# 15341 - Testing a New Method for Finding Leaky Galaxies: Implications for the Epoch of Reionization

Cycle: 25, Proposal Category: GO

(UV Initiative, JWST Initative)

(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) SDSSJ222634.07-090106.2 | COS/FUV<br>COS/NUV | 3 | 24-May-2018 16:05:36.0 | yes |
| 03 | (3) SDSSJ091021.35+610550.2 | COS/FUV<br>COS/NUV | 3 | 24-May-2018 16:05:38.0 | yes |
| 05 | (5) SDSSJ124206.24+011537.5 | COS/FUV<br>COS/NUV | 3 | 24-May-2018 16:05:39.0 | yes |
| 06 | (5) SDSSJ124206.24+011537.5 | COS/FUV<br>COS/NUV | 3 | 24-May-2018 16:05:41.0 | yes |

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 02 | (2) SDSSJ111905.27+592514.1 | COS/FUV<br>COS/NUV | 2 | 24-May-2018 16:05:42.0 | yes |
| 04 | (4) SDSSJ143256.4+274249.6 | COS/FUV<br>COS/NUV | 2 | 24-May-2018 16:05:43.0 | yes |

16 Total Orbits Used

**ABSTRACT**

One of the core missions of JWST will be understanding the Epoch of Reionization (EOR), which traces the formation of the earliest progenitors of present-day galaxies. A major uncertainty is the relative amount of ionizing Lyman Continuum (LyC) photons that can escape from these early galaxies. Unfortunately, it is not possible to directly measure the leakage of LyC photons from galaxies during the EOR. The best strategy is to find lower redshift galaxies that are leaking LyC photons, and to use these analogs to both understand the physical processes that make this leakage possible and to identify reliable indirect signposts of leaky galaxies that could be measured with JWST.

We propose to test one such promising signpost: the relative weakness of the [SII]6717,6731 emission-lines. The lines are produced near and just beyond the outer edge of a Stromgren sphere. In conditions when the gas is optically-thin to LyC photons (allowing leakage) these lines therefore become weak. Our specific goal is to directly observe the rest-frame LyC in five galaxies chosen to have unusually weak SII. If we succeed, this would provide a new signpost for JWST to characterize leaky galaxies during the EOR.

**OBSERVING DESCRIPTION**

We are observing the four target with G140L segment 1105 A. The idea is to get to the Lyman edge at 912A in the rest frame and measure the Lyman continuum flux.

We will proceed by acquiring acquisition images with MIRROR A at S/N =40. Then we will observe with G140 L in each of the 4 FP-POS. These are supplemented by DARK observations at the end of each orbital visible range.

## Visit

**Proposal 15341, Visit 1 Modified :: 3 orbits (01), scheduled** Thu May 24 20:05:44 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

## Fixed Targets

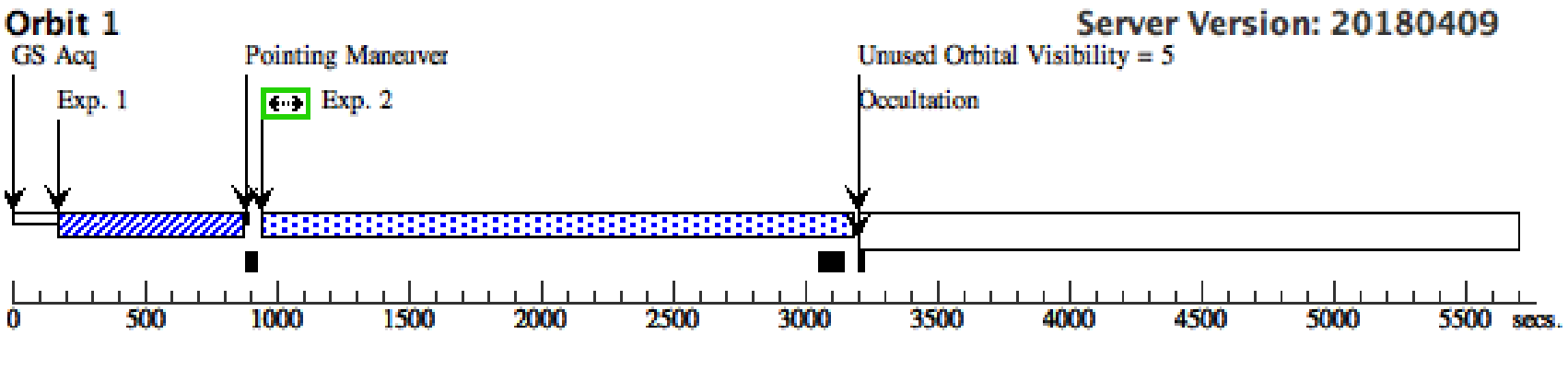
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | SDSSJ222634.07-090106.2 | RA: 22 26 34.0700 (336.6419583d)<br>Dec: -09 01 6.20 (-9.01839d)<br>Equinox: J2000 | Redshift: 0.2988059 | V=18.5+/-0.1<br>2e-16 erg/s/cm2/A [FUV flux density within the COS aperture | Reference Frame: ICRS |

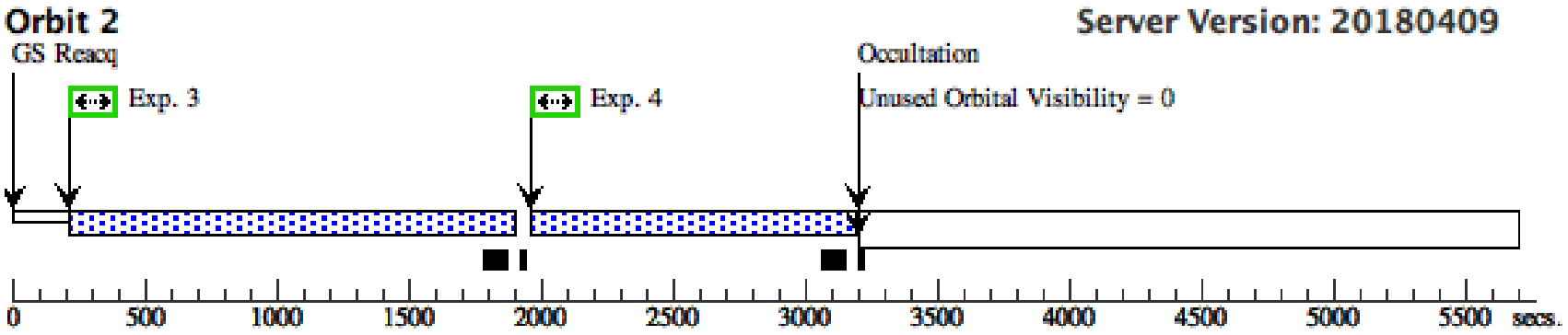
*Comments:*
*Category=GALAXY*
*Description=[STARBURST]*
*Extended=NO*

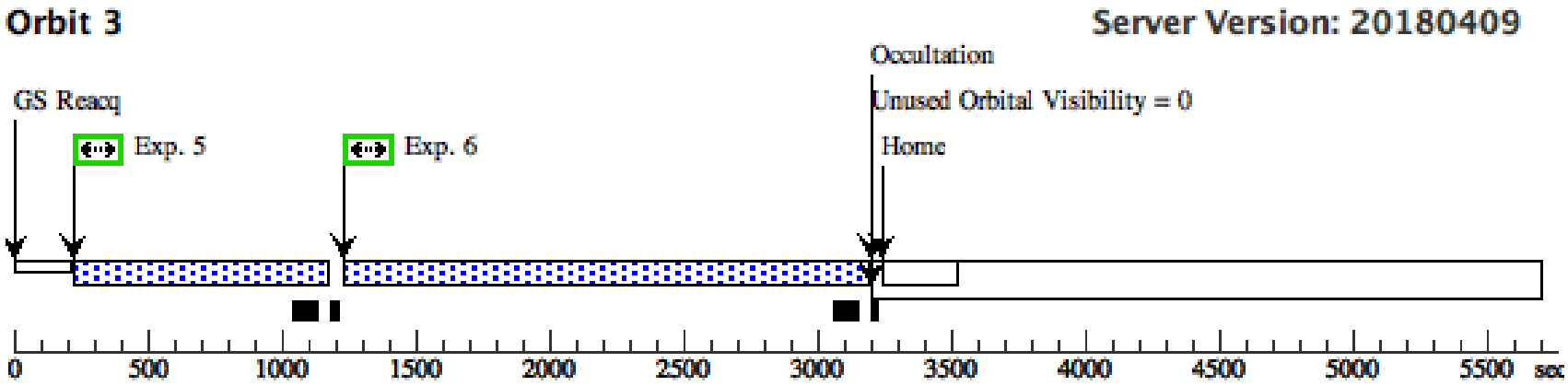
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Exposure 1 (COS.im.1012361) | (1) SDSSJ222634.07-090106.2 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 241 Secs (241 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.1010215) | (1) SDSSJ222634.07-090106.2 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1953; FP-POS=1; SEGMENT=A | | | 2063 Secs (2063 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.1010215) | (1) SDSSJ222634.07-090106.2 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1531; FP-POS=2; SEGMENT=A | | | 1641 Secs (1641 Secs)<br>*[==>]* | ***[2]*** |
| 4 | Exposure 4 (COS.sp.1010215) | (1) SDSSJ222634.07-090106.2 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1063; FP-POS=3; SEGMENT=A | | | 1173 Secs (1173 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.1010215) | (1) SDSSJ222634.07-090106.2 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=790; FP-POS=3; SEGMENT=A | | | 900 Secs (900 Secs)<br>*[==>]* | ***[3]*** |
| 6 | Exposure 6 (COS.sp.1010215) | (1) SDSSJ222634.07-090106.2 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1794; FP-POS=4; SEGMENT=A | | | 1904 Secs (1904 Secs)<br>*[==>]* | ***[3]*** |

Orbit Structure



## Visit

**Proposal 15341, Visit 3 Modified :: 3 orbits (03), scheduling** Thu May 24 20:05:44 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

## Fixed Targets

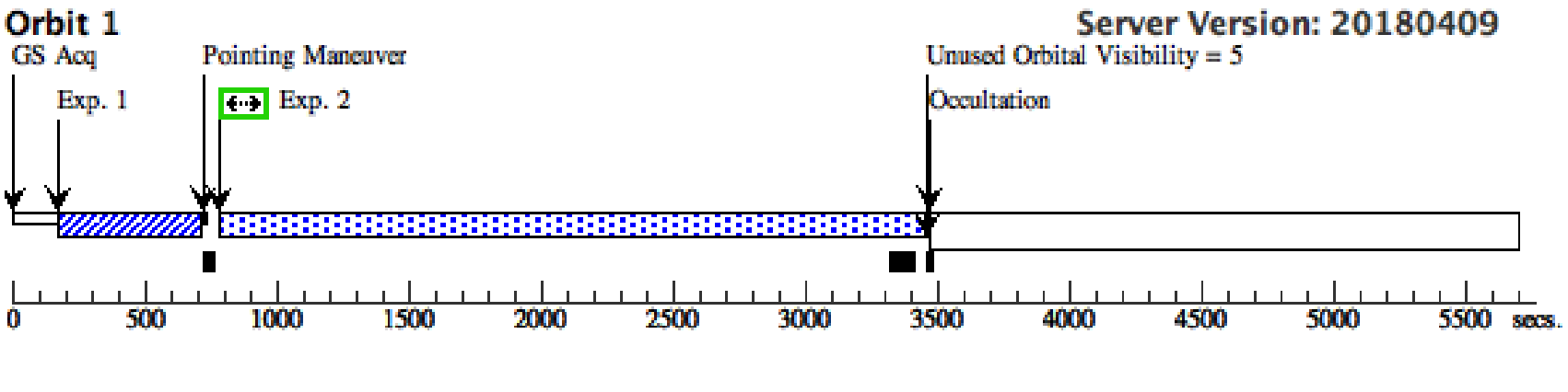
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (3) | SDSSJ091021.35+610550.2 | RA: 09 10 21.3500 (137.5889583d)<br>Dec: +61 05 50.20 (61.09728d)<br>Equinox: J2000 | Redshift: 0.2719949 | V=18.6+/-0.1<br>3e-16 erg/s/cm2/A [FUV flux density within the COS aperture | Reference Frame: ICRS |

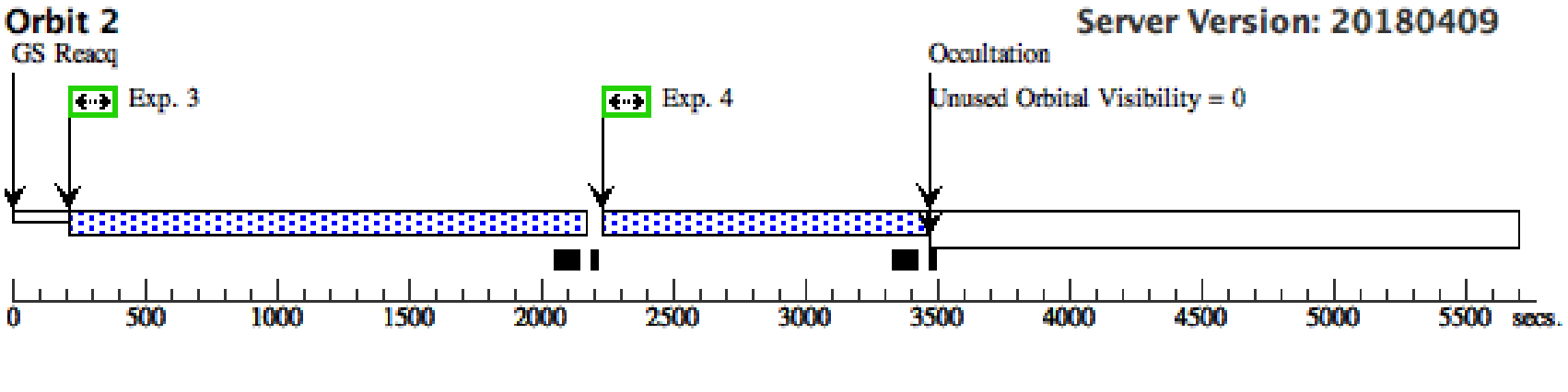
*Comments:*
*Category=GALAXY*
*Description=[STARBURST]*
*Extended=NO*

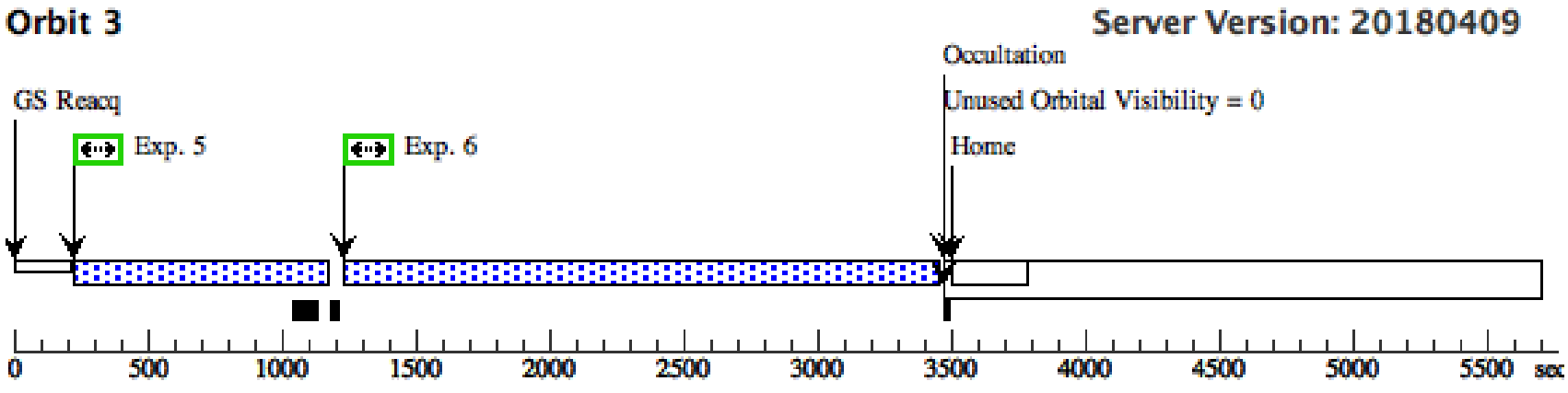
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Exposure 1 (COS.im.1012369) | (3) SDSSJ091021.35+610550.2 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 161 Secs (161 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.1010221) | (3) SDSSJ091021.35+610550.2 | COS/FUV, TIME-TAG, PSA | G140L<br>1105 A | BUFFER-TIME=2379;<br>FP-POS=1;<br>SEGMENT=A | | | 2489 Secs (2489 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.1010221) | (3) SDSSJ091021.35+610550.2 | COS/FUV, TIME-TAG, PSA | G140L<br>1105 A | BUFFER-TIME=1796;<br>FP-POS=2;<br>SEGMENT=A | | | 1906 Secs (1906 Secs)<br>*[==>]* | ***[2]*** |
| 4 | Exposure 4 (COS.sp.1010221) | (3) SDSSJ091021.35+610550.2 | COS/FUV, TIME-TAG, PSA | G140L<br>1105 A | BUFFER-TIME=1064;<br>FP-POS=3;<br>SEGMENT=A | | | 1174 Secs (1174 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.1010221) | (3) SDSSJ091021.35+610550.2 | COS/FUV, TIME-TAG, PSA | G140L<br>1105 A | BUFFER-TIME=790;<br>FP-POS=3;<br>SEGMENT=A | | | 900 Secs (900 Secs)<br>*[==>]* | ***[3]*** |
| 6 | Exposure 6 (COS.sp.1010221) | (3) SDSSJ091021.35+610550.2 | COS/FUV, TIME-TAG, PSA | G140L<br>1105 A | BUFFER-TIME=2056 0;<br>FP-POS=4;<br>SEGMENT=A | | | 2170 Secs (2170 Secs)<br>*[==>]* | ***[3]*** |

Orbit Structure



## Visit

**Proposal 15341, Visit 5 Modified :: 3 orbits (05), completed** Thu May 24 20:05:45 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

## Fixed Targets

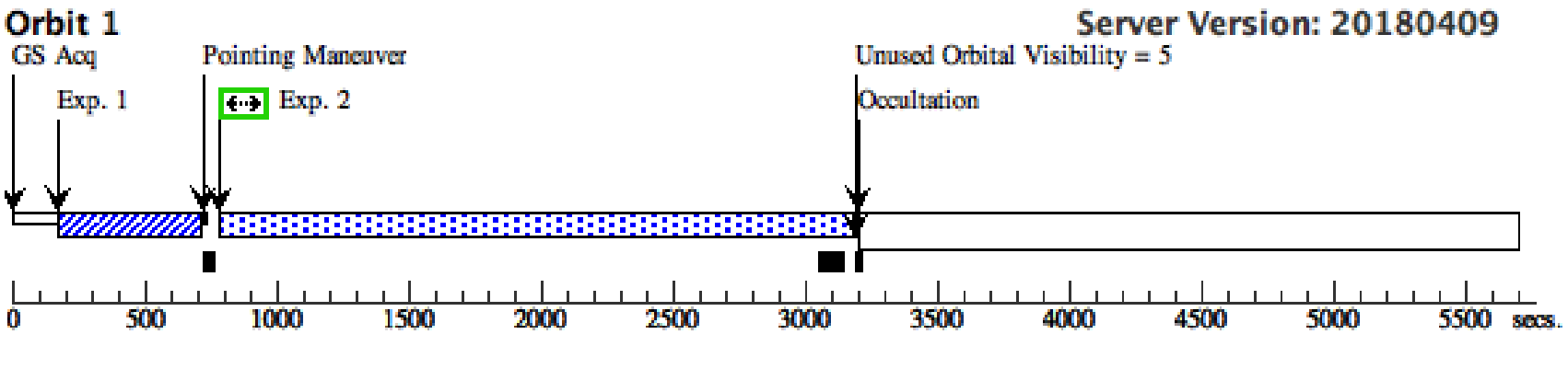
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (5) | SDSSJ124206.24+011537.5 | RA: 12 42 6.2400 (190.5260000d)<br>Dec: +01 15 37.50 (1.26042d)<br>Equinox: J2000 | Redshift: 0.2706371 | V=18.7+/-0.1<br>3e-16 erg/s/cm2/A [FUV flux density within the COS aperture] | Reference Frame: ICRS |

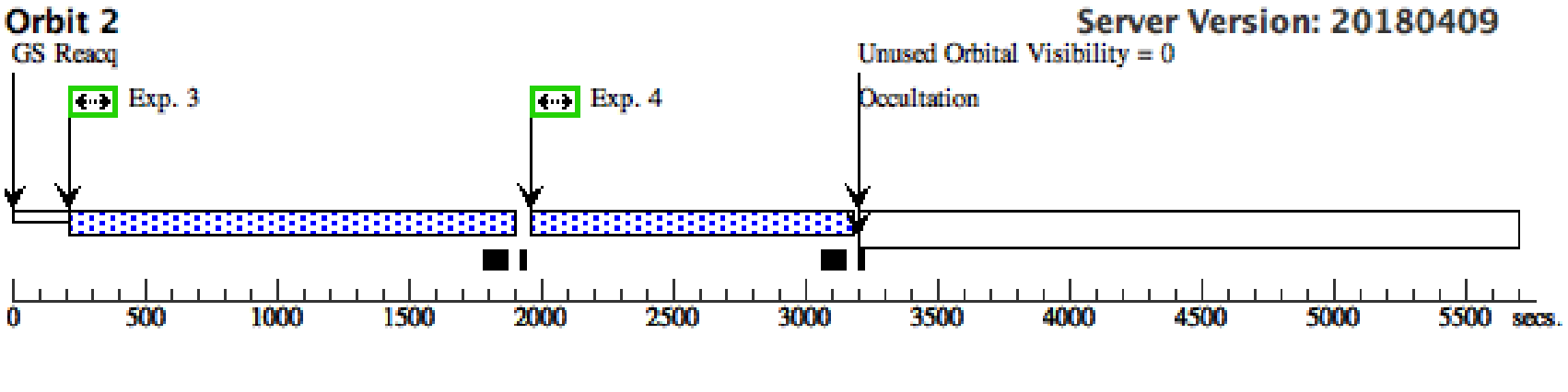
*Comments:*
*Category=GALAXY*
*Description=[STARBURST]*
*Extended=NO*

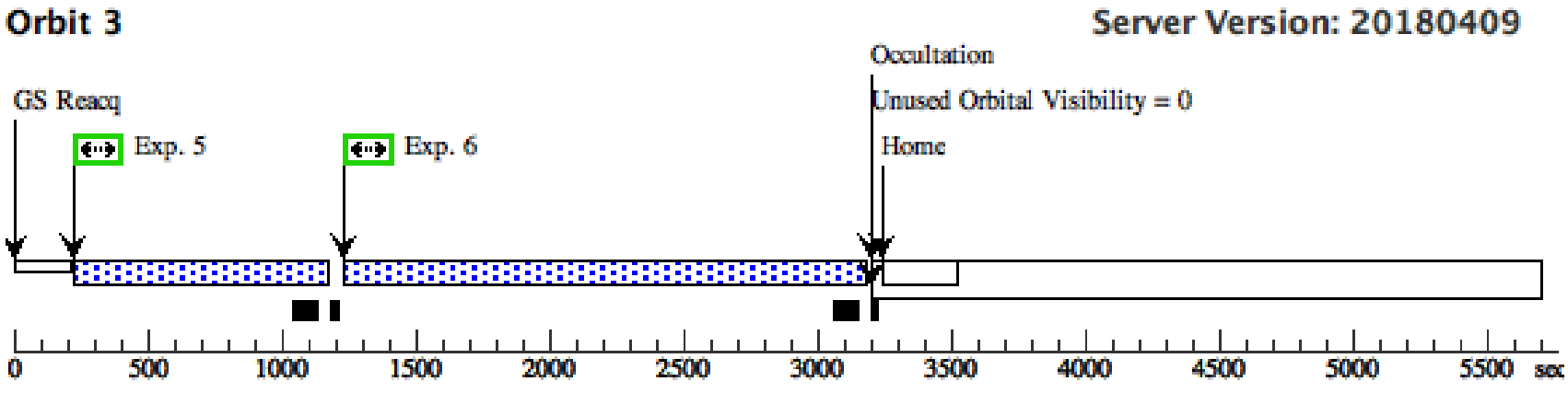
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Exposure 1 (COS.im.1012369) | (5) SDSSJ124206.24+011537.5 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 161 Secs (161 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=2110; FP-POS=1; SEGMENT=A | | | 2220 Secs (2220 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1531; FP-POS=2; SEGMENT=A | | | 1641 Secs (1641 Secs)<br>*[==>]* | ***[2]*** |
| 4 | Exposure 4 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1060; FP-POS=3; SEGMENT=A | | | 1170 Secs (1170 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=790; FP-POS=3; SEGMENT=A | | | 900 Secs (900 Secs)<br>*[==>]* | ***[3]*** |
| 6 | Exposure 6 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1791; FP-POS=4; SEGMENT=A | | | 1901 Secs (1901 Secs)<br>*[==>]* | ***[3]*** |

Orbit Structure



## Visit

**Proposal 15341, Visit 5 HOPR repeat :: 3 orbits (06)** Thu May 24 20:05:45 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

## Fixed Targets

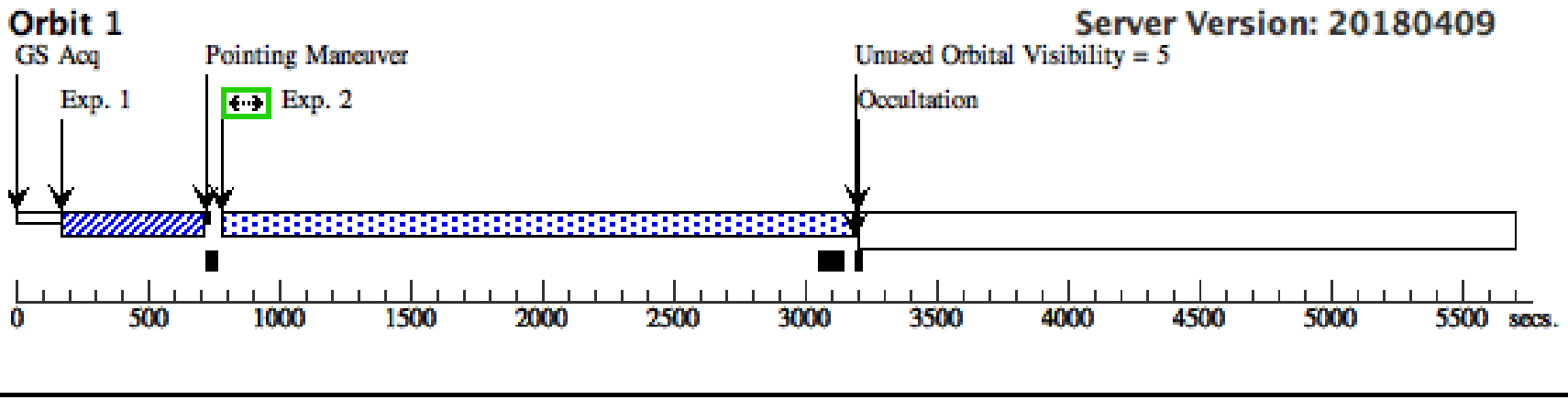
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (5) | SDSSJ124206.24+011537.5 | RA: 12 42 6.2400 (190.5260000d)<br>Dec: +01 15 37.50 (1.26042d)<br>Equinox: J2000 | Redshift: 0.2706371 | V=18.7+/-0.1<br>3e-16 erg/s/cm2/A [FUV flux density within the COS aperture] | Reference Frame: ICRS |

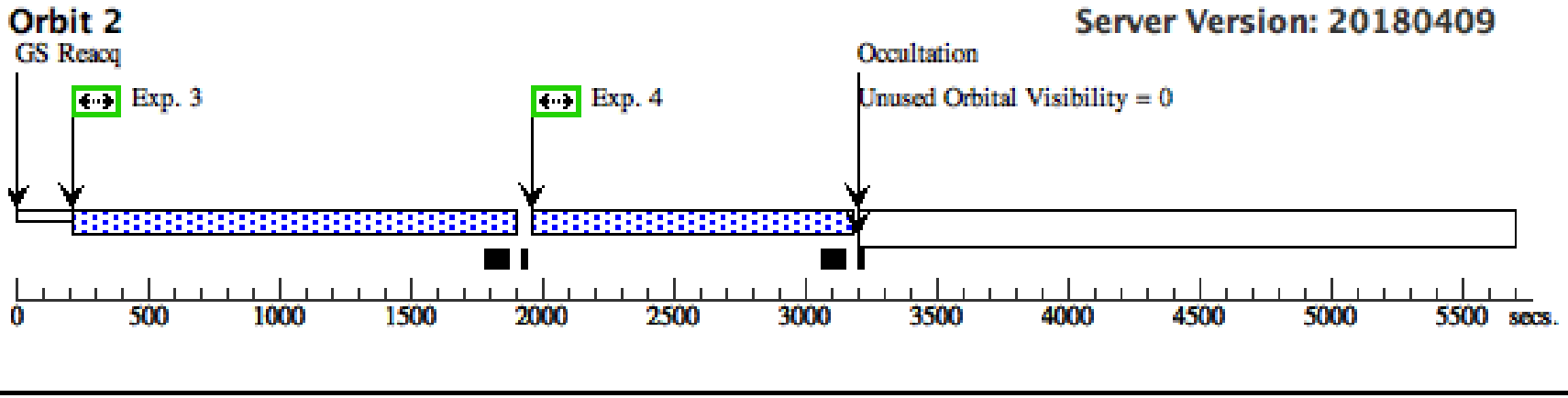
*Comments:*
*Category=GALAXY*
*Description=[STARBURST]*
*Extended=NO*

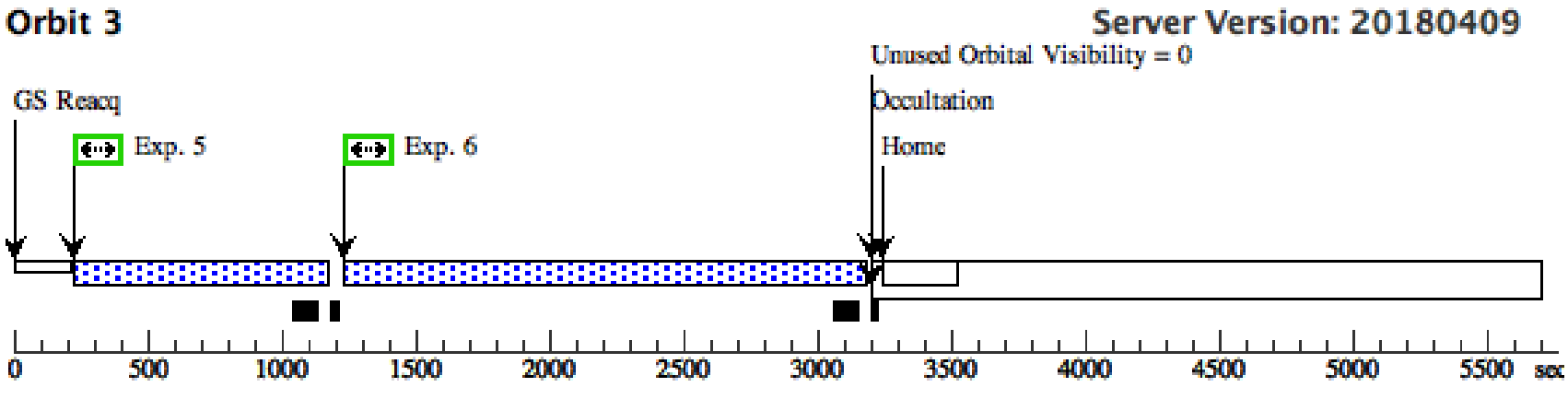
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Exposure 1 (COS.im.1012369) | (5) SDSSJ124206.24+011537.5 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 161 Secs (161 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=2110; FP-POS=1; SEGMENT=A | | | 2220 Secs (2220 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1531; FP-POS=2; SEGMENT=A | | | 1641 Secs (1641 Secs)<br>*[==>]* | ***[2]*** |
| 4 | Exposure 4 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1060; FP-POS=3; SEGMENT=A | | | 1170 Secs (1170 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=790; FP-POS=3; SEGMENT=A | | | 900 Secs (900 Secs)<br>*[==>]* | ***[3]*** |
| 6 | Exposure 6 (COS.sp.1010221) | (5) SDSSJ124206.24+011537.5 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1791; FP-POS=4; SEGMENT=A | | | 1901 Secs (1901 Secs)<br>*[==>]* | ***[3]*** |

Orbit Structure



## Visit

**Proposal 15341, Visit 2 Modified :: 2 orbits (02), scheduling** Thu May 24 20:05:45 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

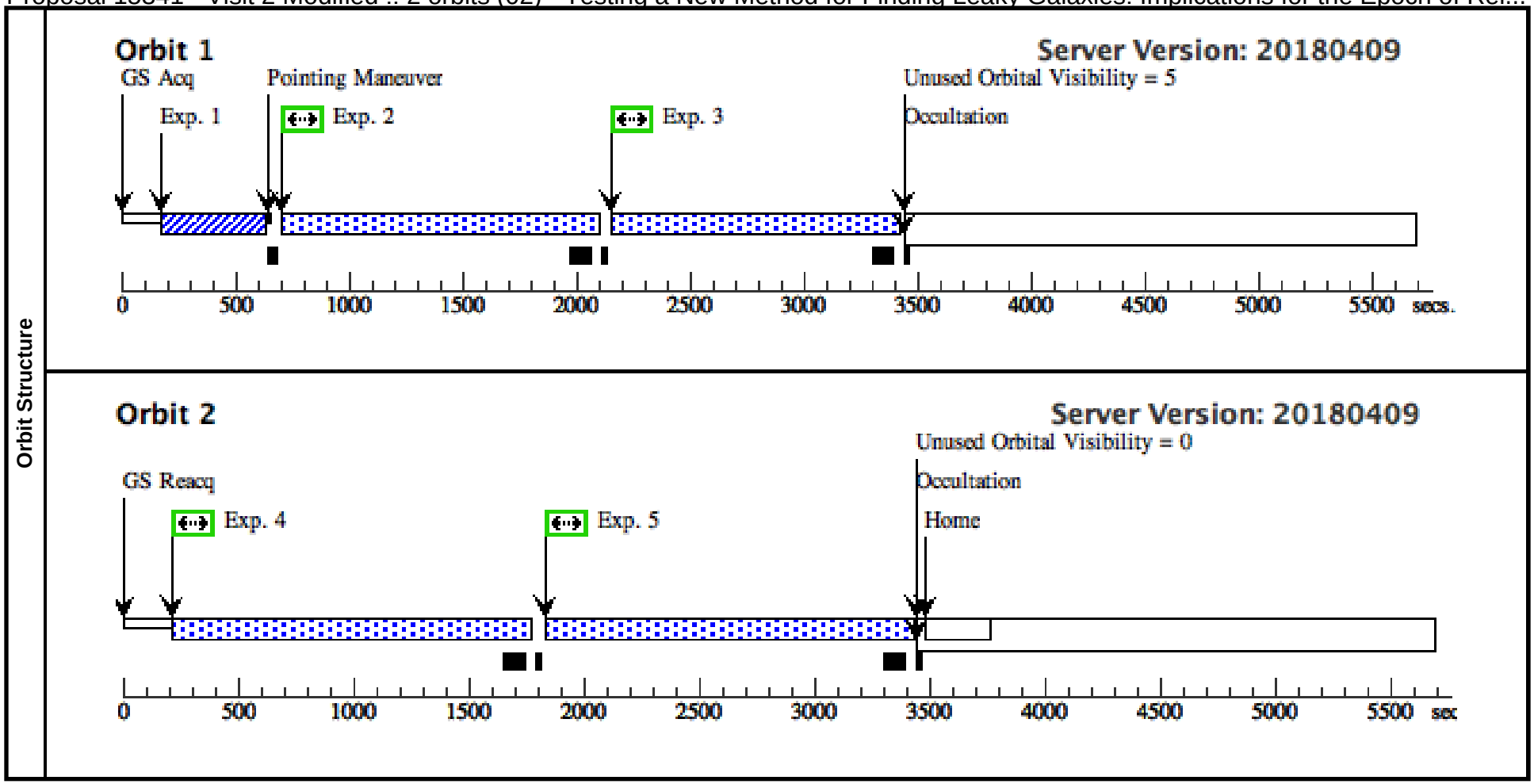
## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (2) | SDSSJ111905.27+592514.1 | RA: 11 19 5.2700 (169.7719583d)<br>Dec: +59 25 14.10 (59.42058d)<br>Equinox: J2000 | Redshift: 0.2898964 | V=18.0+/-0.1<br>4e-16 erg/s/cm2/A [FUV flux density within the COS aperture | Reference Frame: ICRS |

*Comments:*
*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 | Exposure 1 (COS.im.10 12370) | (2) SDSSJ111905.27 +592514.1 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 120 Secs (120 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.101 0237) | (2) SDSSJ111905.27 +592514.1 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1112; FP-POS=1; SEGMENT=A | | | 1222 Secs (1222 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.101 0237) | (2) SDSSJ111905.27 +592514.1 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1112; FP-POS=2; SEGMENT=A | | | 1222 Secs (1222 Secs)<br>*[==>]* | ***[1]*** |
| 4 | Exposure 4 (COS.sp.101 0237) | (2) SDSSJ111905.27 +592514.1 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1400; FP-POS=3; SEGMENT=A | | | 1510 Secs (1510 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.101 0237) | (2) SDSSJ111905.27 +592514.1 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1438; FP-POS=4; SEGMENT=A | | | 1548 Secs (1548 Secs)<br>*[==>]* | ***[2]*** |


Orbit Structure
Orbit 1
Server Version: 20180409
GS Acq
Pointing Maneuver
Unused Orbital Visibility = 5
Exp. 1
Exp. 2
Exp. 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20180409
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15341, Visit 4 Modified :: 2 orbits (04), scheduling** Thu May 24 20:05:45 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) | SDSSJ143256.4+274249.6 | RA: 14 32 56.4000 (218.2350000d)<br>Dec: +27 42 49.60 (27.71378d)<br>Equinox: J2000 | Redshift: 0.2660789 | V=18.4+/-0.1<br>5e-16 erg/s/cm2/A [FUV flux density within the COS aperture | Reference Frame: ICRS |

*Comments:*
*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 | Exposure 1 (COS.im.1012371) | (4) SDSSJ143256.4+274249.6 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 97 Secs (97 Secs)<br>*[==>]* | ***[1]*** |
| 2 | Exposure 2 (COS.sp.1010247) | (4) SDSSJ143256.4+274249.6 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1000; FP-POS=1; SEGMENT=A | | | 1110 Secs (1110 Secs)<br>*[==>]* | ***[1]*** |
| 3 | Exposure 3 (COS.sp.1010247) | (4) SDSSJ143256.4+274249.6 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1046; FP-POS=2; SEGMENT=A | | | 1156 Secs (1156 Secs)<br>*[==>]* | ***[1]*** |
| 4 | Exposure 4 (COS.sp.1010247) | (4) SDSSJ143256.4+274249.6 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1300; FP-POS=3; SEGMENT=A | | | 1410 Secs (1410 Secs)<br>*[==>]* | ***[2]*** |
| 5 | Exposure 5 (COS.sp.1010247) | (4) SDSSJ143256.4+274249.6 | COS/FUV, TIME-TAG, PSA | G140L 1105 A | BUFFER-TIME=1314; FP-POS=4; SEGMENT=A | | | 1424 Secs (1424 Secs)<br>*[==>]* | ***[2]*** |

Orbit Structure