# 15156 - Mapping Gas Flows from the Disk to the Circumgalactic Medium

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?* |
|---|---|---|---|---|---|
| 1A | (1) IC1613-C10 | COS/FUV | 3 | 05-Dec-2018 16:04:34.0 | yes |
| 1B | (1) IC1613-C10 | COS/FUV | 4 | 05-Dec-2018 16:04:35.0 | yes |
| 5C | (1) IC1613-C10 | COS/FUV | 1 | 05-Dec-2018 16:04:36.0 | yes |
| 2A | (2) IC1613-010502-020805 | COS/FUV | 3 | 05-Dec-2018 16:04:37.0 | yes |
| 2B | (2) IC1613-010502-020805 | COS/FUV | 4 | 05-Dec-2018 16:04:39.0 | yes |
| 3A | (3) LBQS-0100+0205 | COS/FUV | 4 | 05-Dec-2018 16:04:40.0 | yes |
| 3B | (3) LBQS-0100+0205 | COS/FUV | 4 | 05-Dec-2018 16:04:41.0 | yes |
| 4A | (4) LBQS-0101+0009 | COS/FUV | 4 | 05-Dec-2018 16:04:42.0 | yes |
| 4B | (4) LBQS-0101+0009 | COS/FUV | 4 | 05-Dec-2018 16:04:44.0 | yes |

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 5A | (5) 2MASX-J01022632-0039045 | COS/FUV | 1 | 05-Dec-2018 16:04:45.0 | yes |
| 5B | (5) 2MASX-J01022632-0039045 | COS/FUV | 1 | 05-Dec-2018 16:04:46.0 | yes |

33 Total Orbits Used

**ABSTRACT**

The feedback efficiency in galaxies remains a crucial component in simulations that is not well constrained by observations. To understand how effectively feedback drives metals into the circumgalactic medium (CGM), we propose to map the metal flows from the disk to the CGM of the nearby dwarf irregular galaxy IC 1613. This will be the first spatial and kinematic map of gas flows from the disk to the halo of a dwarf galaxy. In archival COS spectra of two IC 1613 stars we detect blue-shifted SiII, CII, and SiIV absorption lines, indicative of the existence of multiphase outflows from the disk. We propose to observe two more UV bright stars in IC 1613's disk to assess the covering fraction and strength of the outflow in relation to the galaxy's resolved star formation. We will also observe three QSO sightlines at 0.1, 0.3, and 0.5 Rvir to measure the ionization profile of the gas and the extent of the outflows. We will relate our measurements to the detailed observed star formation history of IC 1613 to directly determine the mass loading factor and feedback efficiency. The proposal will provide critical information on how galaxies evolve and how metals circulate between the disk and the CGM.

**OBSERVING DESCRIPTION**

We propose to observe two UV-bright stars (B type and O type) in the disk of IC 1613 and three QSO sightlines in the halo at 0.1, 0.3, and 0.5 Rvir. The selection of the target stars is based on three criteria: (1) the star should be bright enough to reach S/N~10-15 within a reasonable integration time, (2) there should be HI 21cm emission as observed by the Very Large Array (Little THINGS; Hunter et al. 2012) to provide a velocity reference to distinguish between outflow and inflow, and (3) the star should complement the two archival stars (IC1613-A13 and IC1613-B11) and provide coverage over the disk in regions with different star-formation densities. With this setup, we will be able to accurately estimate the outflow rates and understand whether outflows are correlated with star-forming activities. The three QSOs are selected based on the QSO catalog by Veron-Cetty & Veron (2010), cross-correlated with the GALEX database. The positions and brightness of all the five targets have been confirmed with the corresponding GALEX images as viewed in Aladin.

To access the multiphase condition of the outflows and the CGM of IC1613, we propose to observe the five targets with both G130M and G160M gratings. For G130M grating, we request to use the cenwave setting of 1291 angstroms. This is the only cenwave in G130M from which we can

simultaneously obtain ion absorption lines of SiII 1190/1193/1260, SiIII 1206, Si IV 1393/1402, FeII 1143/1144, C II 1334, SII 1250/1253/1259. In particular, the set of SiII/ SiIII/SiIV lines is critical for us to estimate the ionization condition of the CGM of IC 1613 using adjacent ionization states. Due to the limited available FP-POS positions for G130M/1291 segment B, we only use FP-POS=3, 4 for our targets for both segments to ensure similar S/N level.

For G160M grating, we request to use the cenwave setting of 1577 angstroms. This is to ensure the detection of the weak absorption SiIV 1393/1402 doublets in segment B, the maximum S/N of which might be impacted by the fact that we only use two FP-POS positions for G130M/1291. No other cenwave setting in G160M can be used to achieve this goal. Besides SiIV 1393/1402 doublet, from the G160M/1577 setting we aim to detect the CIV 1548/1550 doublet. The CIV doublet is the highest ionization states among all the absorption lines we can obtain with G130M and G160M, which will be critical for us to estimate the extent to which the CGM and the outflows have been ionized.

To ensure the detection of the weak absorption lines, we require to achieve a mean S/N of ~10-15 for our proposed targets. One of the proposed stars, IC1613-010502-020805, has been observed with G140L, thus we use the G140L spectrum as input and request a FUV flux normalization at 6e-15 erg s-1 cm-2 A-1 at 1350 angstroms. The other proposed star, IC1613-C10, has a similar V mag and spectral type to the star IC 1613-B4 which was observed with G140L (but not proposed for here). Therefore we use the G140L spectrum for IC1613-B4 as input and request a FUV flux normalization at 4.5e-15 erg s-1 cm-2 A-1 at 1350 angstroms. For the QSO targets, our ETC estimates are based on their FUV mag retrieved from the GALEX database. All three QSOs are selected based on the QSO catalog by Veron-Cetty & Veron (2010), cross-correlated with the GALEX database. We assume flat spectra as input.

For the exposure setup, we request SN=40 in ETC for both segments for ACQ/Search, PeakXD, and PeakD. We use TIME-TAG mode for the actual observation of each target. We note that 6 out of the 10 visits we arrange have 4 orbits duration each, which is beyond the suggested 2-3 orbits duration. This is due to the concern that most of our objects are very faint; spliting 4 orbits into 2 visits would reduce exposure time (thus maximum S/N) we can reach (in addition to the S/N loss from the only two FP-POS positions we can use with G130M/1291). Therefore, we request to observe each of our targets in single visit for each grating, so that we can maximize the S/N to detect the weak absorption lines in the CGM and outflows of IC1613.

## Visit

**Proposal 15156, Visit 1A, scheduling** Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 1A) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Visit 1A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 1A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 1A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

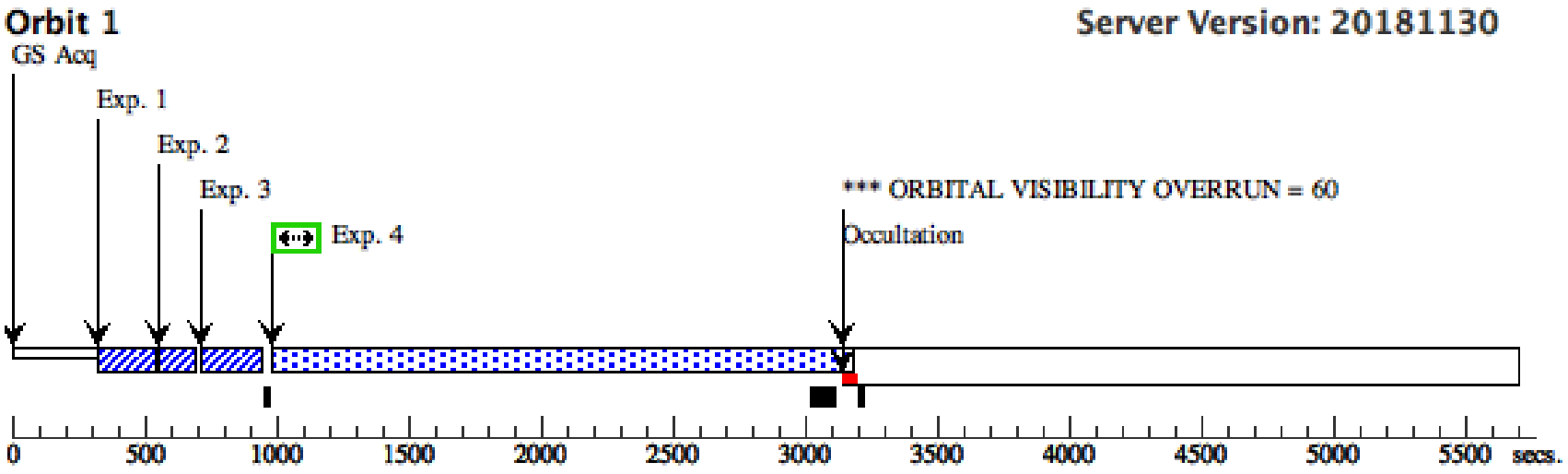
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | IC1613-C10 | RA: 01 04 43.3900 (16.1807917d)<br>Dec: +02 10 22.20 (2.17283d)<br>Equinox: J2000 | Radial Velocity: -234 km/sec | V=18.82 | Reference Frame: ICRS |

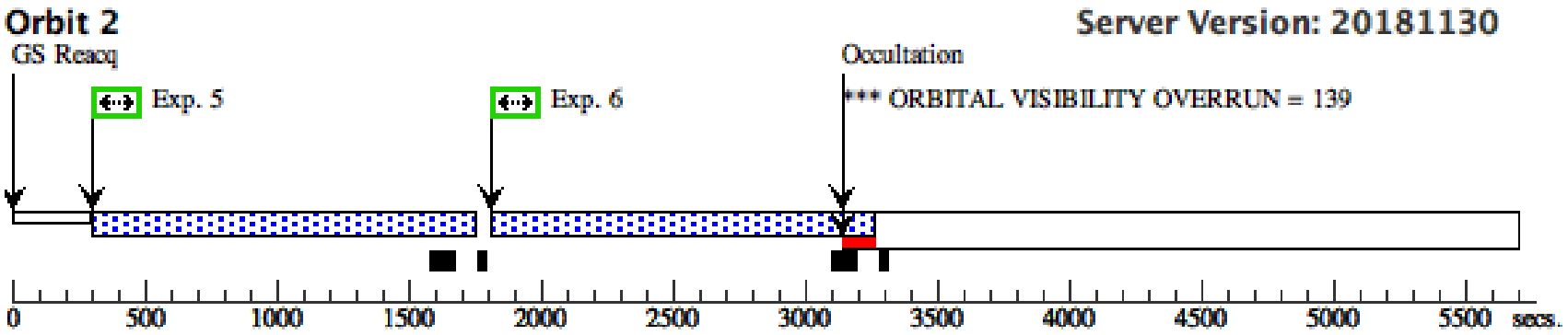
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-STAR*
*Description=[B0-B2 III-I]*
*Extended=NO*

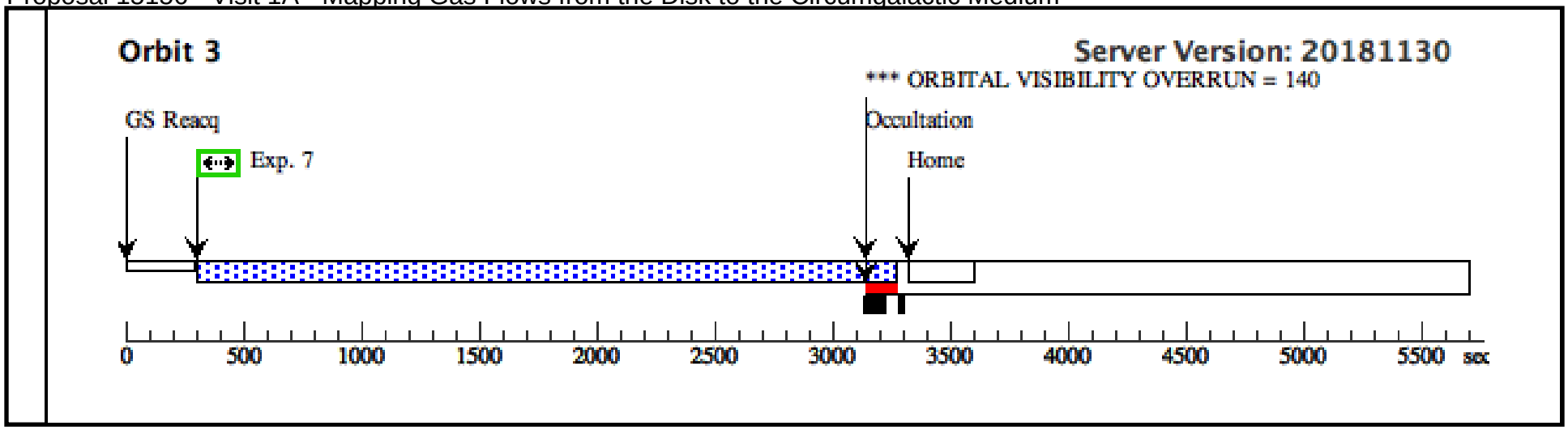
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006522) | (1) IC1613-C10 | COS/FUV, ACQ/SEARCH, PSA | G130M 1291 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 15 Secs (15 Secs)<br>*[==>]* | *[1]* |
| 2 | (1006522) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | | | | 15 Secs (15 Secs)<br>*[==>]* | *[1]* |
| 3 | (1006522) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKD, PSA | G130M 1291 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 15 Secs (15 Secs)<br>*[==>]* | *[1]* |
| 4 | (1006525) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2000; FP-POS=3; SEGMENT=BOTH | | | 2100 Secs (2149 Secs)<br>*[==>2149.0 Secs ]* | *[1]* |
| 5 | (1006525) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1250; FP-POS=3; SEGMENT=BOTH | | | 1350 Secs (1400 Secs)<br>*[==>1400.0 Secs ]* | *[2]* |
| 6 | (1006525) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1250; FP-POS=4; SEGMENT=BOTH | | | 1350 Secs (1400 Secs)<br>*[==>1400.0 Secs ]* | *[2]* |
| 7 | (1006525) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2900 Secs (2916 Secs)<br>*[==>2916.0 Secs ]* | *[3]* |

Orbit Structure




Orbit 3
Server Version: 20181130
*** ORBITAL VISIBILITY OVERRUN = 140
GS Reacq
Exp. 7
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
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sec

## Visit

**Proposal 15156, Visit 1B, failed**

Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 1B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 1B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 1B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 1B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

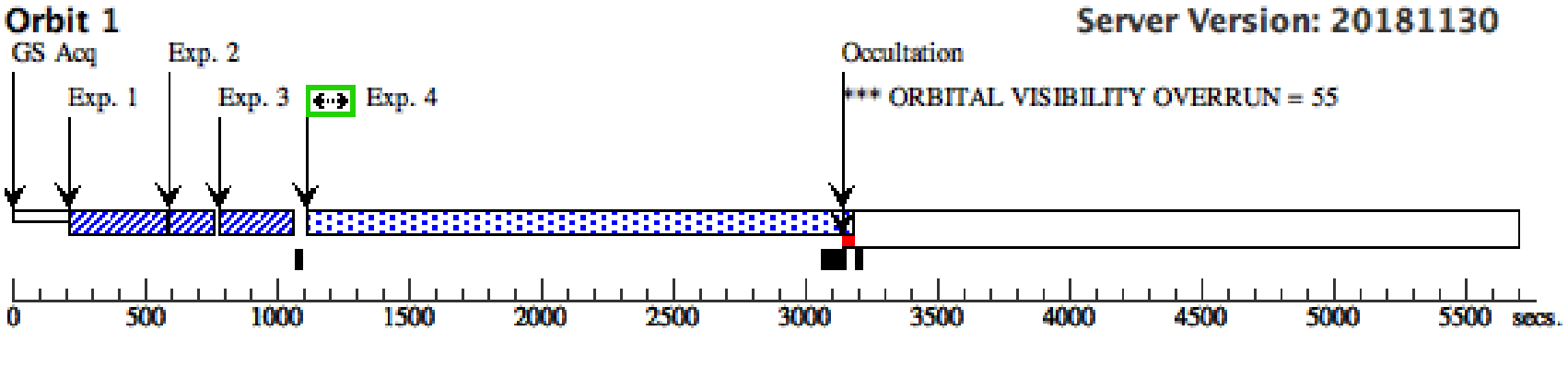
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | IC1613-C10 | RA: 01 04 43.3900 (16.1807917d)<br>Dec: +02 10 22.20 (2.17283d)<br>Equinox: J2000 | Radial Velocity: -234 km/sec | V=18.82 | Reference Frame: ICRS |

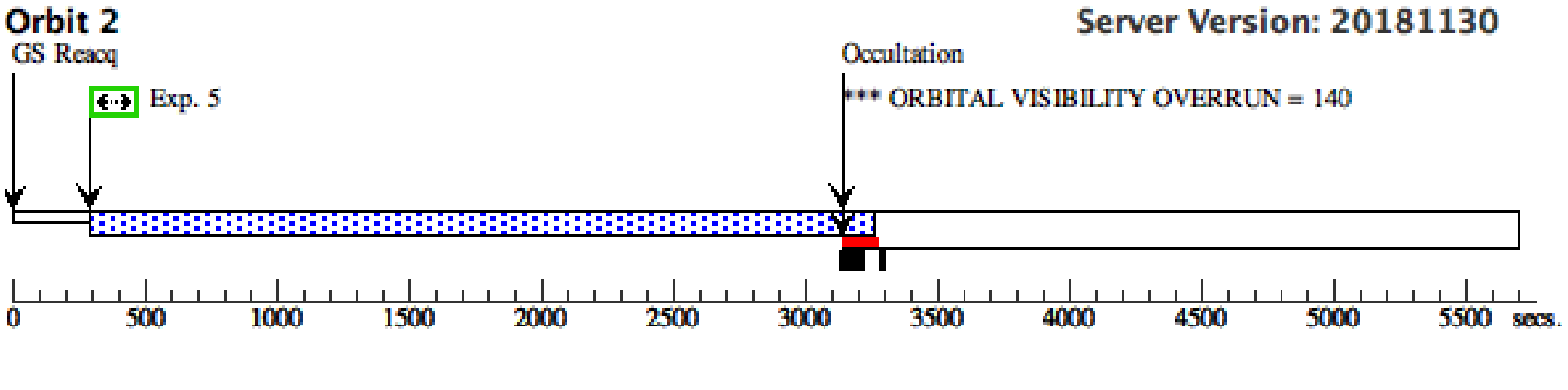
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-STAR*
*Description=[B0-B2 III-I]*
*Extended=NO*

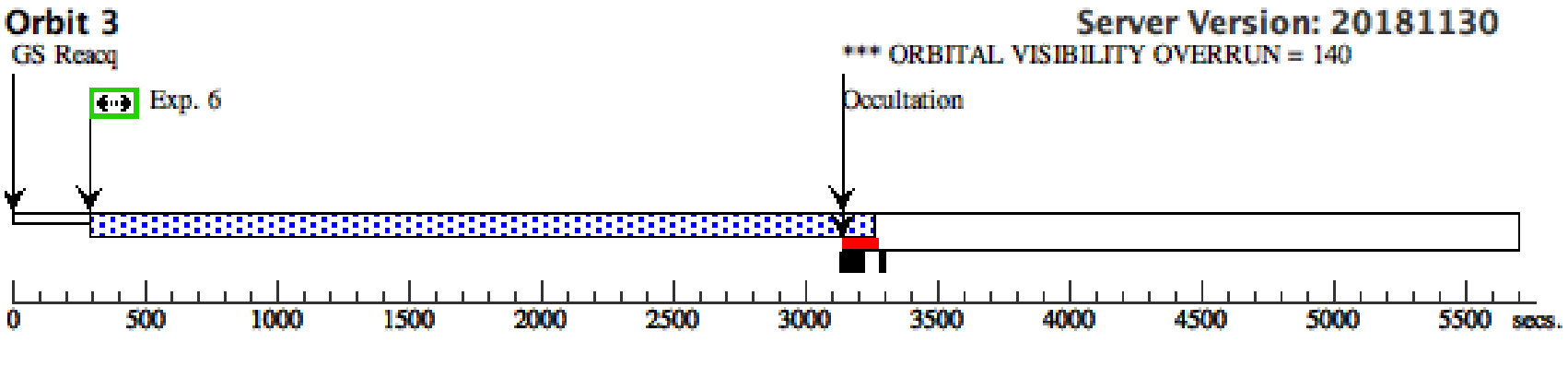
## Exposures

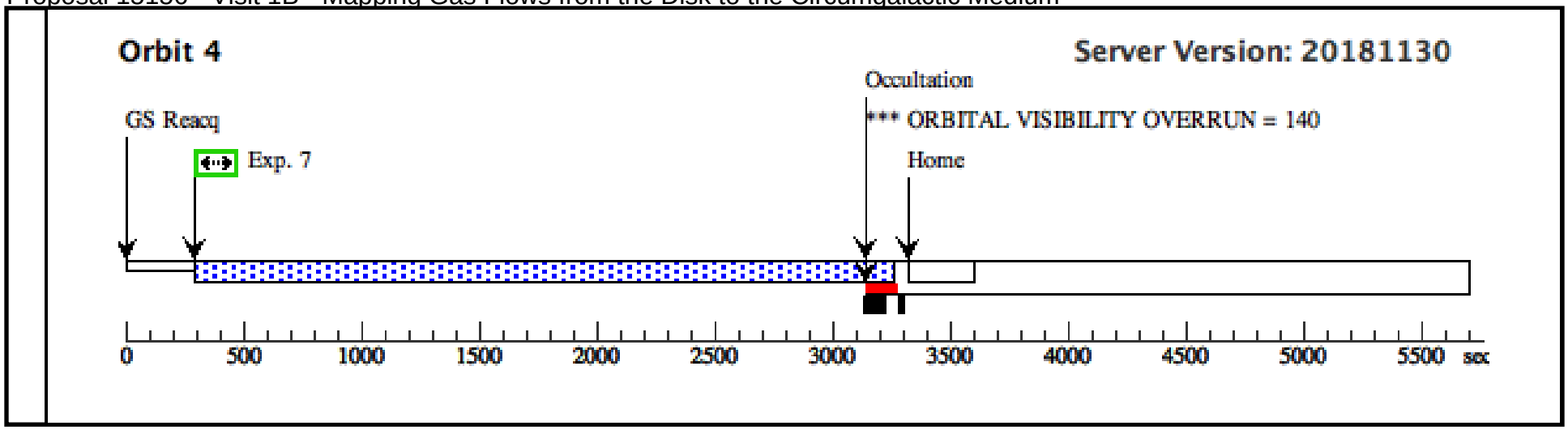
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/SEARCH, PSA | G160M 1577 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 26 Secs (26 Secs)<br>*[==>]* | ***[1]*** |
| 2 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKXD, PSA | G160M 1577 A | | | | 26 Secs (26 Secs)<br>*[==>]* | ***[1]*** |
| 3 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKD, PSA | G160M 1577 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 26 Secs (26 Secs)<br>*[==>]* | ***[1]*** |
| 4 | (1006576) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=1850; FP-POS=1; SEGMENT=BOTH | | | 1950 Secs (1950 Secs)<br>*[==>]* | ***[1]*** |
| 5 | (1006576) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=2; SEGMENT=BOTH | | | 2900 Secs (2916 Secs)<br>*[==>2916.0 Secs ]* | ***[2]*** |
| 6 | (1006576) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=3; SEGMENT=BOTH | | | 2900 Secs (2916 Secs)<br>*[==>2916.0 Secs ]* | ***[3]*** |
| 7 | (1006576) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2900 Secs (2916 Secs)<br>*[==>2916.0 Secs ]* | ***[4]*** |

Orbit Structure




Orbit 4
Server Version: 20181130
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 140
Exp. 7
Home
0
500
1000
1500
2000
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3500
4000
4500
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5500
sec

## Visit

**Proposal 15156, repeat-orbit2-visit1B (5C)** Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

*Comments: This is to repeat the observation of orbit 2 in visit 1B, which failed due to the delay of a guide-star acqusition.*

## Diagnostics

(repeat-orbit2-visit1B (5C)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

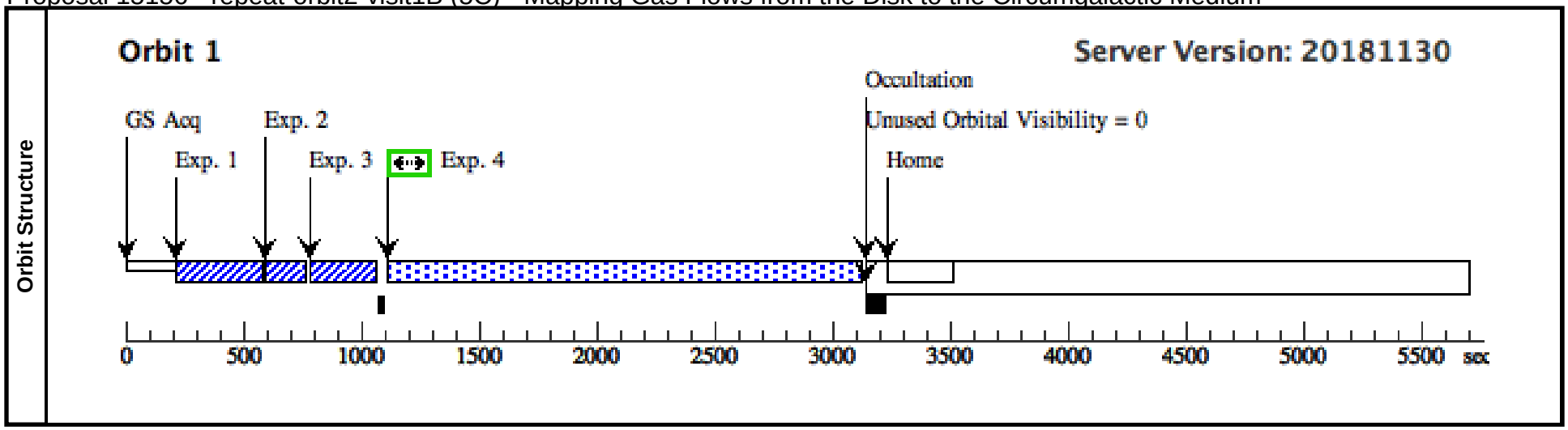
## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | IC1613-C10 | RA: 01 04 43.3900 (16.1807917d)<br>Dec: +02 10 22.20 (2.17283d)<br>Equinox: J2000 | Radial Velocity: -234 km/sec | V=18.82 | Reference Frame: ICRS |

*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-STAR*
*Description=[B0-B2 III-I]*
*Extended=NO*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/SEARCH, PSA | G160M<br>1577 A | CENTER=FLUX-WT;<br>SCAN-SIZE=2 | | | 26 Secs (26 Secs)<br>*[==>]* | <br>***[1]*** |
| 2 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKXD, PSA | G160M<br>1577 A | | | | 26 Secs (26 Secs)<br>*[==>]* | <br>***[1]*** |
| 3 | (1006574) | (1) IC1613-C10 | COS/FUV, ACQ/PEAKD, PSA | G160M<br>1577 A | STEP-SIZE=0.9;<br>CENTER=FLUX-WT-FLR;<br>NUM-POS=5 | | | 26 Secs (26 Secs)<br>*[==>]* | <br>***[1]*** |
| 4 | (1006576) | (1) IC1613-C10 | COS/FUV, TIME-TAG, PSA | G160M<br>1577 A | BUFFER-TIME=2800;<br>FP-POS=2;<br>SEGMENT=BOTH | | | 1895 Secs (1895 Secs)<br>*[==>]* | <br>***[1]*** |


Orbit Structure
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Server Version: 20181130
Occultation
GS Acq
Exp. 2
Unused Orbital Visibility = 0
Exp. 1
Exp. 3
Exp. 4
Home
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 2A, completed** Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

*Comments: This one has been observed with G140L before. We use that spectra as input for ETC calculation.*

## Diagnostics

(Visit 2A) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Visit 2A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 2A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 2A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

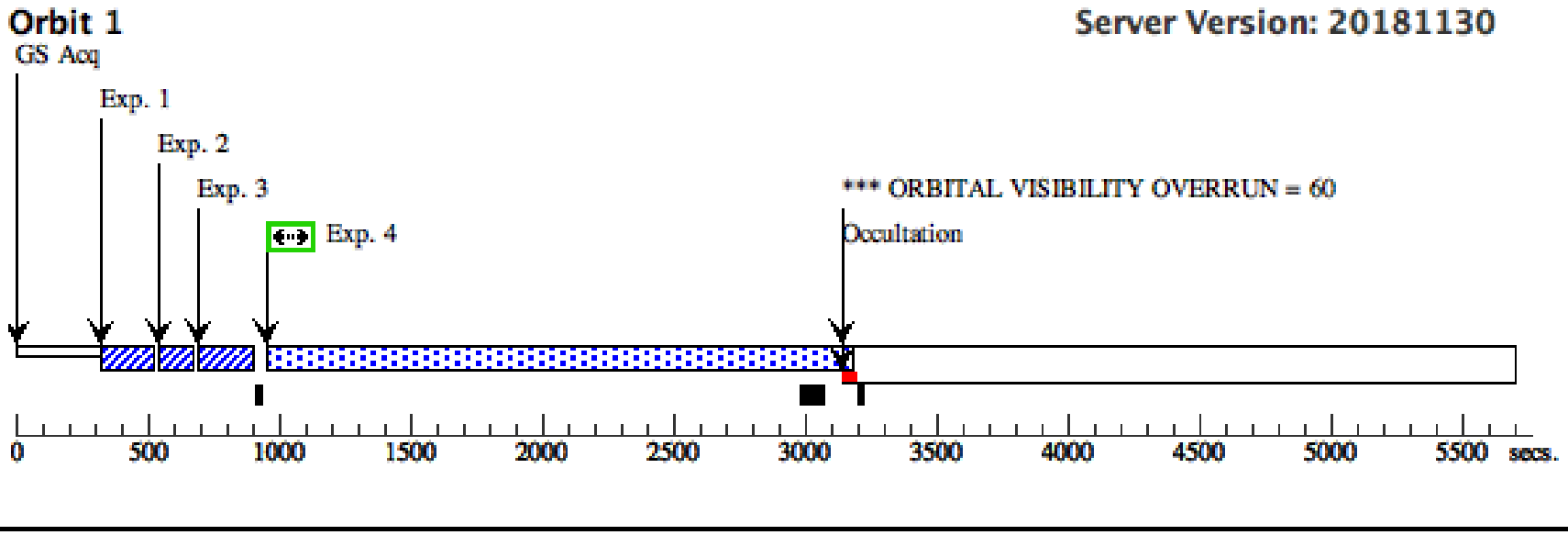
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (2) | IC1613-010502-020805 | RA: 01 05 1.9730 (16.2582208d) | Radial Velocity: -234 km/sec | V=18.965 | Reference Frame: ICRS |
| | Alt Name1: HLG90-52 | Dec: +02 08 5.10 (2.13475d) | | | |
| | | Equinox: J2000 | | | |

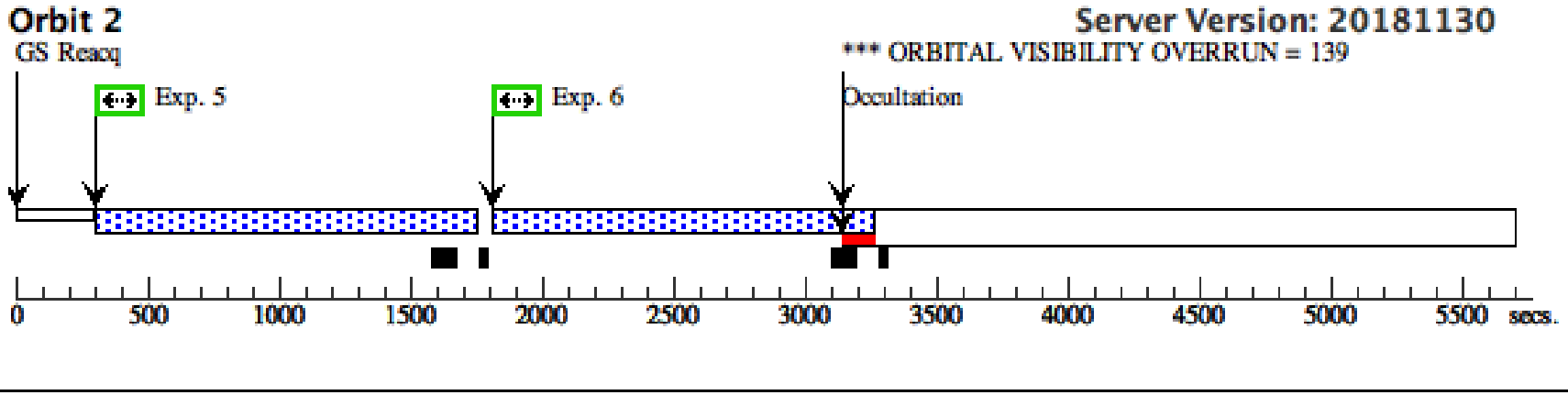
*Comments: This object was observed with G140L in program 12587. The input RA/DEC above are the number used in that observation. This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-STAR*
*Description=[SUPERGIANT O]*
*Extended=NO*

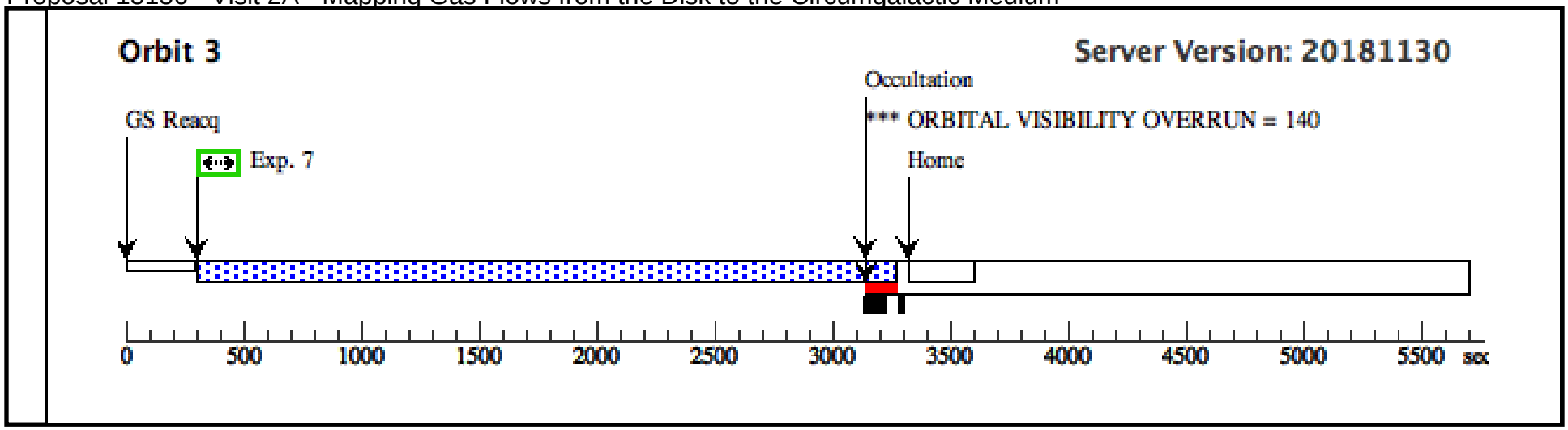
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006505) | (2) IC1613-010502-020805 | COS/FUV, ACQ/SEARCH, PSA | G130M 1291 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 12 Secs (12 Secs) *[==>]* | *[1]* |
| 2 | (1006505) | (2) IC1613-010502-020805 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | | | | 12 Secs (12 Secs) *[==>]* | *[1]* |
| 3 | (1006505) | (2) IC1613-010502-020805 | COS/FUV, ACQ/PEAKD, PSA | G130M 1291 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 12 Secs (12 Secs) *[==>]* | *[1]* |
| 4 | (1006506) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2000; FP-POS=3; SEGMENT=BOTH | | | 2100 Secs (2185 Secs) *[==>2185.0 Secs ]* | *[1]* |
| 5 | (1006506) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1250; FP-POS=3; SEGMENT=BOTH | | | 1350 Secs (1400 Secs) *[==>1400.0 Secs ]* | *[2]* |
| 6 | (1006506) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1250; FP-POS=4; SEGMENT=BOTH | | | 1350 Secs (1400 Secs) *[==>1400.0 Secs ]* | *[2]* |
| 7 | (1006506) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2900 Secs (2916 Secs) *[==>2916.0 Secs ]* | *[3]* |

Orbit Structure




Orbit 3
Server Version: 20181130
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 140
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 2B, completed** Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

*Comments: This one has been observed with G140L before. We use that spectra as input for ETC calculation.*

## Diagnostics

(Visit 2B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 2B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 2B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 2B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

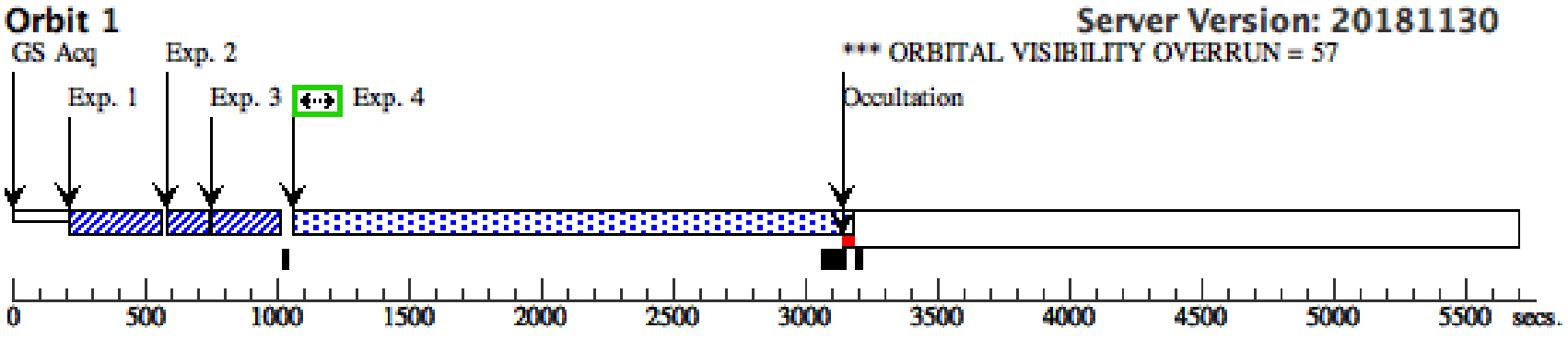
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (2) | IC1613-010502-020805 | RA: 01 05 1.9730 (16.2582208d) | Radial Velocity: -234 km/sec | V=18.965 | Reference Frame: ICRS |
| | Alt Name1: HLG90-52 | Dec: +02 08 5.10 (2.13475d) | | | |
| | | Equinox: J2000 | | | |

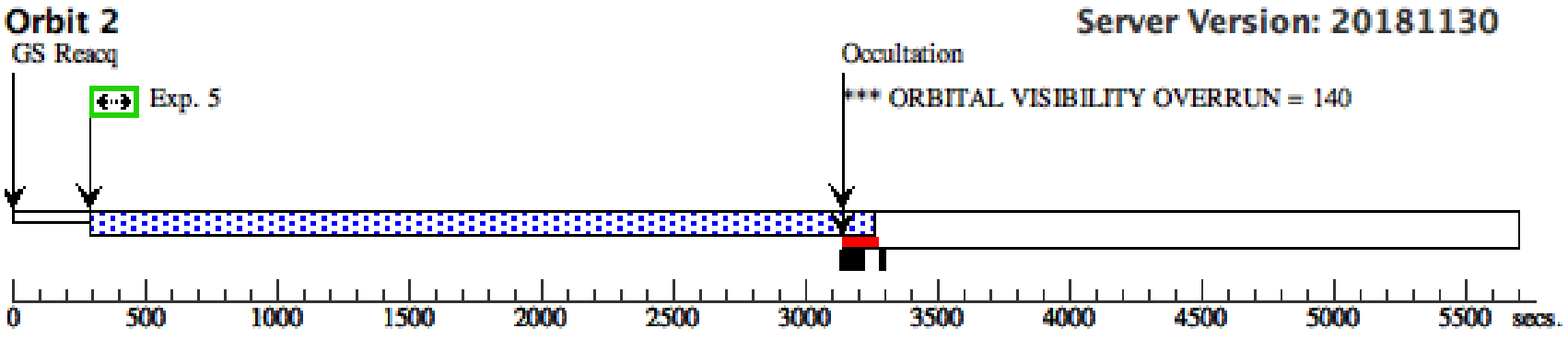
*Comments: This object was observed with G140L in program 12587. The input RA/DEC above are the number used in that observation. This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=EXT-STAR*
*Description=[SUPERGIANT O]*
*Extended=NO*

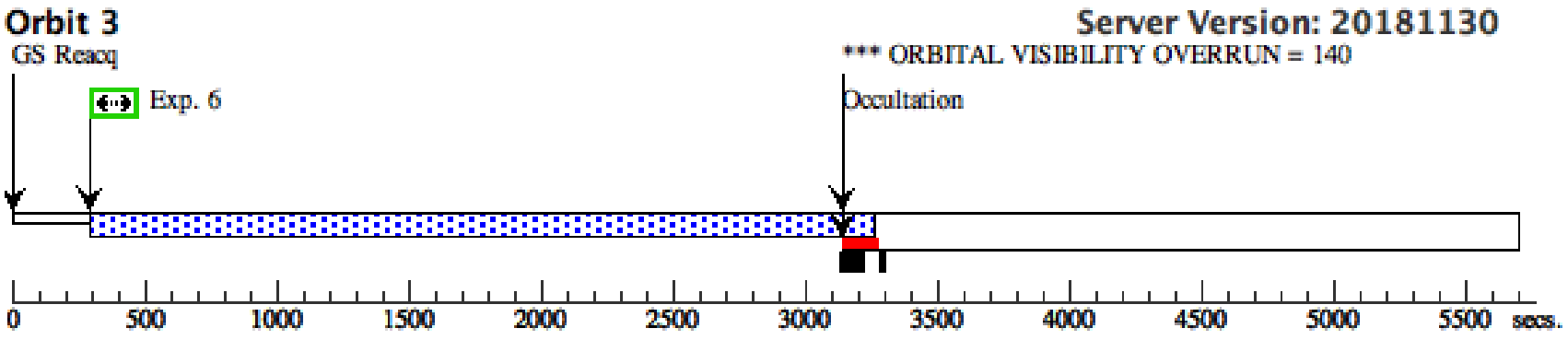
## Exposures

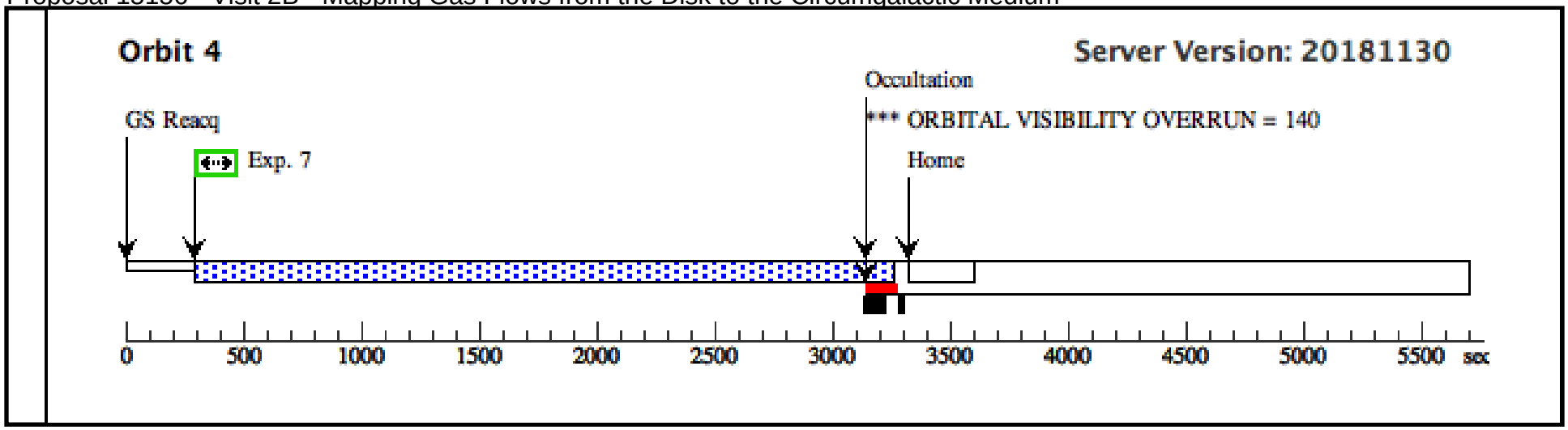
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006571) | (2) IC1613-010502-020805 | COS/FUV, ACQ/SEARCH, PSA | G160M 1577 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 22 Secs (22 Secs) *[==>]* | *[1]* |
| 2 | (1006571) | (2) IC1613-010502-020805 | COS/FUV, ACQ/PEAKXD, PSA | G160M 1577 A | | | | 22 Secs (22 Secs) *[==>]* | *[1]* |
| 3 | (1006571) | (2) IC1613-010502-020805 | COS/FUV, ACQ/PEAKD, PSA | G160M 1577 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 22 Secs (22 Secs) *[==>]* | *[1]* |
| 4 | (1006572) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=1900; SEGMENT=BOTH; FP-POS=1 | | | 2000 Secs (2000 Secs) *[==>]* | *[1]* |
| 5 | (1006572) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | SEGMENT=BOTH; FP-POS=2; BUFFER-TIME=2800 | | | 2900 Secs (2916 Secs) *[==>2916.0 Secs ]* | *[2]* |
| 6 | (1006572) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; SEGMENT=BOTH; FP-POS=3 | | | 2900 Secs (2916 Secs) *[==>2916.0 Secs ]* | *[3]* |
| 7 | (1006572) | (2) IC1613-010502-020805 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; SEGMENT=BOTH; FP-POS=4 | | | 2900 Secs (2916 Secs) *[==>2916.0 Secs ]* | *[4]* |

Orbit Structure




Orbit 4
Server Version: 20181130
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 140
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 3A, implementation**

Wed Dec 05 21:04:47 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 3A) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

## Fixed Targets

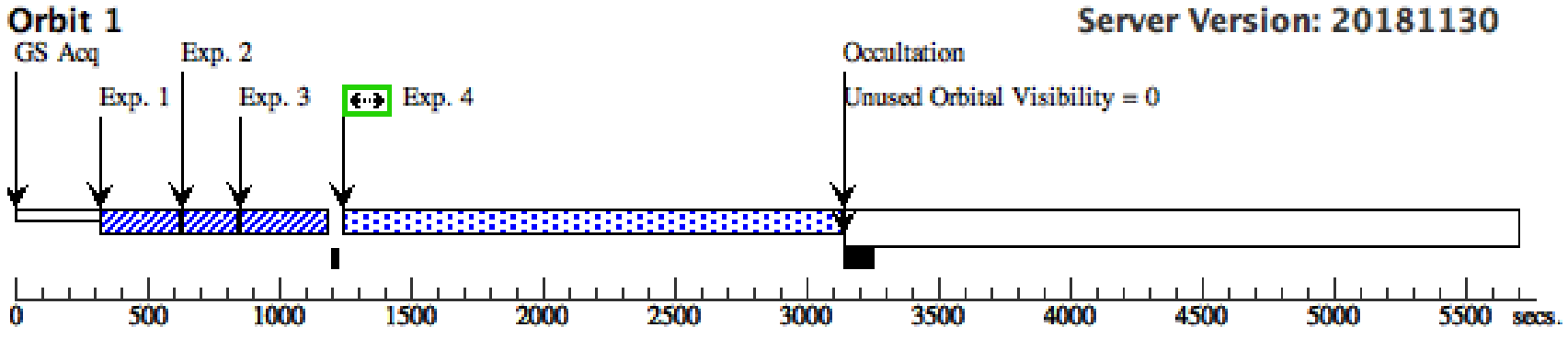
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (3) | LBQS-0100+0205 | RA: 01 03 12.9881 (15.8041171d)<br>Dec: +02 21 10.05 (2.35279d)<br>Equinox: J2000 | Redshift: 0.394 | V=16.39<br>FUV=18.32 | Reference Frame: ICRS |

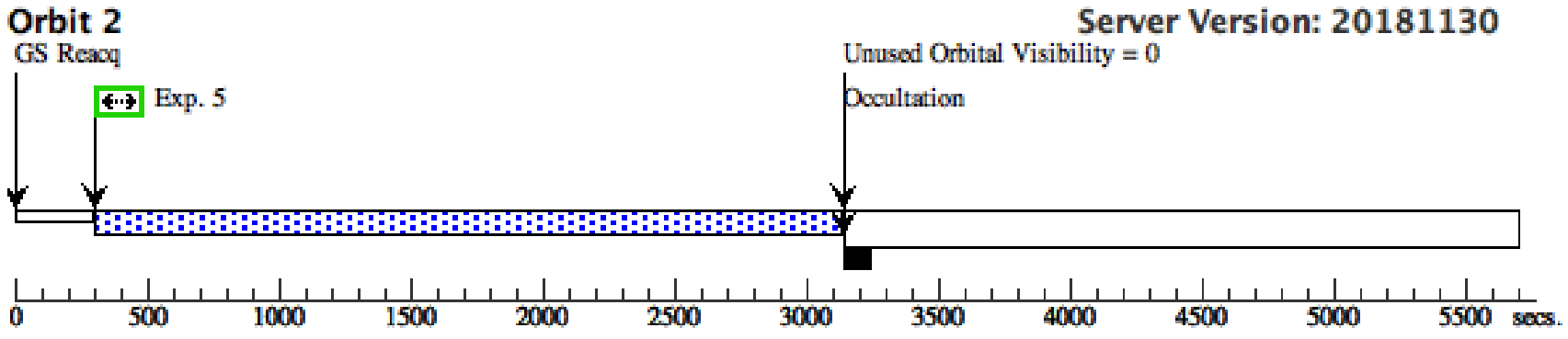
*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[QSO]*
*Extended=NO*

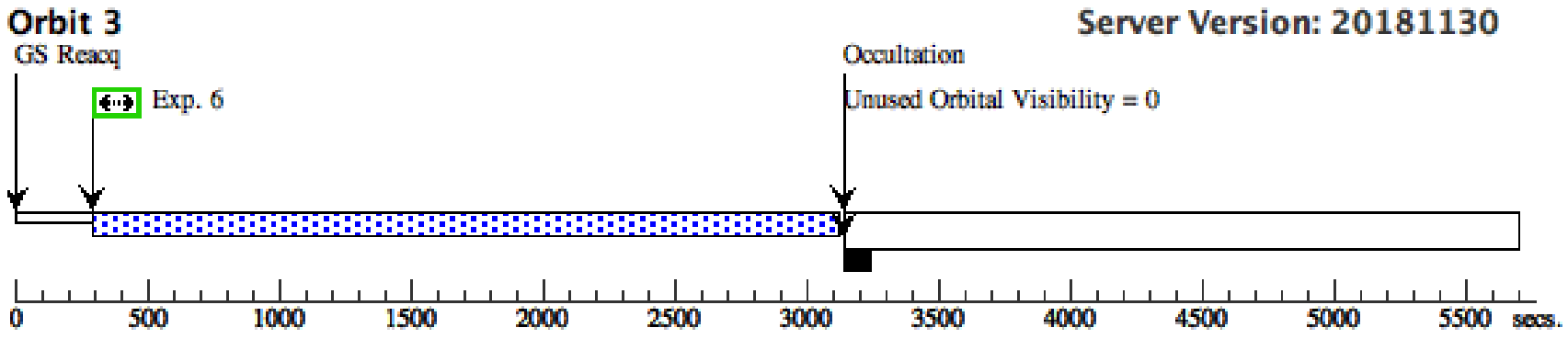
## Exposures

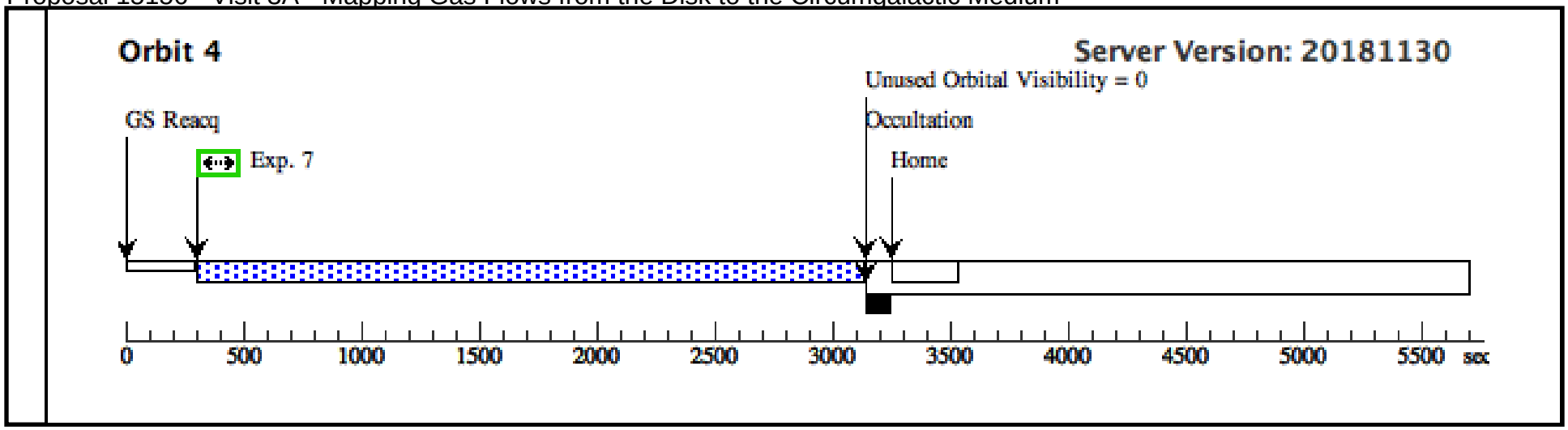
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006529) | (3) LBQS-0100+0205 | COS/FUV, ACQ/SEARCH, PSA | G130M 1291 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 36 Secs (36 Secs)<br>*[==>]* | *[1]* |
| 2 | (1006529) | (3) LBQS-0100+0205 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | | | | 36 Secs (36 Secs)<br>*[==>]* | *[1]* |
| 3 | (1006529) | (3) LBQS-0100+0205 | COS/FUV, ACQ/PEAKD, PSA | G130M 1291 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 36 Secs (36 Secs)<br>*[==>]* | *[1]* |
| 4 | (1006532) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1790; FP-POS=3; SEGMENT=BOTH | | | 1837 Secs (1837 Secs)<br>*[==>]* | *[1]* |
| 5 | (1006532) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=3; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | *[2]* |
| 6 | (1006532) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | *[3]* |
| 7 | (1006532) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | *[4]* |

Orbit Structure




Orbit 4
Server Version: 20181130
Unused Orbital Visibility = 0
GS Reacq
Exp. 7
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 3B, implementation** Wed Dec 05 21:04:48 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Fixed Targets

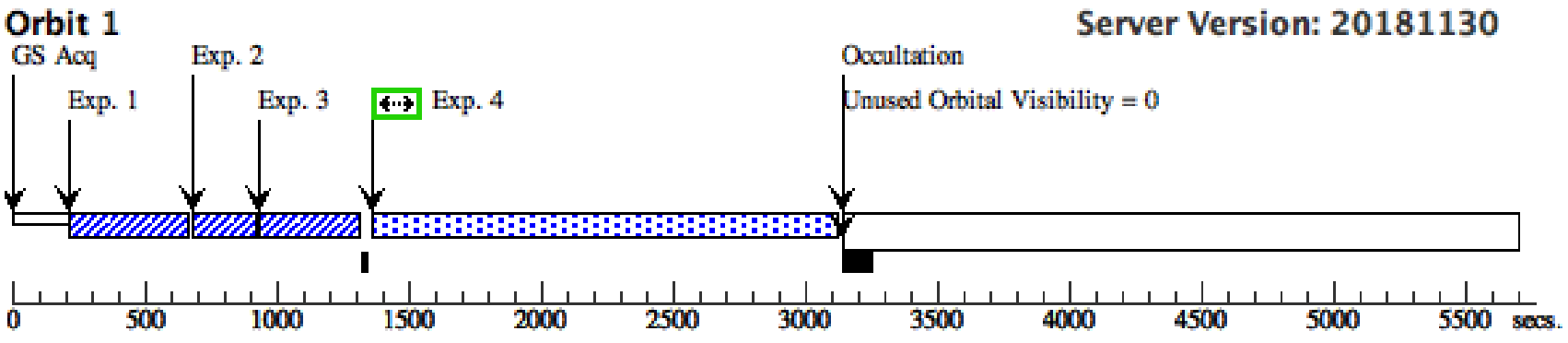
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (3) | LBQS-0100+0205 | RA: 01 03 12.9881 (15.8041171d)<br>Dec: +02 21 10.05 (2.35279d)<br>Equinox: J2000 | Redshift: 0.394 | V=16.39<br>FUV=18.32 | Reference Frame: ICRS |

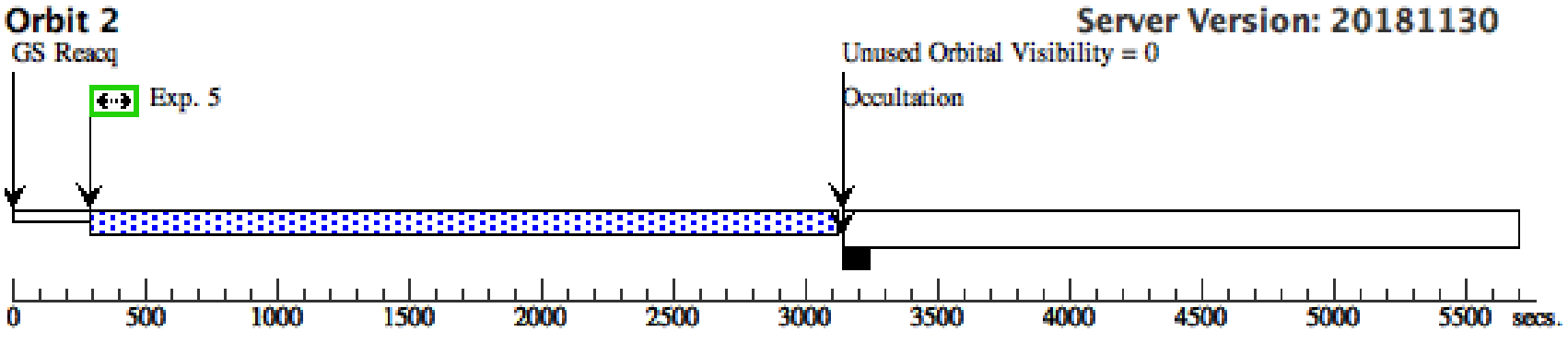
*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[QSO]*
*Extended=NO*

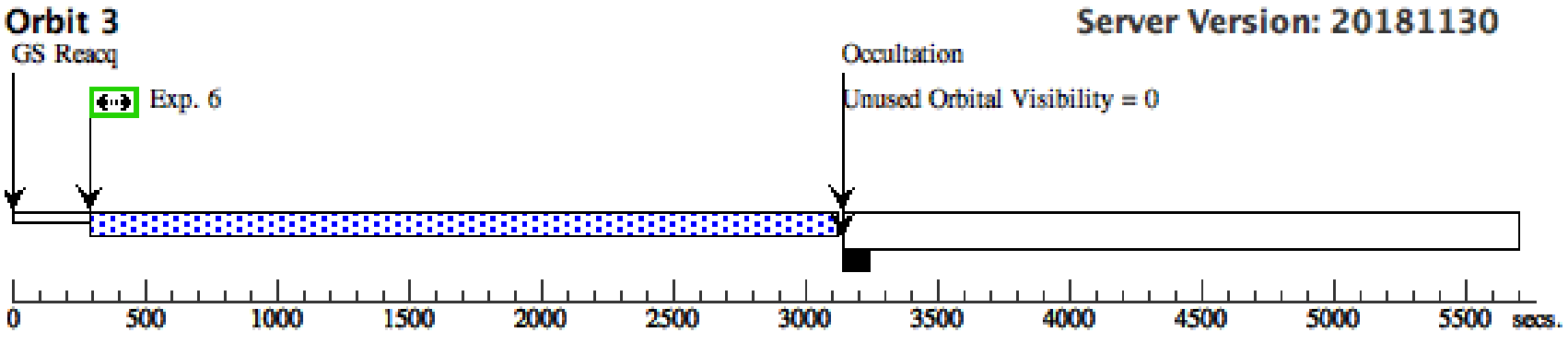
## Exposures

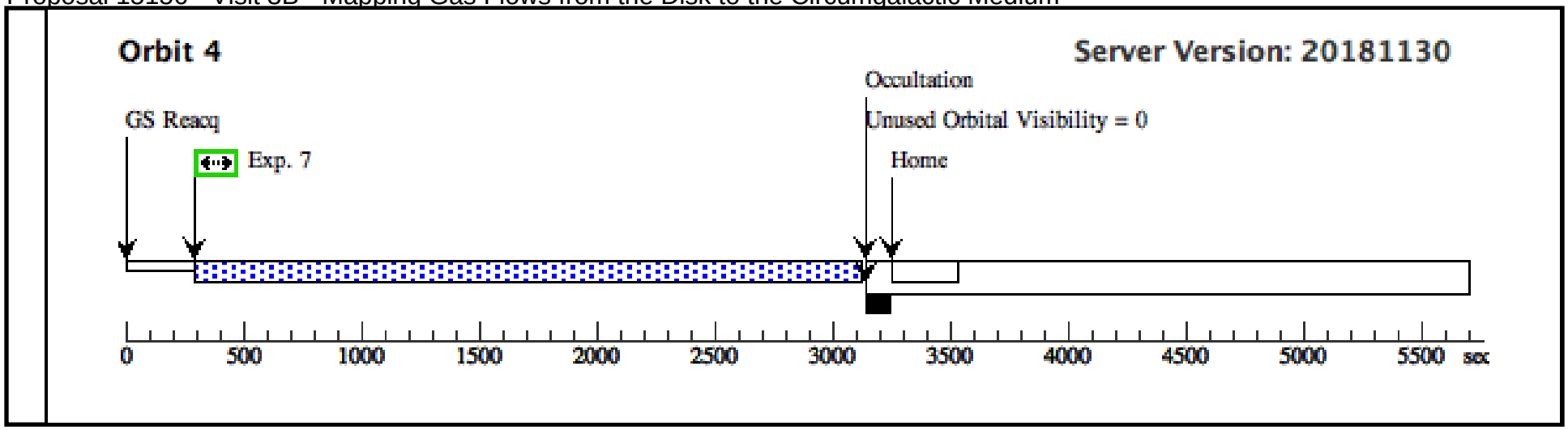
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006581) | (3) LBQS-0100+0205 | COS/FUV, ACQ/SEARCH, PSA | G160M 1577 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 47 Secs (47 Secs)<br>*[==>]* | ***[1]*** |
| 2 | (1006581) | (3) LBQS-0100+0205 | COS/FUV, ACQ/PEAKXD, PSA | G160M 1577 A | | | | 47 Secs (47 Secs)<br>*[==>]* | ***[1]*** |
| 3 | (1006581) | (3) LBQS-0100+0205 | COS/FUV, ACQ/PEAKD, PSA | G160M 1577 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 47 Secs (47 Secs)<br>*[==>]* | ***[1]*** |
| 4 | (1006586) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=1600; FP-POS=1; SEGMENT=BOTH | | | 1643 Secs (1643 Secs)<br>*[==>]* | ***[1]*** |
| 5 | (1006586) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=2; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[2]*** |
| 6 | (1006586) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=3; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[3]*** |
| 7 | (1006586) | (3) LBQS-0100+0205 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[4]*** |

Orbit Structure




Orbit 4
Server Version: 20181130
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 4A, implementation**

Wed Dec 05 21:04:48 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 4A) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

## Fixed Targets

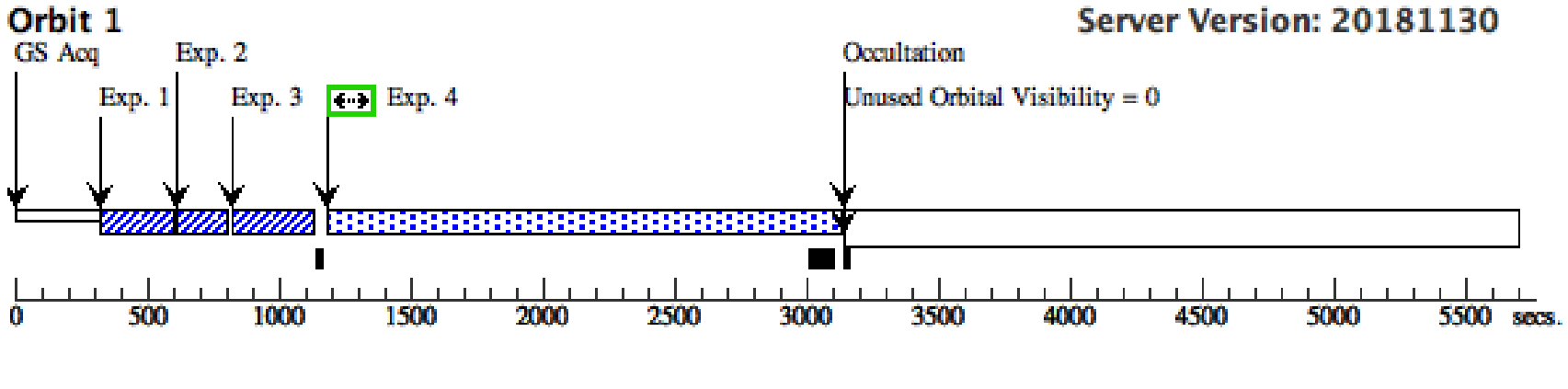
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (4) | LBQS-0101+0009 | RA: 01 03 42.7380 (15.9280750d)<br>Dec: +00 25 37.30 (.42703d)<br>Equinox: J2000 | Redshift: 0.394 | V=17.57<br>FUV=18.19 | Reference Frame: ICRS |

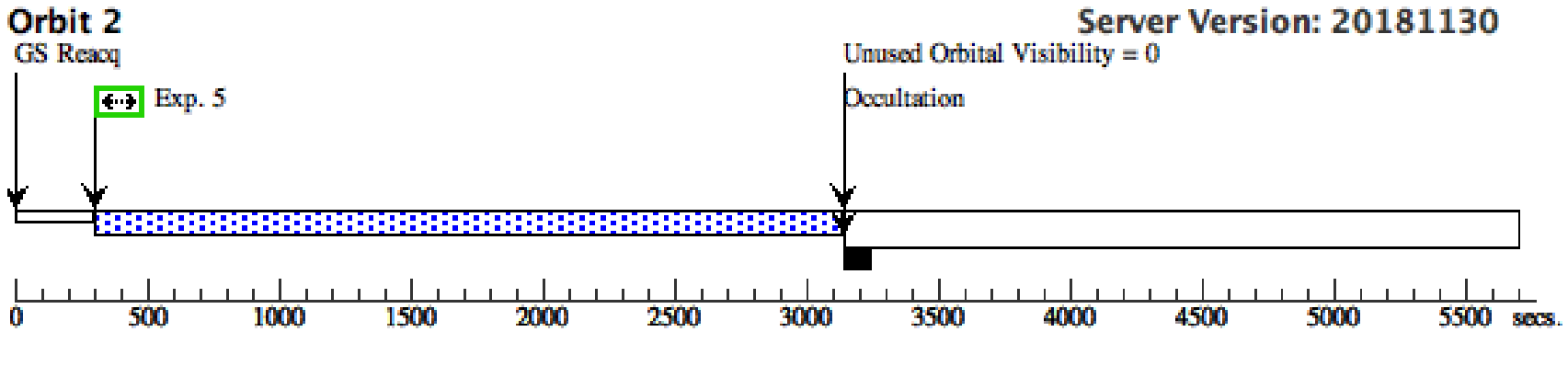
*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[QSO]*
*Extended=NO*

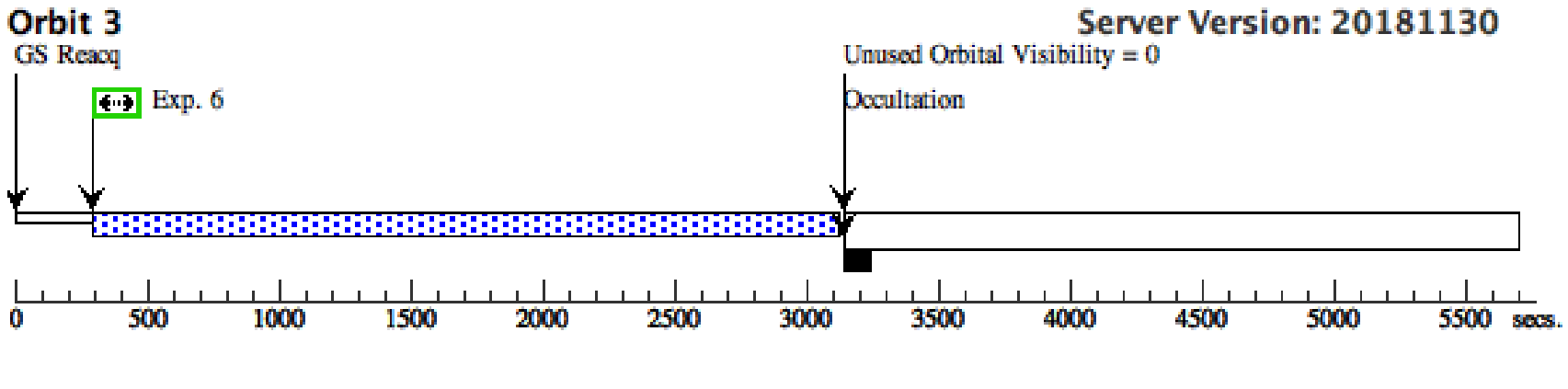
## Exposures

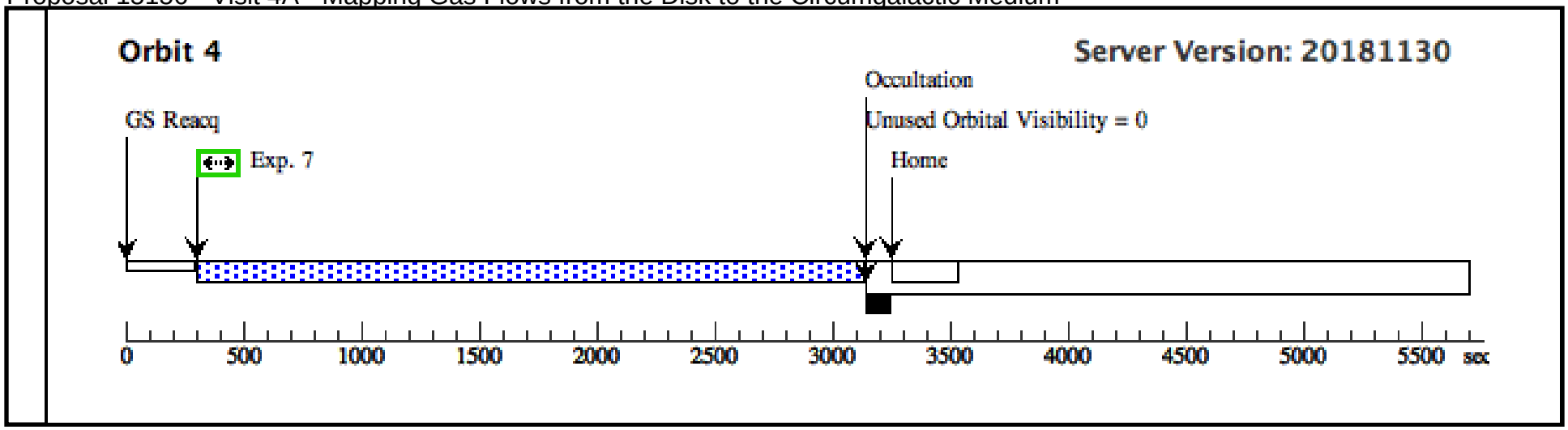
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006542) | (4) LBQS-0101+0009 | COS/FUV, ACQ/SEARCH, PSA | G130M 1291 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 31 Secs (31 Secs)<br>*[==>]* | ***[1]*** |
| 2 | (1006542) | (4) LBQS-0101+0009 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | | | | 31 Secs (31 Secs)<br>*[==>]* | ***[1]*** |
| 3 | (1006542) | (4) LBQS-0101+0009 | COS/FUV, ACQ/PEAKD, PSA | G130M 1291 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 31 Secs (31 Secs)<br>*[==>]* | ***[1]*** |
| 4 | (1006543) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=1800; FP-POS=3; SEGMENT=BOTH | | | 1897 Secs (1897 Secs)<br>*[==>]* | ***[1]*** |
| 5 | (1006543) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=3; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[2]*** |
| 6 | (1006543) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[3]*** |
| 7 | (1006543) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[4]*** |

Orbit Structure




Orbit 4
Server Version: 20181130
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 4B, implementation** Wed Dec 05 21:04:48 GMT 2018

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Fixed Targets

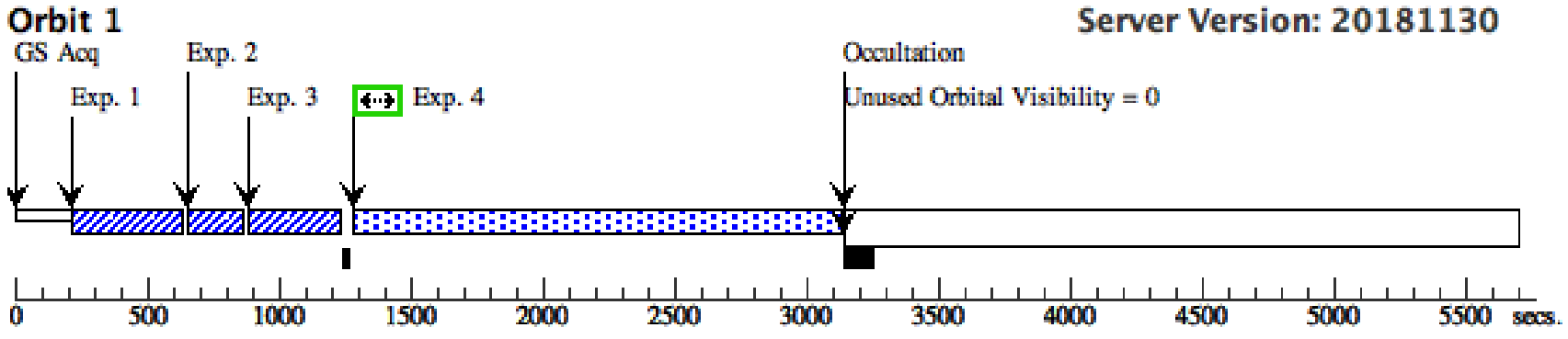
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (4) | LBQS-0101+0009 | RA: 01 03 42.7380 (15.9280750d)<br>Dec: +00 25 37.30 (.42703d)<br>Equinox: J2000 | Redshift: 0.394 | V=17.57<br>FUV=18.19 | Reference Frame: ICRS |

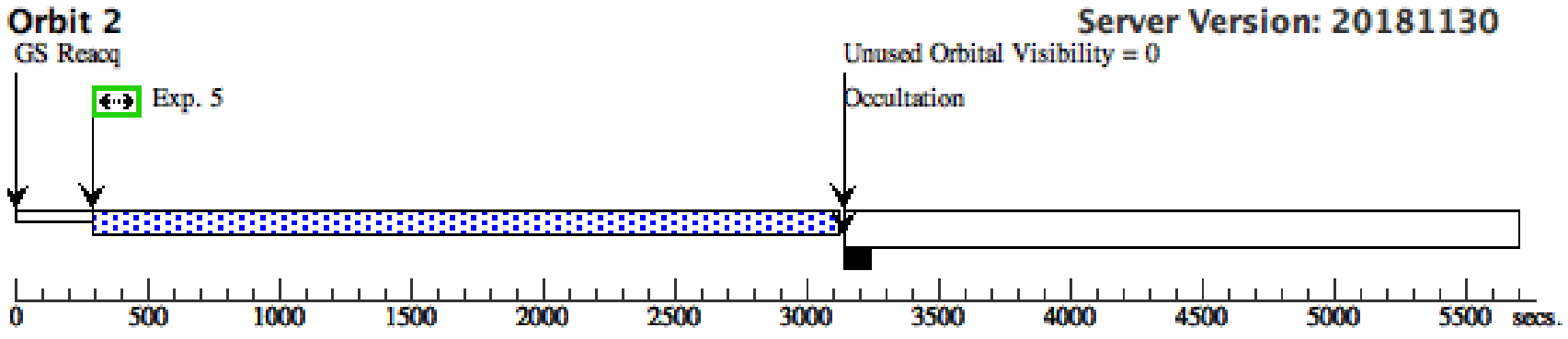
*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[QSO]*
*Extended=NO*

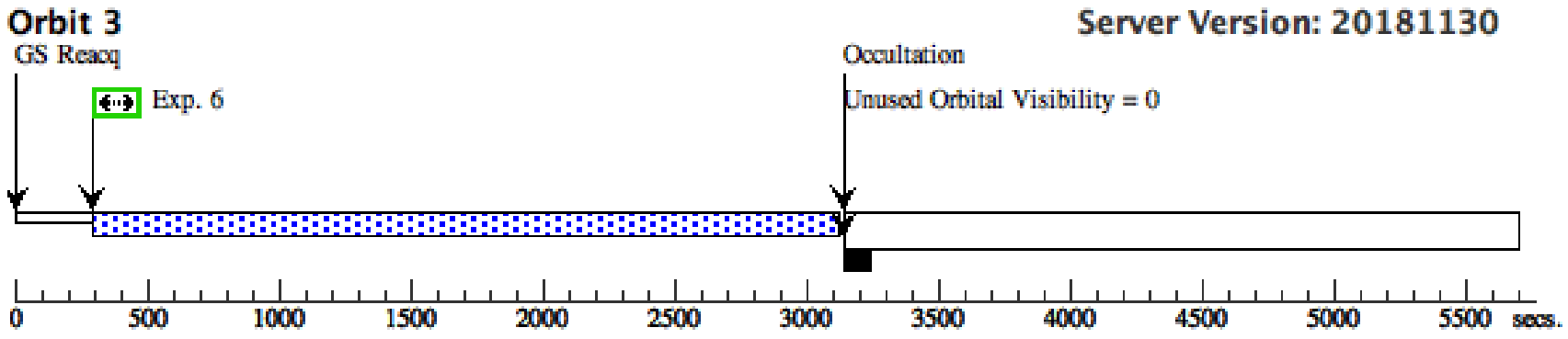
## Exposures

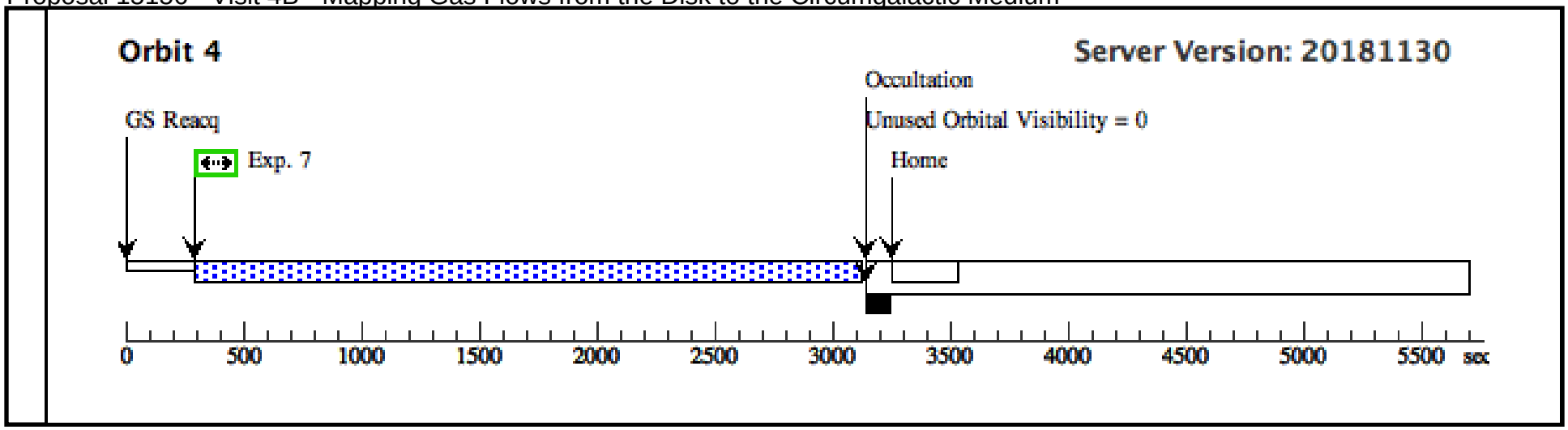
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006587) | (4) LBQS-0101+0009 | COS/FUV, ACQ/SEARCH, PSA | G160M 1577 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 40 Secs (40 Secs)<br>*[==>]* | ***[1]*** |
| 2 | (1006587) | (4) LBQS-0101+0009 | COS/FUV, ACQ/PEAKXD, PSA | G160M 1577 A | | | | 40 Secs (40 Secs)<br>*[==>]* | ***[1]*** |
| 3 | (1006587) | (4) LBQS-0101+0009 | COS/FUV, ACQ/PEAKD, PSA | G160M 1577 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 40 Secs (40 Secs)<br>*[==>]* | ***[1]*** |
| 4 | (1006588) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=1680; FP-POS=1; SEGMENT=BOTH | | | 1727 Secs (1727 Secs)<br>*[==>]* | ***[1]*** |
| 5 | (1006588) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=2; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[2]*** |
| 6 | (1006588) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=3; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[3]*** |
| 7 | (1006588) | (4) LBQS-0101+0009 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=2800; FP-POS=4; SEGMENT=BOTH | | | 2776 Secs (2776 Secs)<br>*[==>]* | ***[4]*** |

Orbit Structure




Orbit 4
Server Version: 20181130
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 7
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 15156, Visit 5A, completed** Wed Dec 05 21:04:48 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 5A) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Visit 5A) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

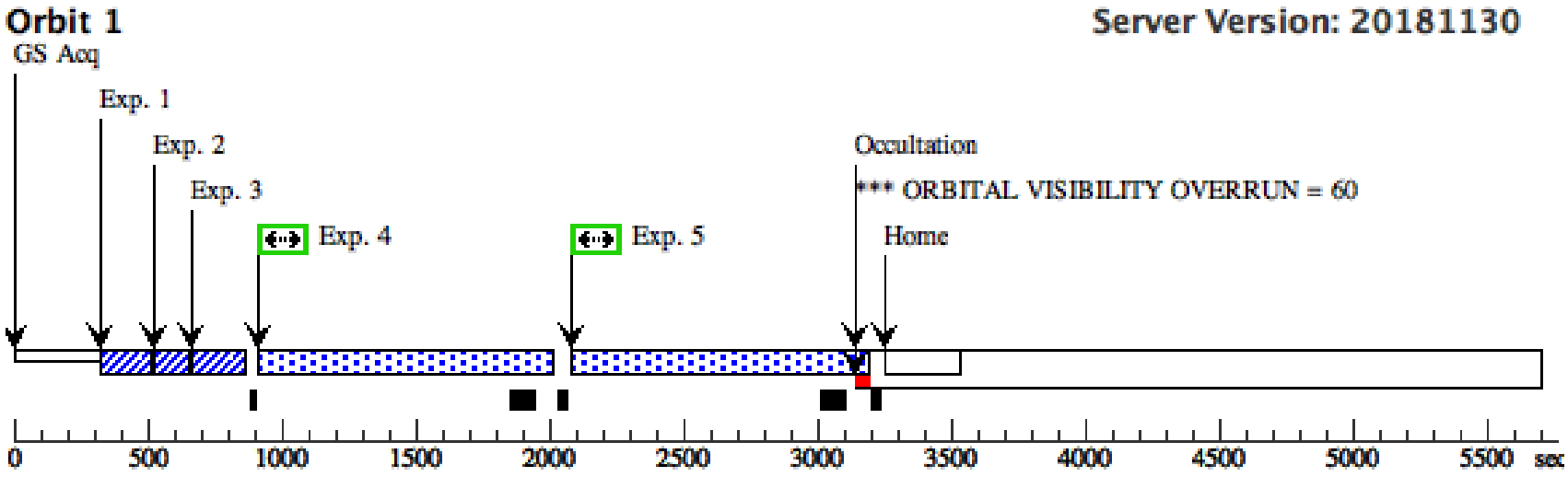
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (5) | 2MASX-J01022632-0039045 | RA: 01 02 26.3154 (15.6096475d)<br>Dec: -00 39 4.52 (-.65126d)<br>Equinox: J2000 | Redshift: 0.294 | V=16.54<br>FUV=16.83 | Reference Frame: ICRS |

*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[SEYFERT]*
*Extended=NO*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006545) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/SEARCH, PSA | G130M 1291 A | CENTER=FLUX-WT;<br>SCAN-SIZE=2 | | | 9 Secs (9 Secs)<br>*[==>]* | *[1]* |
| 2 | (1006545) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/PEAKXD, PSA | G130M 1291 A | | | | 9 Secs (9 Secs)<br>*[==>]* | *[1]* |
| 3 | (1006545) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/PEAKD, PSA | G130M 1291 A | STEP-SIZE=0.9;<br>CENTER=FLUX-WT-FLR;<br>NUM-POS=5 | | | 9 Secs (9 Secs)<br>*[==>]* | *[1]* |
| 4 | (1006543) | (5) 2MASX-J01022632-0039045 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=900;<br>FP-POS=3;<br>SEGMENT=BOTH | | | 1040 Secs (1053 Secs)<br>*[==>1053.0 Secs ]* | *[1]* |
| 5 | (1006543) | (5) 2MASX-J01022632-0039045 | COS/FUV, TIME-TAG, PSA | G130M 1291 A | BUFFER-TIME=900;<br>FP-POS=4;<br>SEGMENT=BOTH | | | 1040 Secs (1053 Secs)<br>*[==>1053.0 Secs ]* | *[1]* |

Orbit Structure



## Visit

**Proposal 15156, Visit 5B, completed** Wed Dec 05 21:04:48 GMT 2018

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV

Special Requirements: (none)

## Diagnostics

(Visit 5B) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

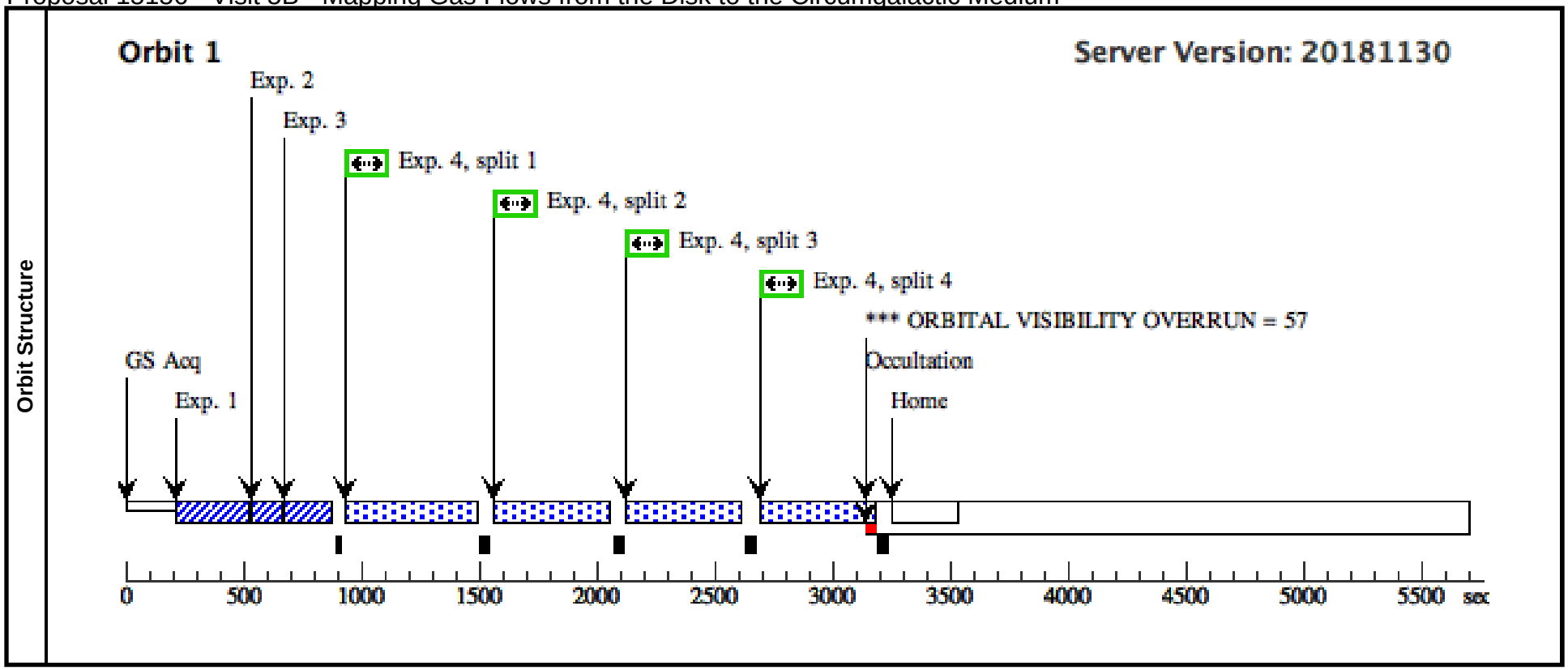
## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (5) | 2MASX-J01022632-0039045 | RA: 01 02 26.3154 (15.6096475d)<br>Dec: -00 39 4.52 (-.65126d)<br>Equinox: J2000 | Redshift: 0.294 | V=16.54<br>FUV=16.83 | Reference Frame: ICRS |

*Comments: The GALEX FUV position match well with the position from SIMBAD (optical value). This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[SEYFERT]*
*Extended=NO*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (1006589) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/SEARCH, PSA | G160M 1577 A | CENTER=FLUX-WT; SCAN-SIZE=2 | | | 11 Secs (11 Secs)<br>*[==>]* | <br>***[1]*** |
| 2 | (1006589) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/PEAKXD, PSA | G160M 1577 A | | | | 11 Secs (11 Secs)<br>*[==>]* | <br>***[1]*** |
| 3 | (1006589) | (5) 2MASX-J01022632-0039045 | COS/FUV, ACQ/PEAKD, PSA | G160M 1577 A | STEP-SIZE=0.9; CENTER=FLUX-WT-FLR; NUM-POS=5 | | | 11 Secs (11 Secs)<br>*[==>]* | <br>***[1]*** |
| 4 | (1006590) | (5) 2MASX-J01022632-0039045 | COS/FUV, TIME-TAG, PSA | G160M 1577 A | BUFFER-TIME=1400; FP-POS=ALL; SEGMENT=BOTH | | | 450 Secs (1760 Secs)<br>*[==>440.0 Secs (Split 1)]*<br>*[==>440.0 Secs (Split 2)]*<br>*[==>440.0 Secs (Split 3)]*<br>*[==>440.0 Secs (Split 4)]* | <br>***[1]*** |


Orbit Structure
Orbit 1
Server Version: 20181130
Exp. 2
Exp. 3
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
*** ORBITAL VISIBILITY OVERRUN = 57
GS Acq
Exp. 1
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec