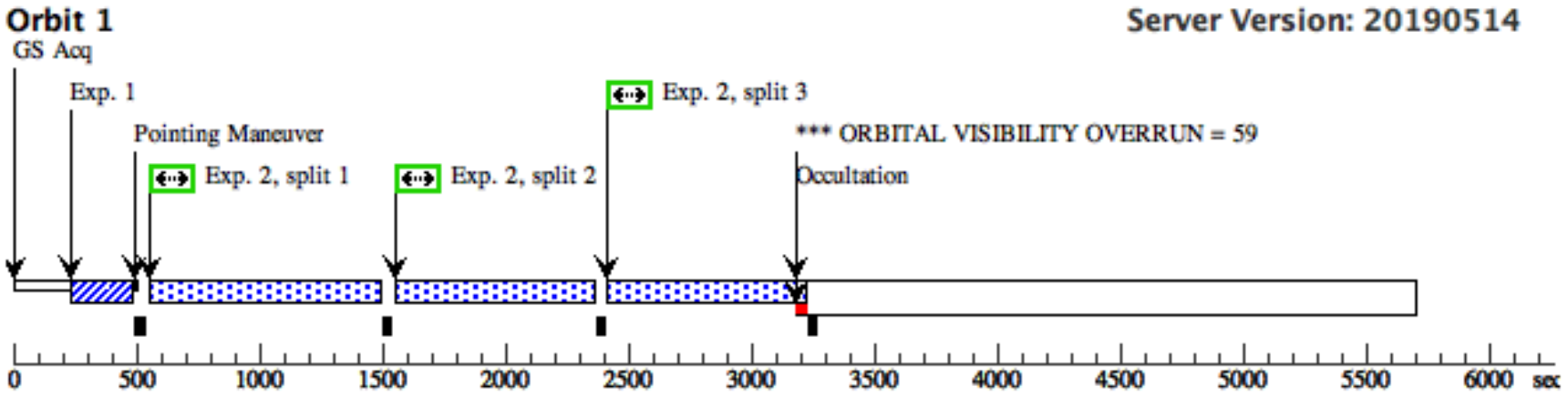
Fixed Targets

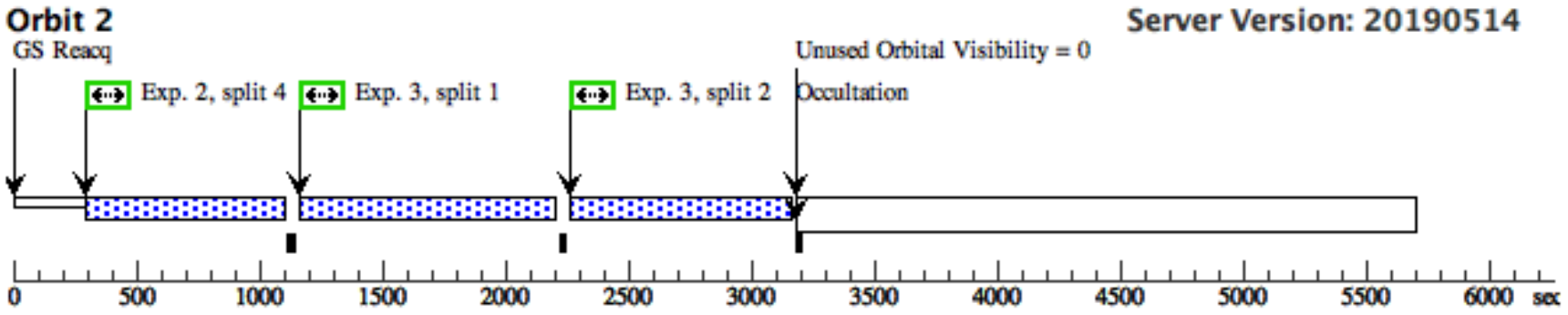
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	NGC5253-OBJECT-1	RA: 13 39 56.0200 (204.9834167d) Dec: -31 38 31.30 (-31.64203d) Equinox: J2000		V=10.4+/-0.1	Reference Frame: ICRS
Comments: The coordinates for this target were obtained from a HLA image which is based on GSC2.3 astrometry. *Category=GALAXY* *Description=[STARBURST]* *Extended=NO*					
(8)	NGC5253-OBJECT-2	RA: 13 39 55.8890 (204.9828708d) Dec: -31 38 38.34 (-31.64398d) Equinox: J2000		V=10.4+/-0.1	Reference Frame: ICRS
Comments: The coordinates for this target were obtained from a HLA image which is based on GSC2.3 astrometry. *Category=GALAXY* *Description=[STARBURST]* *Extended=NO*					

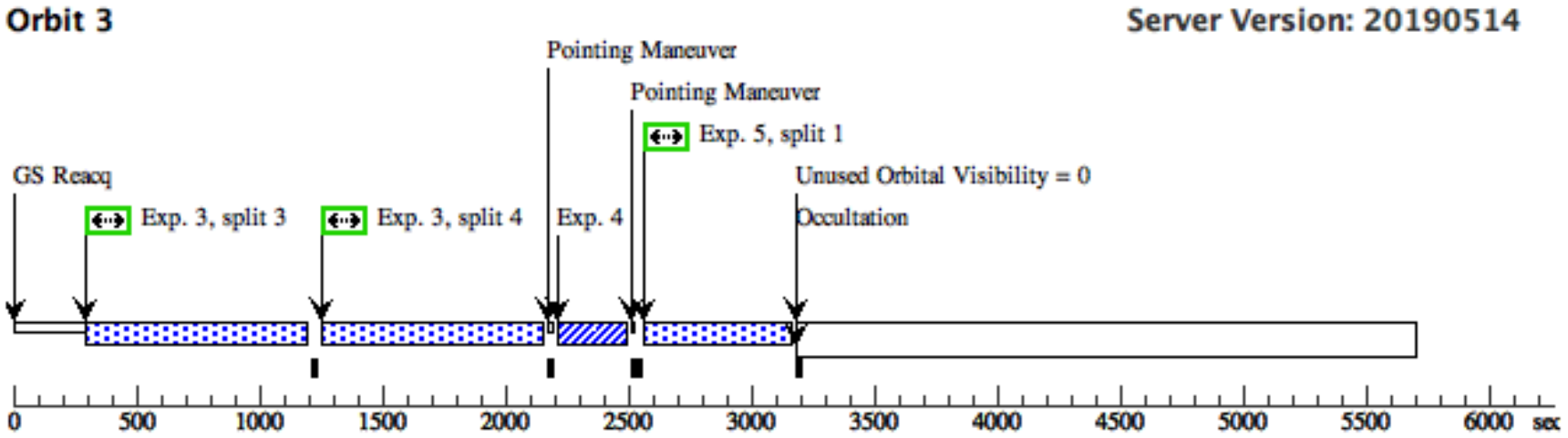
Exposures

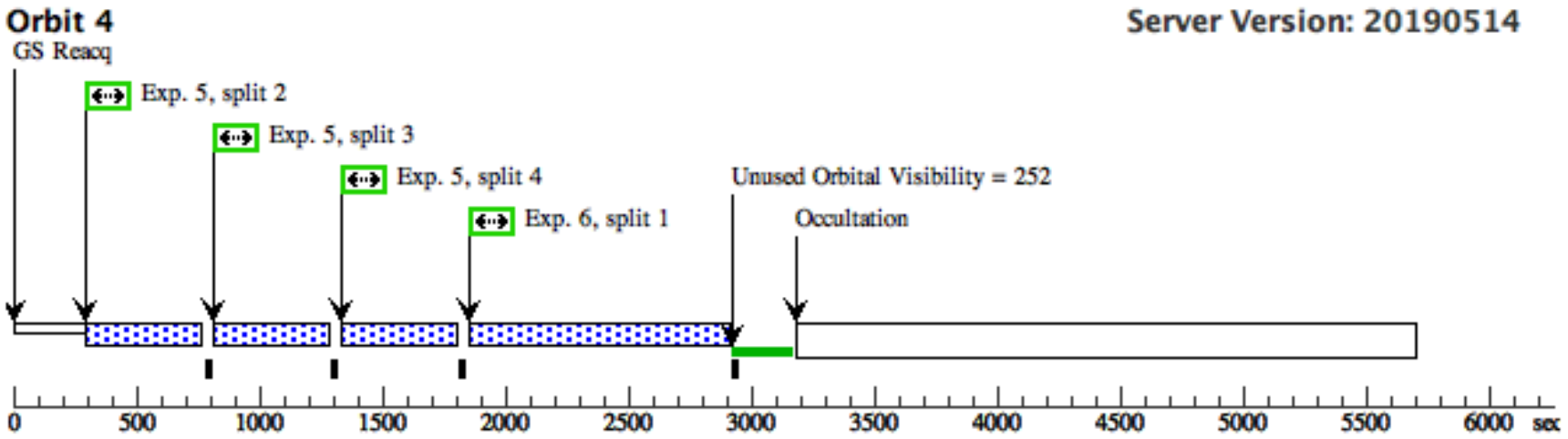
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_ngc5253_object2_ta_image (COS.ta.1047942)	(8) NGC5253-OBJECT-2	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				15 Secs (15 Secs)	
								[==>]	***[1]***
2	cos_ngc5253_object2_g130m_1222 (COS.sp.1048545)	(8) NGC5253-OBJECT-2	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=6738; FP-POS=ALL			753 Secs (3012 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
								[==>(Split 3)]	
								[==>(Split 4)]	***[2]***
3	cos_ngc5253_object2_g160m_1623 (COS.sp.1048544)	(8) NGC5253-OBJECT-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=10276; FP-POS=ALL			852 Secs (3408 Secs)	
								[==>(Split 1)]	***[2]***
								[==>(Split 2)]	
								[==>(Split 3)]	***[3]***
								[==>(Split 4)]	
4	cos_ngc5253_object1_ta_image (COS.ta.1047941)	(7) NGC5253-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				7 Secs (7 Secs)	
								[==>]	***[3]***
5	cos_ngc5253_object1_g130m_1222 (COS.sp.1048542)	(7) NGC5253-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=5216; FP-POS=ALL			414 Secs (1656 Secs)	
								[==>(Split 1)]	***[3]***
								[==>(Split 2)]	
								[==>(Split 3)]	***[4]***
								[==>(Split 4)]	
6	cos_ngc5253_object1_g160m_1623 (COS.sp.1048543)	(7) NGC5253-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=8117; FP-POS=ALL			868 Secs (3472 Secs)	
								[==>(Split 1)]	***[4]***
								[==>(Split 2)]	
								[==>(Split 3)]	***[5]***
								[==>(Split 4)]	

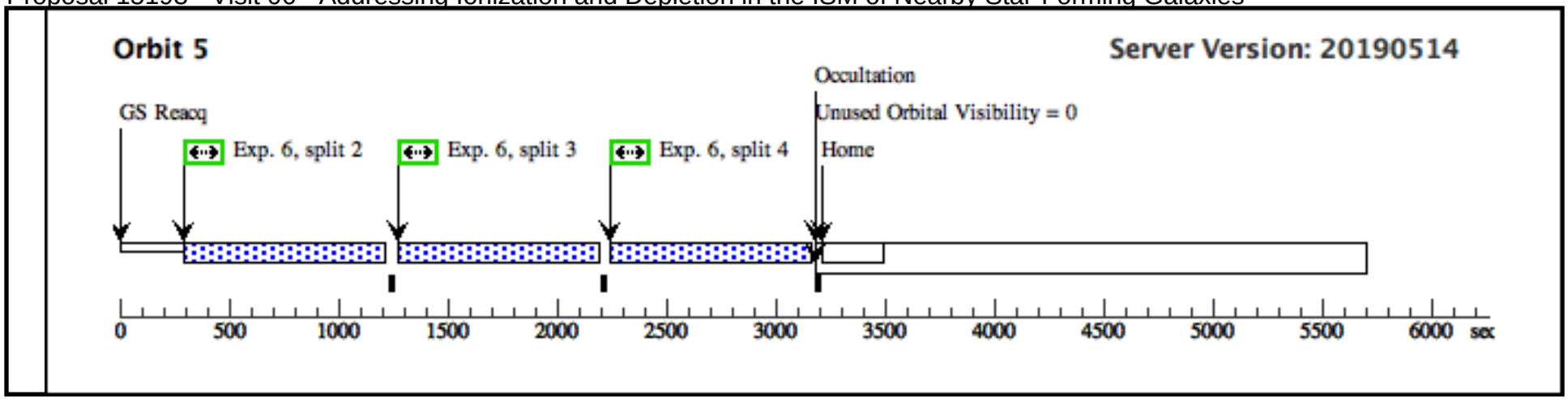
Orbit Structure






Orbit 3
Server Version: 20190514
Pointing Maneuver
Pointing Maneuver
Exp. 5, split 1
GS Reacq
Unused Orbital Visibility = 0
Exp. 3, split 3
Exp. 3, split 4
Exp. 4
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 4
Server Version: 20190514
GS Reacq
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Exp. 6, split 1
Unused Orbital Visibility = 252
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 5
Server Version: 20190514
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 6, split 2
Exp. 6, split 3
Exp. 6, split 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 56 Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 56) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Visit 56) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

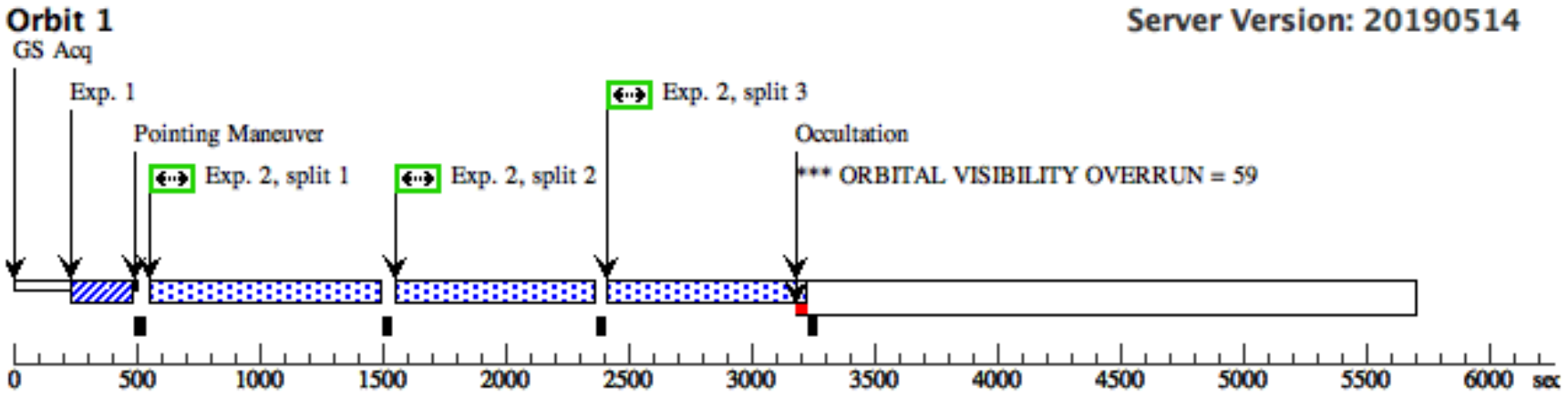
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(8)	NGC5253-OBJECT-2	RA: 13 39 55.8890 (204.9828708d) Dec: -31 38 38.34 (-31.64398d) Equinox: J2000		V=10.4+/-0.1	Reference Frame: ICRS

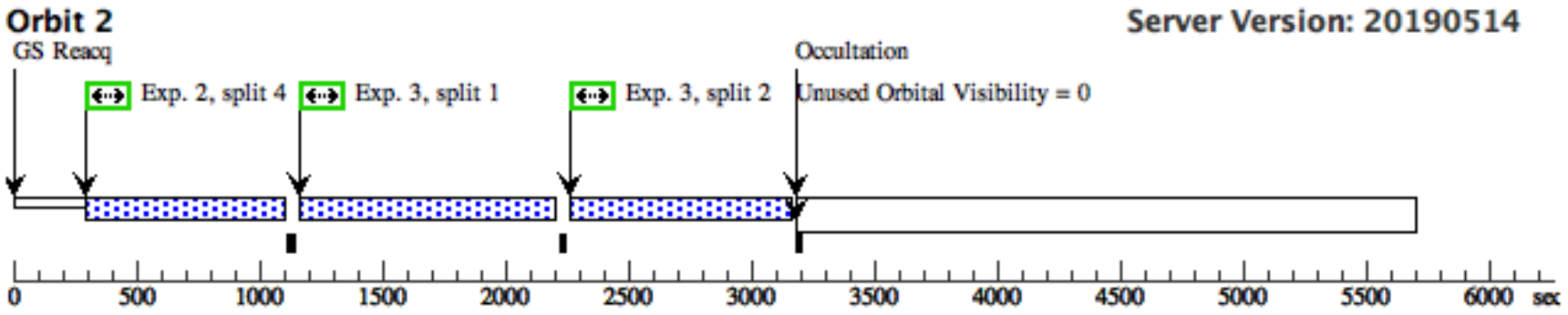
Comments: The coordinates for this target were obtained from a HLA image which is based on GSC2.3 astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

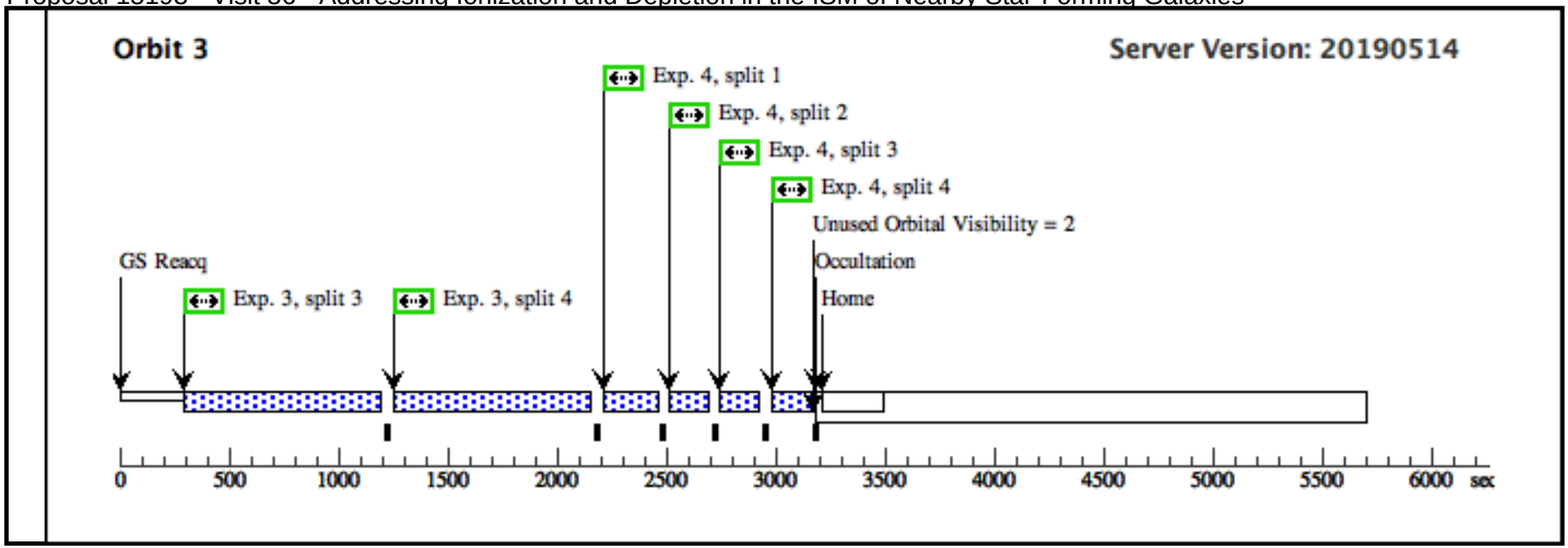
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_ngc5253_object2_ta_image (COS.ta.1047942)	(8) NGC5253-OBJECT-2	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				15 Secs (15 Secs)	
								[==>]	***[1]***
2	cos_ngc5253_object2_g130m_1222 (COS.sp.1048545)	(8) NGC5253-OBJECT-2	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=6738; FP-POS=ALL			753 Secs (3012 Secs)	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]*	***[1]***
								[==>(Split 4)]	***[2]***
3	cos_ngc5253_object2_g160m_long_1623 (COS.sp.1048544)	(8) NGC5253-OBJECT-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=10276; FP-POS=ALL			852 Secs (3408 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[2]***
								[==>(Split 3)] *[==>(Split 4)]*	***[3]***
4	cos_ngc5253_object2_g160m_short_1623 (COS.sp.1048544)	(8) NGC5253-OBJECT-2	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=10276; FP-POS=ALL			129 Secs (516 Secs)	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20190514
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Unused Orbital Visibility = 2
Occultation
Home
GS Reacq
Exp. 3, split 3
Exp. 3, split 4
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 07, completed Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: Part 1 of integration on IZw18 target (we cannot schedule a 6-orbit visit, so this is visit 1 with first 3 orbits).

Diagnostics

(Visit 07) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

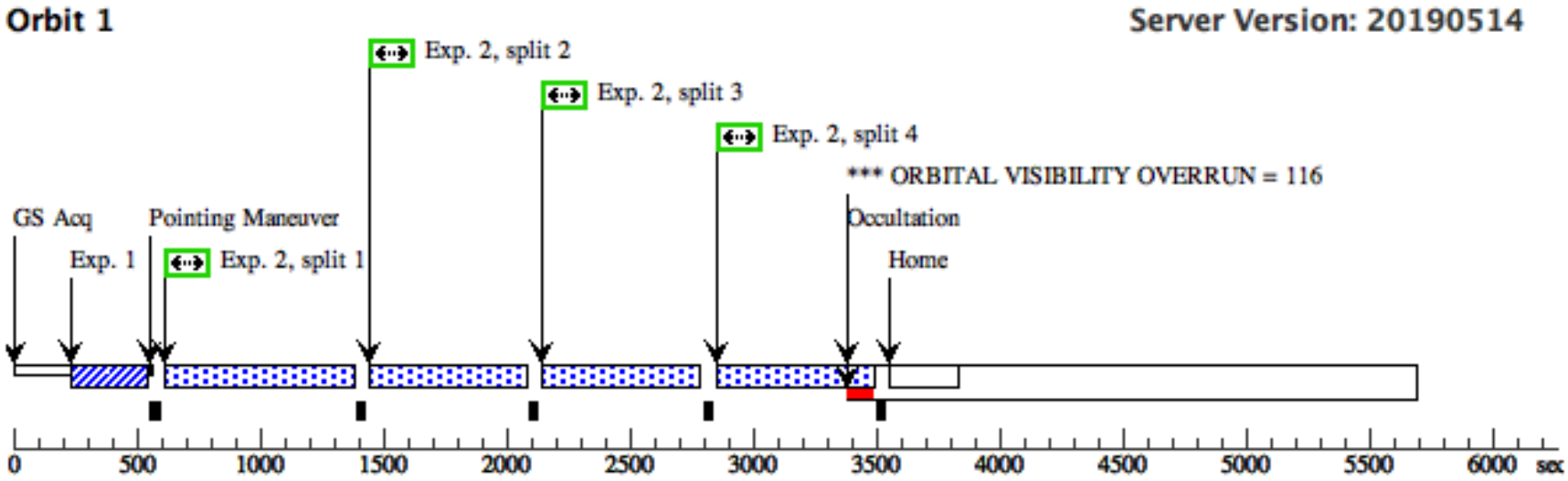
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(9)	IZW18-OBJECT-1	RA: 09 34 1.9700 (143.5082083d) Dec: +55 14 28.10 (55.24114d) Equinox: J2000		V=15.6+/-0.1	Reference Frame: ICRS

Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[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_izw18_object1_ta_image (COS.ta.1047943)	(9) IZW18-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				44 Secs (44 Secs) *[==>]*	 ***[1]***
2	cos_izw18_object1_g130m_1222 (COS.sp.1048546)	(9) IZW18-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=4221; FP-POS=ALL			588 Secs (2352 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 15193, Visit 08, failed Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 08) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

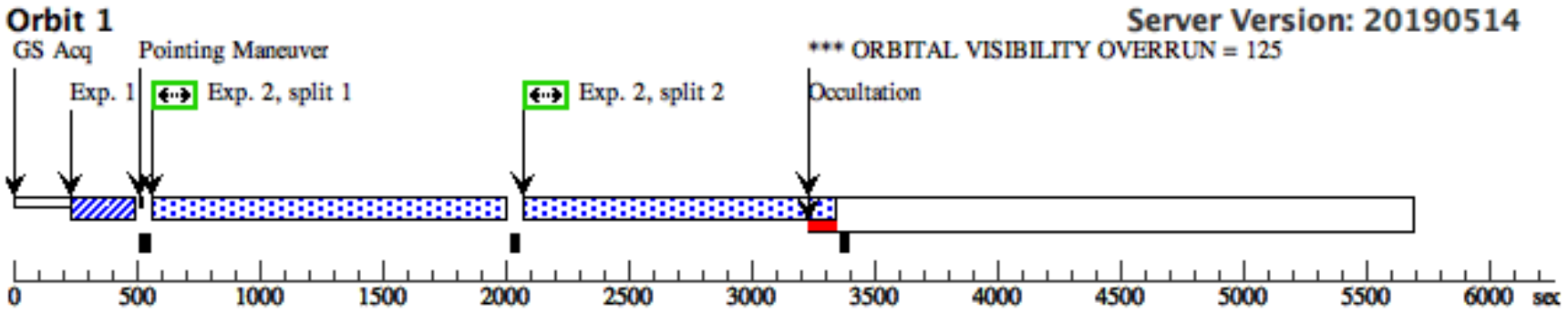
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(10)	SBS1415+437-OBJECT-1	RA: 14 17 1.4200 (214.2559167d) Dec: +43 30 5.16 (43.50143d) Equinox: J2000		V=15.5+/-0.1	Reference Frame: ICRS

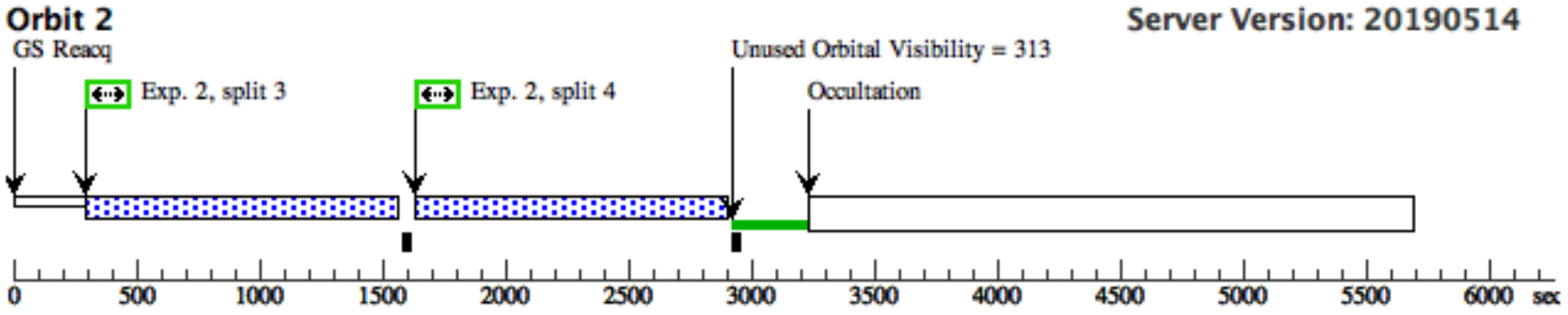
Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

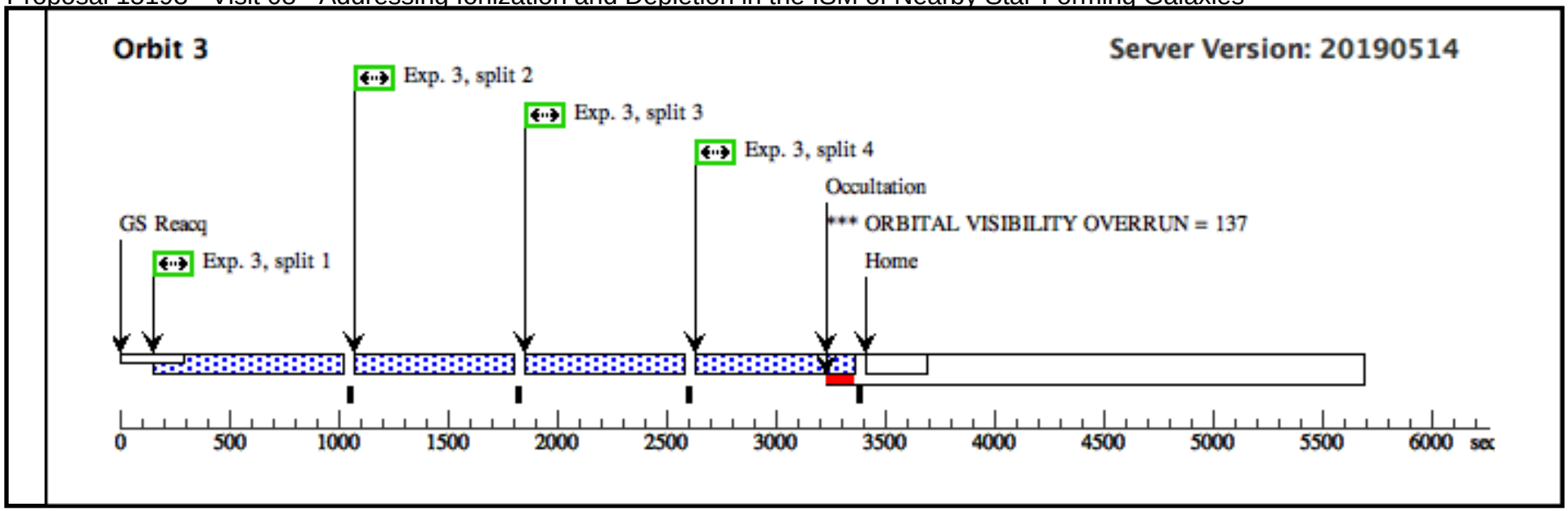
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_sbs1415+437_object1_ta_image (COS.ta.1047944)	(10) SBS1415+437-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				23 Secs (23 Secs)	
								[==>]	***[1]***
2	cos_sbs1415+437_object1_g160m_1623 (COS.sp.1048548)	(10) SBS1415+437-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=10560; FP-POS=ALL			1222 Secs (4888 Secs)	
								[==>(Split 1)]	***[1]***
								[==>(Split 2)]	
								[==>(Split 3)]	***[2]***
								[==>(Split 4)]	
3	cos_sbs1415+437_object1_g130m_1222 (COS.sp.1048549)	(10) SBS1415+437-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=6465; FP-POS=ALL			673 Secs (2692 Secs)	
								[==>(Split 1)]	***[3]***
								[==>(Split 2)]	
								[==>(Split 3)]	
								[==>(Split 4)]	

Orbit Structure






Orbit 3
Server Version: 20190514
Exp. 3, split 2
Exp. 3, split 3
Exp. 3, split 4
Occultation
*** ORBITAL VISIBILITY OVERRUN = 137
GS Reacq
Exp. 3, split 1
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 58, completed Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 58) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

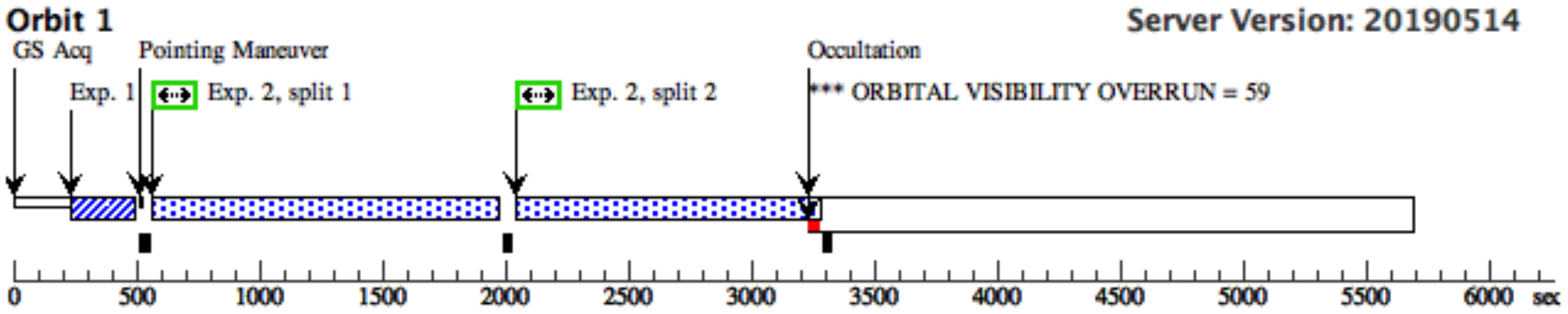
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(10)	SBS1415+437-OBJECT-1	RA: 14 17 1.4200 (214.2559167d) Dec: +43 30 5.16 (43.50143d) Equinox: J2000		V=15.5+/-0.1	Reference Frame: ICRS

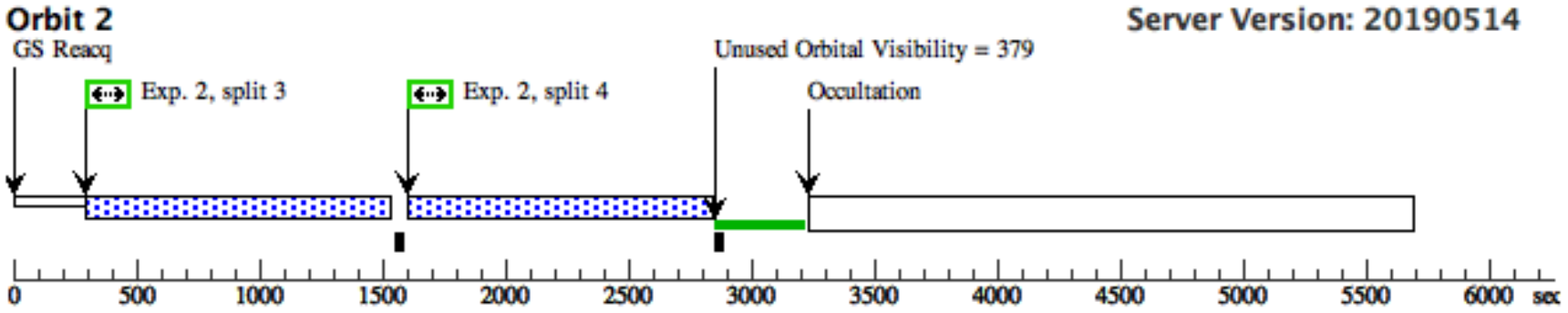
Comments: The coordinates for this target were obtained from a HLA image which is based on SDSS astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

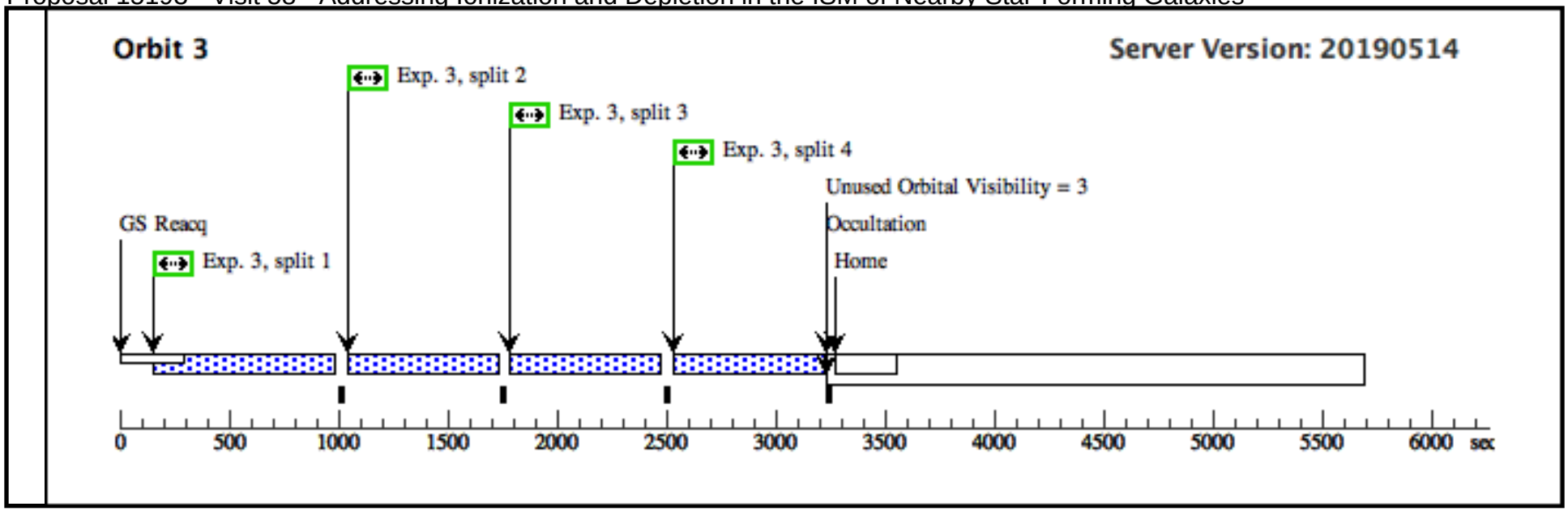
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_sbs1415+437_object1_ta_image (COS.ta.1047944)	(10) SBS1415+437-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				23 Secs (23 Secs) *[==>]*	***[1]***
2	cos_sbs1415+437_object1_g160m_1623 (COS.sp.1048548)	(10) SBS1415+437-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=10560; FP-POS=ALL			1189 Secs (4756 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]*** ***[2]***
3	cos_sbs1415+437_object1_g130m_1222 (COS.sp.1048549)	(10) SBS1415+437-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=6465; FP-POS=ALL			638 Secs (2552 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20190514
Exp. 3, split 2
Exp. 3, split 3
Exp. 3, split 4
Unused Orbital Visibility = 3
GS Reacq
Occultation
Exp. 3, split 1
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 09, failed

Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 09) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 09) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 09) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

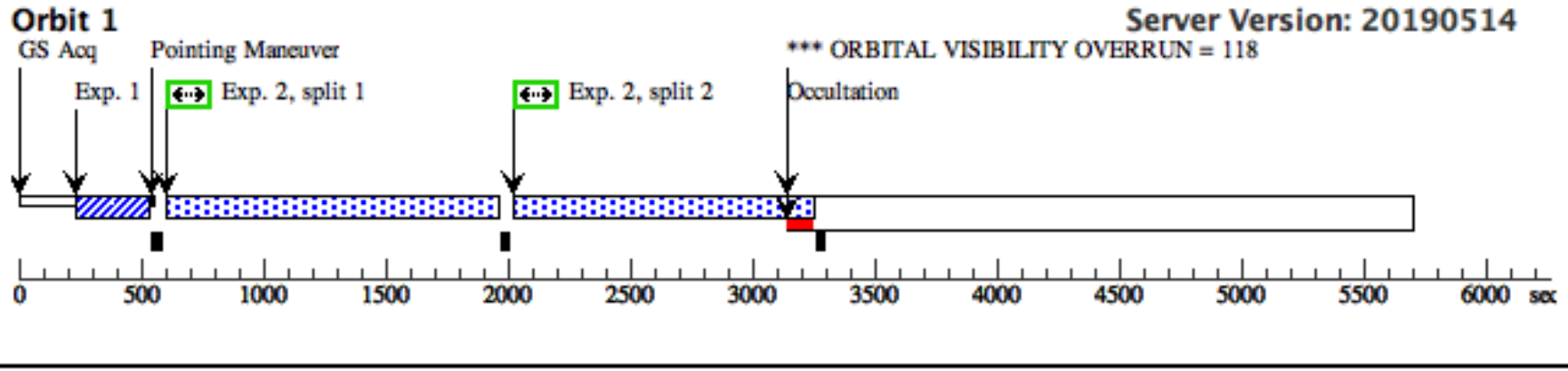
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(11)	SBS0335-052-OBJECT-1	RA: 03 37 43.9800 (54.4332500d) Dec: -05 02 38.90 (-5.04414d) Equinox: J2000		V=16.7+/-0.1	Reference Frame: ICRS

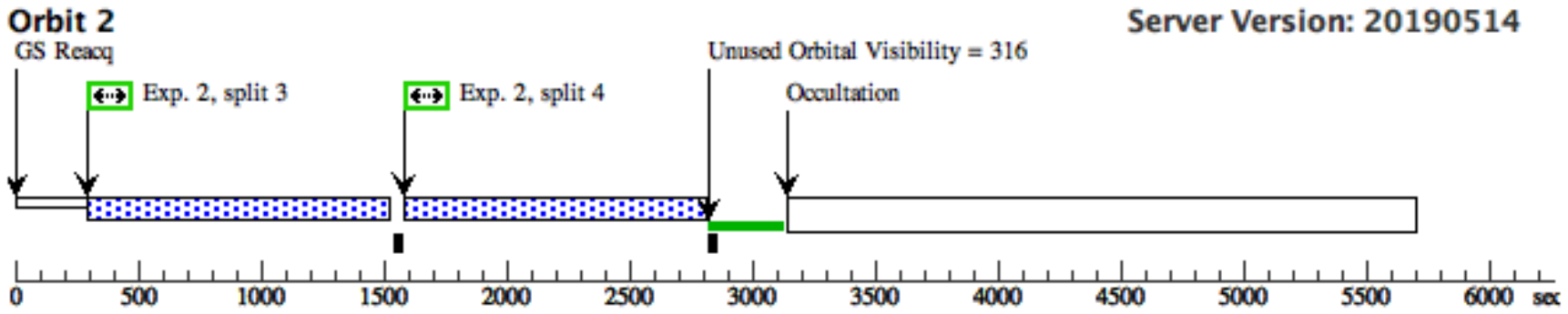
Comments: The coordinates for this target were obtained from a HLA image which is based on GSC2.3 astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

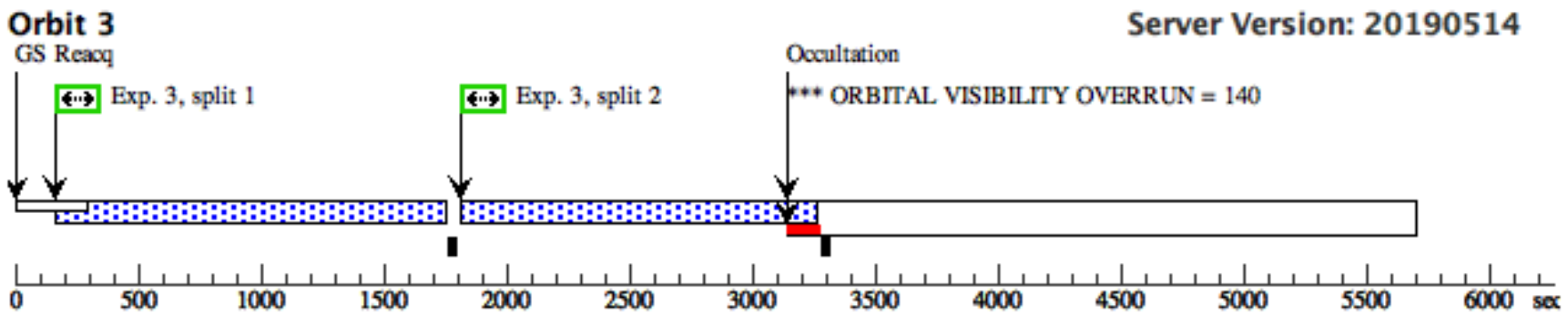
Exposures

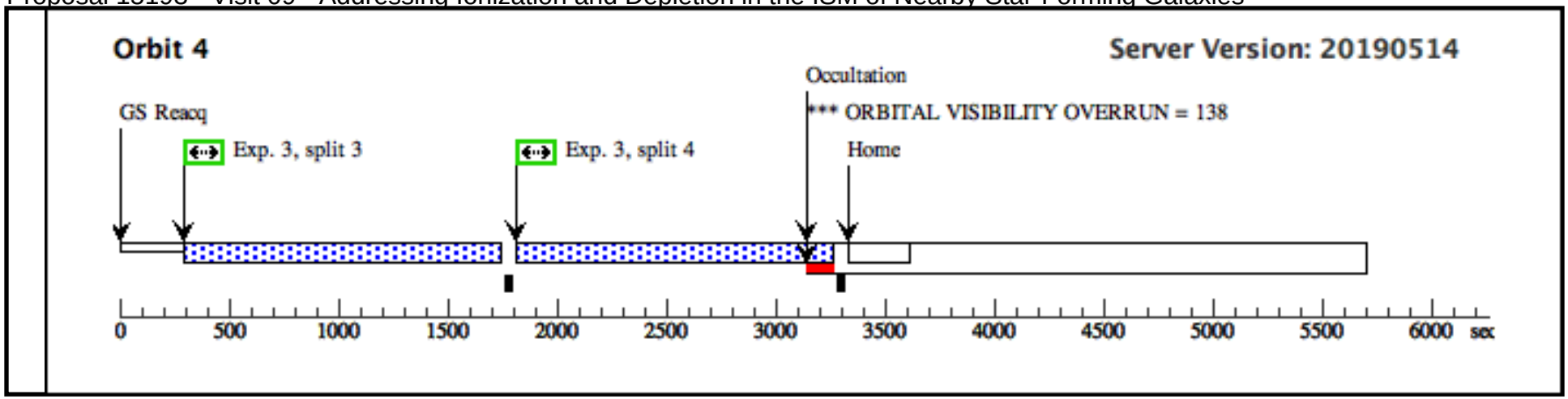
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_sbs0335-052_object1_ta_image (COS.ta.1047945)	(11) SBS0335-052-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				40 Secs (40 Secs) *[==>]*	 ***[1]***
2	cos_sbs0335-052_object1_g130m_1222 (COS.sp.1048550)	(11) SBS0335-052-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=8308; FP-POS=ALL			1174 Secs (4696 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[1]*** ***[2]***
3	cos_sbs0335-052_object1_g160m_1623 (COS.sp.1048551)	(11) SBS0335-052-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12548; FP-POS=ALL			1401 Secs (5604 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	 ***[3]*** ***[4]***

Orbit Structure








Orbit 4
Server Version: 20190514
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 138
Exp. 3, split 3
Exp. 3, split 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15193, Visit 59, completed Fri Jul 05 14:01:08 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Visit 59) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

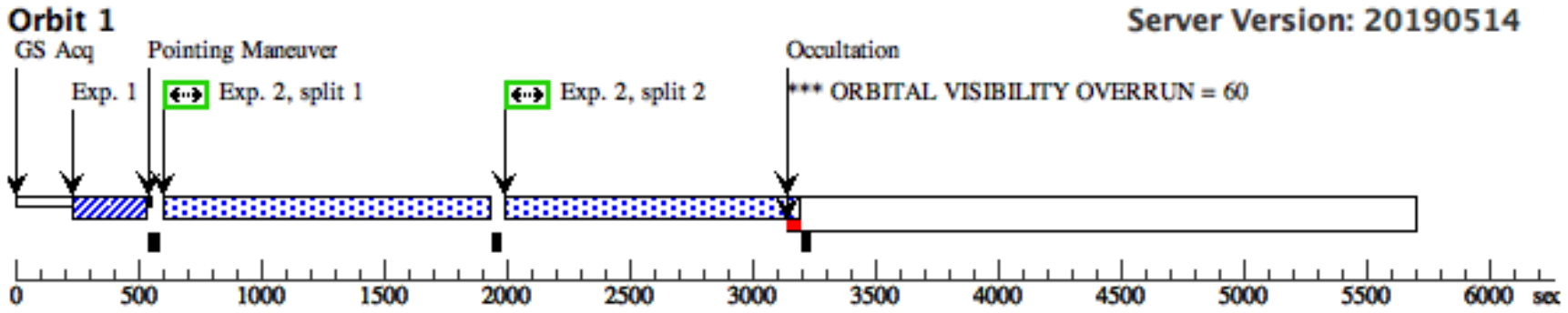
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(11)	SBS0335-052-OBJECT-1	RA: 03 37 43.9800 (54.4332500d) Dec: -05 02 38.90 (-5.04414d) Equinox: J2000		V=16.7+/-0.1	Reference Frame: ICRS

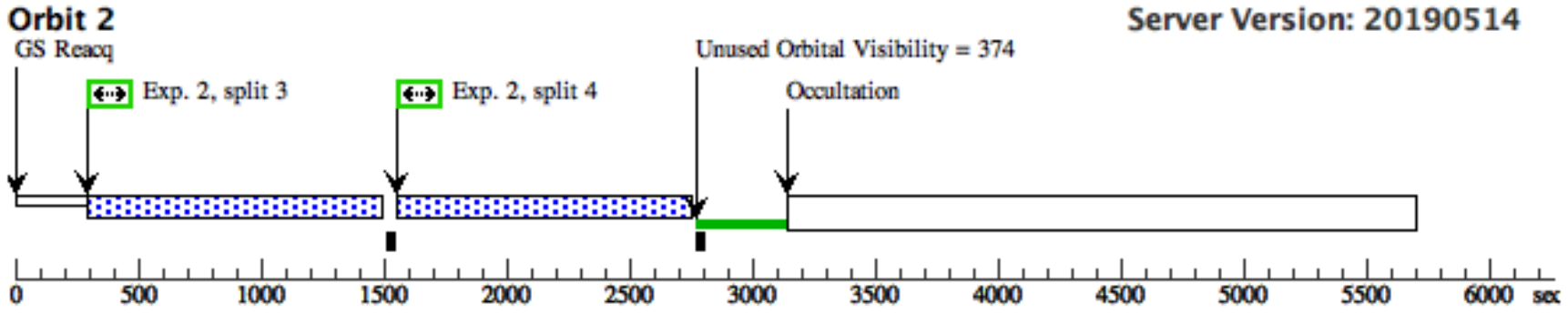
Comments: The coordinates for this target were obtained from a HLA image which is based on GSC2.3 astrometry.
Category=GALAXY
Description=[STARBURST]
Extended=NO

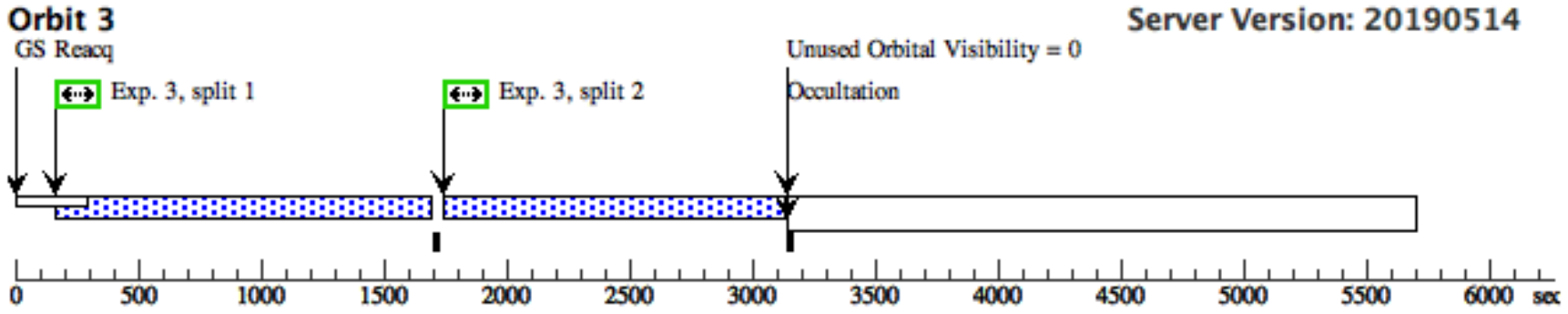
Exposures

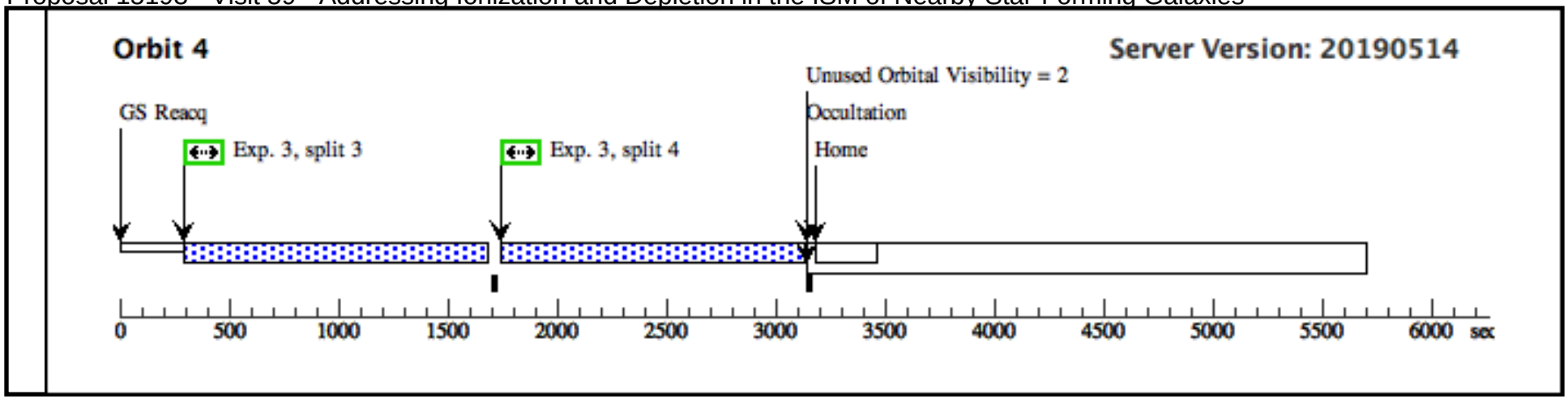
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	cos_sbs0335-052_object1_ta_image (COS.ta.1047945)	(11) SBS0335-052-OBJECT-1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				40 Secs (40 Secs)	
								[==>]	***[1]***
2	cos_sbs0335-052_object1_g130m_1222 (COS.sp.1048550)	(11) SBS0335-052-OBJECT-1	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=8308; FP-POS=ALL			1145 Secs (4580 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[1]***
								[==>(Split 3)] *[==>(Split 4)]*	***[2]***
3	cos_sbs0335-052_object1_g160m_1623 (COS.sp.1048551)	(11) SBS0335-052-OBJECT-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=12548; FP-POS=ALL			1336 Secs (5344 Secs)	
								[==>(Split 1)] *[==>(Split 2)]*	***[3]***
								[==>(Split 3)] *[==>(Split 4)]*	***[4]***

Orbit Structure








Orbit 4
Server Version: 20190514
Unused Orbital Visibility = 2
GS Reacq
Occultation
Exp. 3, split 3
Exp. 3, split 4
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec