# 16294 - Pox 186: A Case of Complete Neutral Gas Blow-Away?

Cycle: 28, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**


| *Name* | *Institution* | *E-Mail* |
|---|---|---|
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**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) LEDA-46982 | WFC3/UVIS | 4 | 30-Jun-2020 18:00:53.0 | yes |
| 03 | (1) LEDA-46982 | WFC3/UVIS | 3 | 30-Jun-2020 18:00:55.0 | yes |
| 04 | (1) LEDA-46982 | COS/FUV<br>COS/NUV | 4 | 30-Jun-2020 18:00:56.0 | yes |

11 Total Orbits Used

**ABSTRACT**

Energetically, it is possible for a starburst in a dwarf galaxy to blow away and completely ionize its ISM, resulting in a very high escape fraction of its ionizing radiation. Finding examples of such galaxies would ease the tension between the energy needed to reionize the universe and the ionizing energy budget available to do so. Pox 186 is an exceptional dwarf galaxy with an active starburst, yet a non-detection in deep 21cm HI observations. Its optical spectrum also shows very highly ionized gas, with an extraordinary [OIII]/[OII] ratio (> 20), and evidence of an 800 km/s outflow. Thus,

Pox 186 has many physical properties consistent with those of the Green Pea galaxies - low redshift analogs of the sources responsible for the reionization of the universe. However, Green Peas are dominated by bright star clusters embedded in larger systems many times more massive than the galaxies responsible for reionization. The lower mass of Pox 186 makes it a better match to the high redshift systems. When combined with its close proximity (D~18 Mpc), Pox 186 offers a unique laboratory to study in detail the extreme properties of a galaxy like those responsible for reionization.

We will image Pox 186 with both narrow and broadband filters and obtain a UV COS spectrum with the G160M grating. The imaging will allow us to study the ionization structure to confirm the density bounded nature of the galaxy. The UV spectrum will be used to study the structure of the outflow, the stars driving the outflow, and to directly compare what one could learn from a similar unresolved, high redshift system.

**OBSERVING DESCRIPTION**

This project will use 7 orbits for WFC3+UVIS multiband imaging of Pox 186 distributed over 2 visits. Our exposure times are set to detect the surface brightness emission at a distance of 1".0 from the center with a S/N > 3 per resolution element, using the ETC to verify the S/N for each filters listed exposure times. We will image the target in the F225W, F280N, F336W, F373N, F467M, F487N, F502N, F621M, and F658N filters. For all filters we will use a 3 point dithering pattern to sample the PSF and reduce the effect of cosmic rays. To reduce overhead and minimze CTE effects we use the UVIS2-C1K1C-SUB aperture for imaging in all but F280N, F373N, and F487N, and add a POST-FLASH flux to ensure a minimum charge packet of 20 electrons as recommended by the recent White paper. F280N, F373N, and F487N will use the full field of view (aperture UVIS2-C1K1C-CTE) to maximize the number of field stars that will be used to verify the alignment of the filters across the two visits.

Four orbits are dedicated to obtaining a deep FUV spectra using COS-G160M with CENWAVE=1533. We used COS ETC to estimate the exposure times for spectroscopic observations based on archival STIS observations (PID:8333) and then estimated the required exosure time to reach a S/N of 10 when binning by two resolution elements. The STIS data were also used to estimate the exposure time for obtaining the ACQ/Image using PSA/MirrorA for the recommended S/N = 20. To best remove the fixed pattern noise we cycle through the 4 FP-POS settings over the four orbits. The Bright Object Tool reports a warning about exceeding the local count rate in the ACQ/Image exposure, but there are no objects are present in the 21.5" field around the target in the archival F336W image. Therefore we ignore this warning.

## Visit

**Proposal 16294, WFC3 (01)** Tue Jun 30 22:00:57 GMT 2020

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(F280N (01.001)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F621M (01.002)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F373N (01.003)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F336W (01.004)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-LINE-3PT<br>Purpose=DITHER<br>Number Of Points=3<br>Point Spacing=0.135<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false | | (1), (2), (3), (4) |

## Fixed Targets

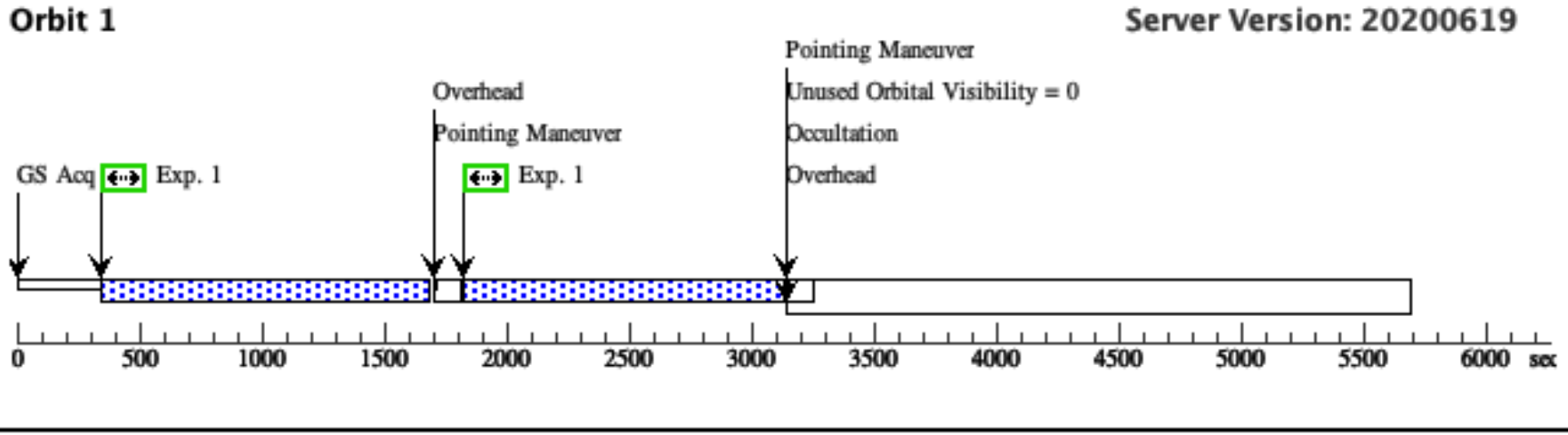
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LEDA-46982 | RA: 13 25 48.6000 (201.4525000d)<br>Dec: -11 36 38.00 (-11.61056d)<br>Equinox: J2000 | Epoch of Position: 2000<br>Redshift: 0.0041 | V=17.43+/-0.03 | Reference Frame: ICRS |

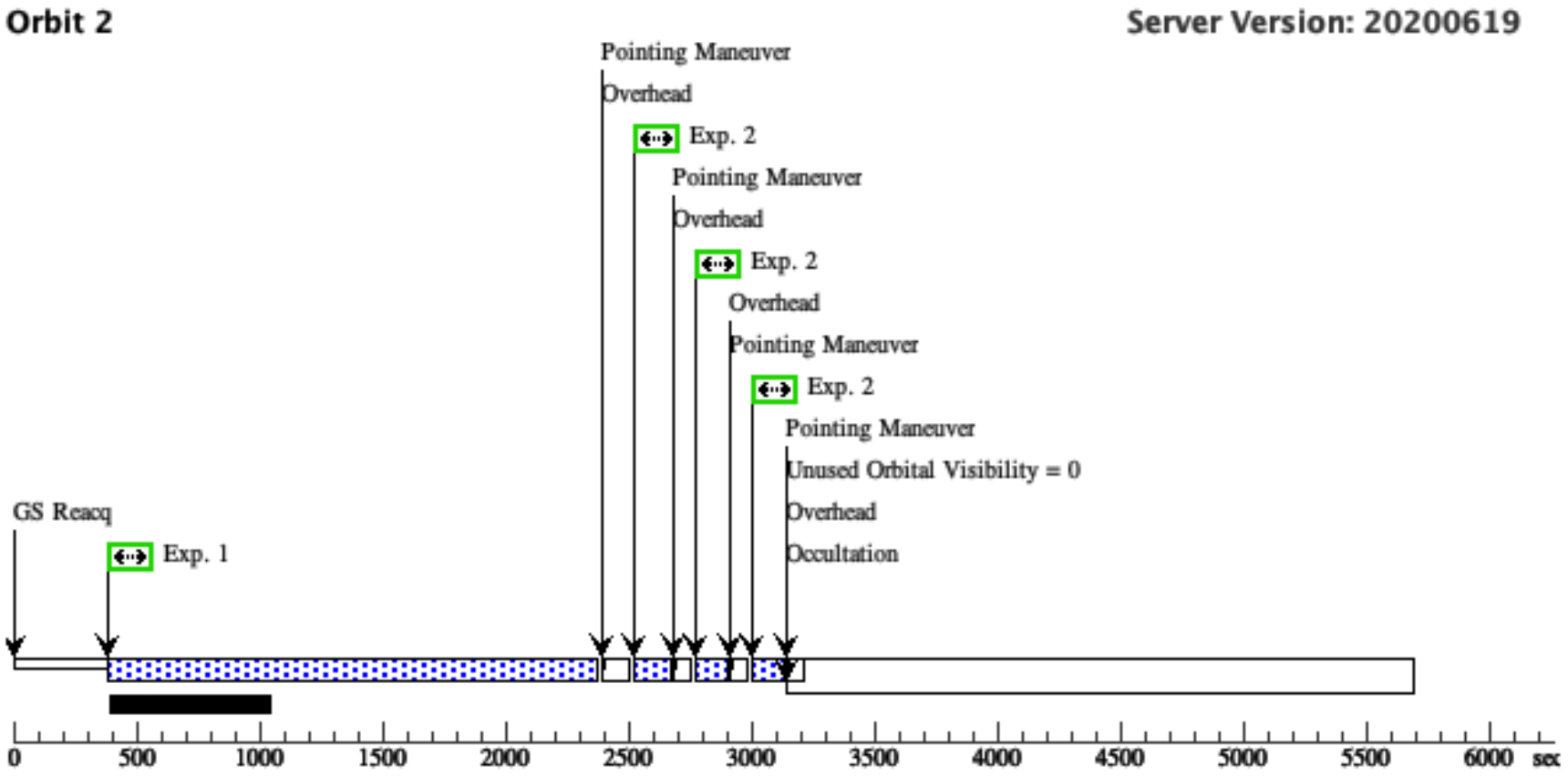
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[DWARF COMPACT, STARBURST]*
*Extended=YES*

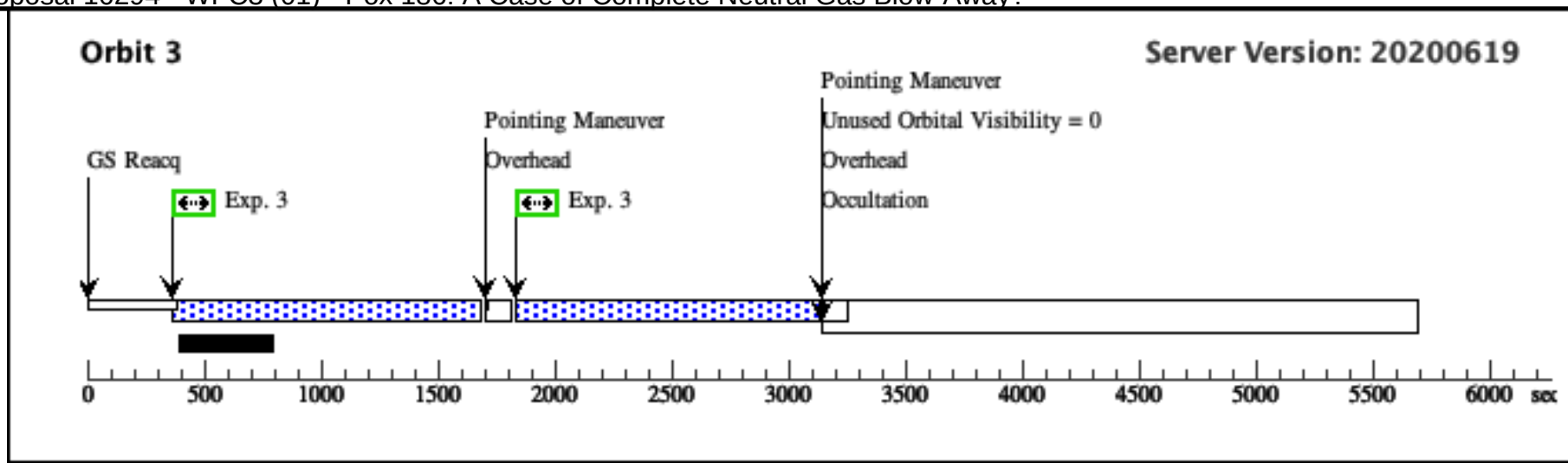
## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F280N | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE | F280N | FLASH=17 | | Pattern 1, Exps 1-1 in WFC3 (01) (1) | 1383 Secs (4616 Secs)<br>*[==>1310.0 Secs (Pattern 1)]*<br>*[==>1310.0 Secs (Pattern 2)]*<br>*[==>1996.0 Secs (Pattern 3)]* | <br>***[1]***<br>***[2]*** |
| 2 | F621M | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F621M | FLASH=18 | | Pattern 1, Exps 2-2 in WFC3 (01) (1) | 131 Secs (393 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | <br>***[2]*** |
| 3 | F373N | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE | F373N | FLASH=17 | | Pattern 1, Exps 3-3 in WFC3 (01) (1) | 1383 Secs (4596 Secs)<br>*[==>1305.0 Secs (Pattern 1)]*<br>*[==>1306.0 Secs (Pattern 2)]*<br>*[==>1985.0 Secs (Pattern 3)]* | <br>***[3]***<br>***[4]*** |
| 4 | F336W | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F336W | FLASH=20 | | Pattern 1, Exps 4-4 in WFC3 (01) (1) | 130 Secs (390 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | <br>***[4]*** |

Orbit Structure




Orbit 3
Server Version: 20200619
Pointing Maneuver
Unused Orbital Visibility = 0
Overhead
Occultation
Pointing Maneuver
Overhead
Exp. 3
GS Reacq
Exp. 3
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1000
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2500
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3500
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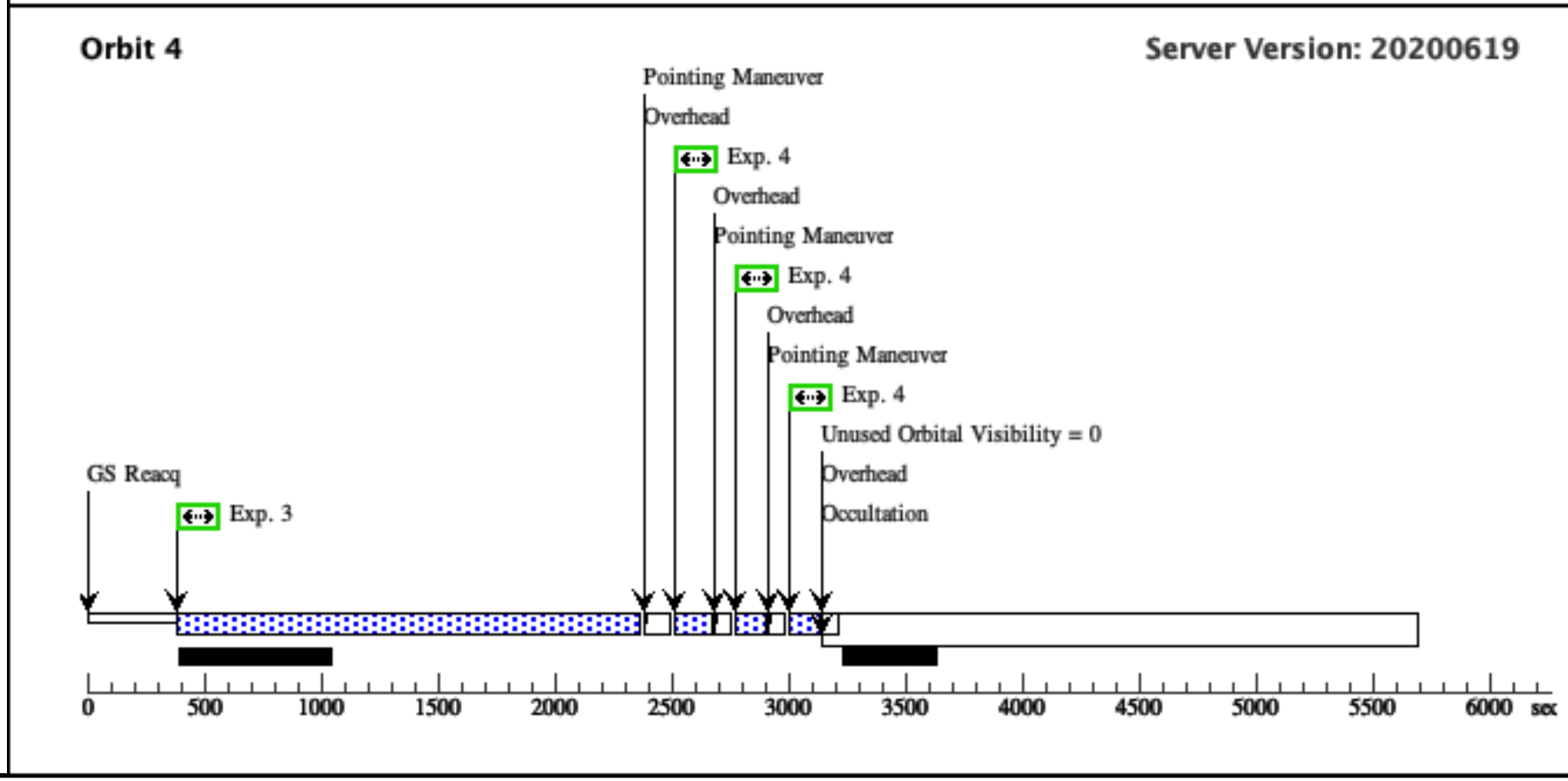
sec


Orbit 4
Server Version: 20200619
Pointing Maneuver
Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Unused Orbital Visibility = 0
Overhead
Occultation
GS Reacq
Exp. 3
0
500
1000
1500
2000
2500
3000
3500
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4500
5000
5500
6000
sec

## Visit

**Proposal 16294, WFC3 (03)** Tue Jun 30 22:00:57 GMT 2020

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(F225W (03.001)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F502N (03.002)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F467M (03.003)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F658N (03.004)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

(F487N (03.005)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-LINE-3PT<br>Purpose=DITHER<br>Number Of Points=3<br>Point Spacing=0.135<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=46.84<br>Angle Between Sides=<br>Center Pattern=false | | (1), (2), (3), (4), (5) |

## Fixed Targets

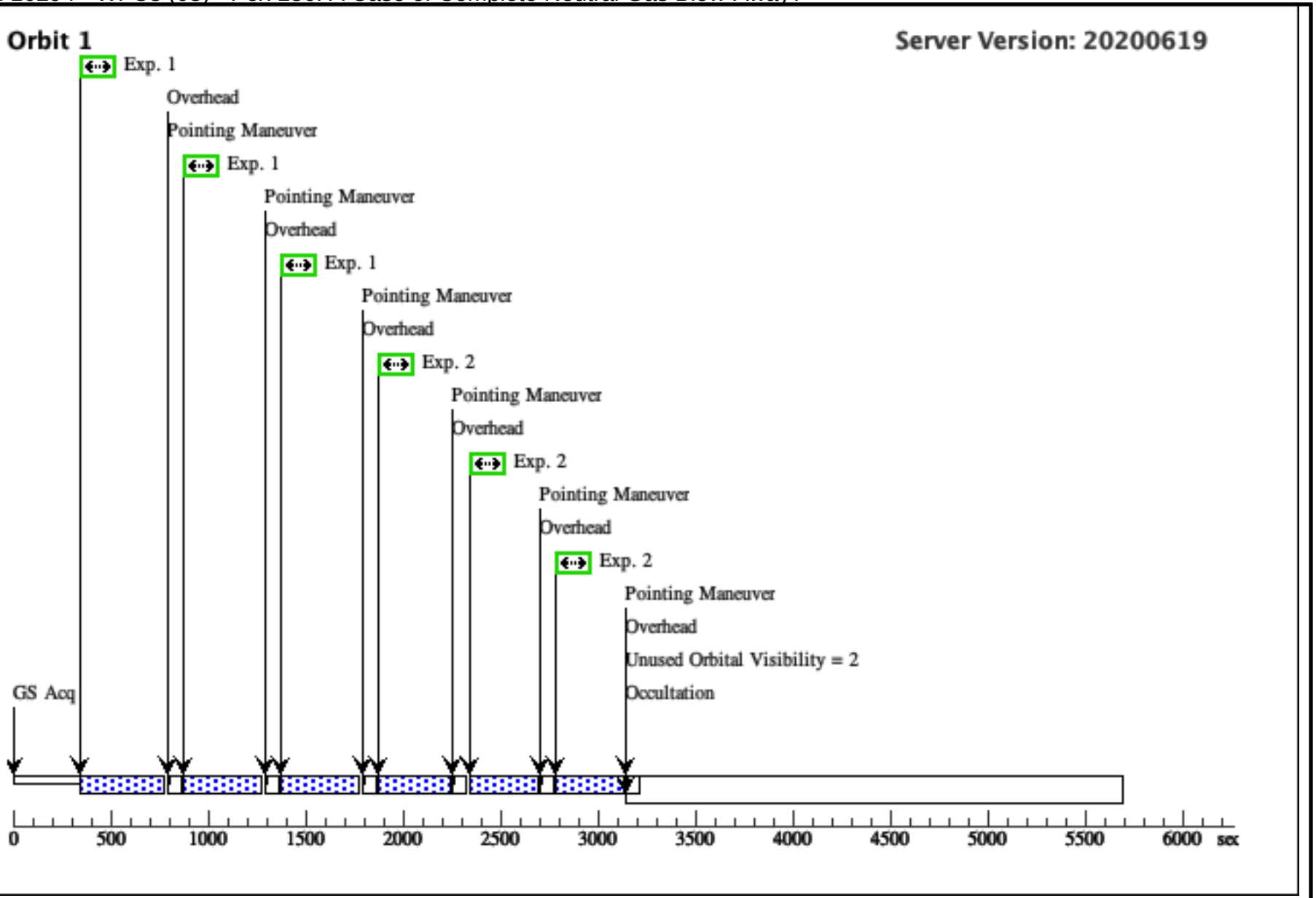
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LEDA-46982 | RA: 13 25 48.6000 (201.4525000d)<br>Dec: -11 36 38.00 (-11.61056d)<br>Equinox: J2000 | Epoch of Position: 2000<br>Redshift: 0.0041 | V=17.43+/-0.03 | Reference Frame: ICRS |

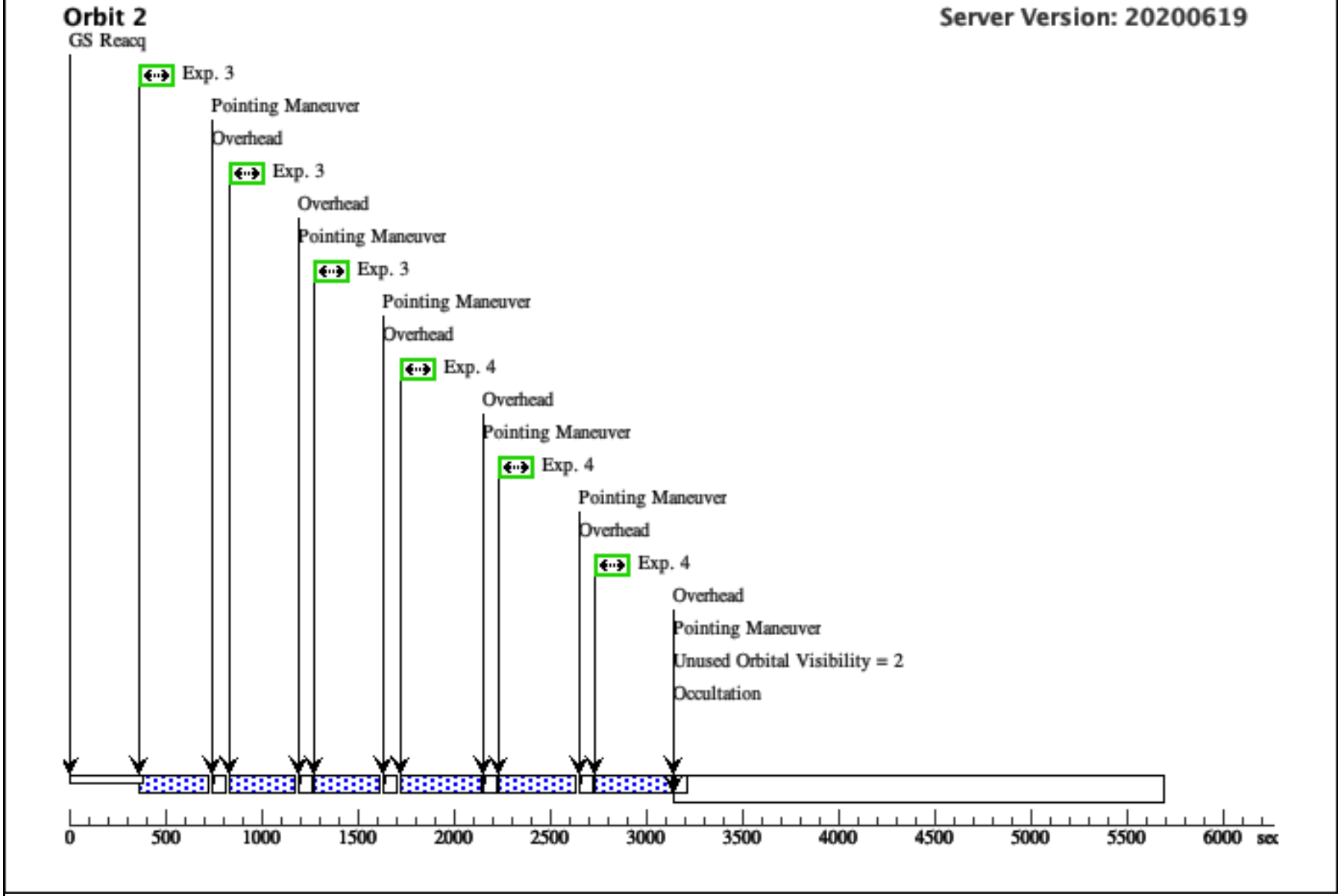
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[DWARF COMPACT, STARBURST]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F225W | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F225W | FLASH=19 | | Pattern 1, Exps 1-1 in WFC3 (03) (1) | 403 Secs (1209 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | ***[1]*** |
| 2 | F502N | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F502N | FLASH=19 | | Pattern 1, Exps 2-2 in WFC3 (03) (1) | 348 Secs (1044 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | ***[1]*** |
| 3 | F467M | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F467M | FLASH=20 | | Pattern 1, Exps 3-3 in WFC3 (03) (1) | 347 Secs (1041 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | ***[2]*** |
| 4 | F658N | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F658N | FLASH=19 | | Pattern 1, Exps 4-4 in WFC3 (03) (1) | 400 Secs (1200 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | ***[2]*** |
| 5 | F487N | (1) LEDA-46982 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE | F487N | FLASH=18 | | Pattern 1, Exps 5-5 in WFC3 (03) (1) | 824 Secs (2472 Secs)<br>*[==>(Pattern 1)]*<br>*[==>(Pattern 2)]*<br>*[==>(Pattern 3)]* | ***[3]*** |

Orbit Structure

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GS Reacq
Exp. 3
Pointing Maneuver
Overhead
Exp. 3
Overhead
Pointing Maneuver
Exp. 3
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Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 4
Pointing Maneuver
Overhead
Exp. 4
Overhead
Pointing Maneuver
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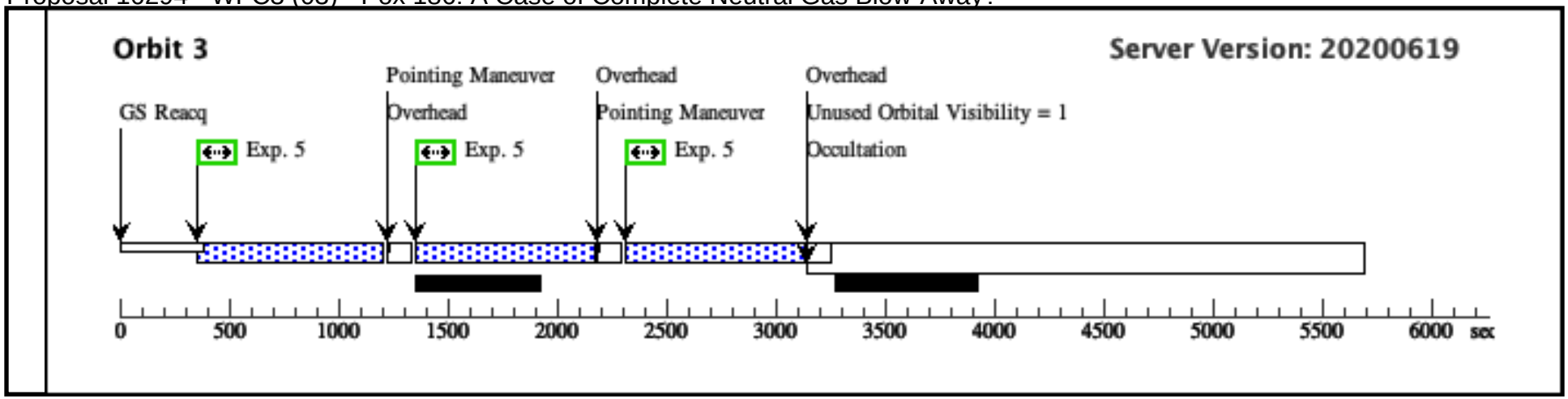
sec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Server Version: 20200619
GS Reacq
Exp. 5
Pointing Maneuver
Overhead
Exp. 5
Overhead
Pointing Maneuver
Exp. 5
Overhead
Unused Orbital Visibility = 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

## Visit

**Proposal 16294, COS (04)** Tue Jun 30 22:00:57 GMT 2020

**Diagnostic Status: Warning**

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

## Diagnostics

(G160M (04.002)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(G160M (04.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(G160M (04.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(G160M (04.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

## Fixed Targets

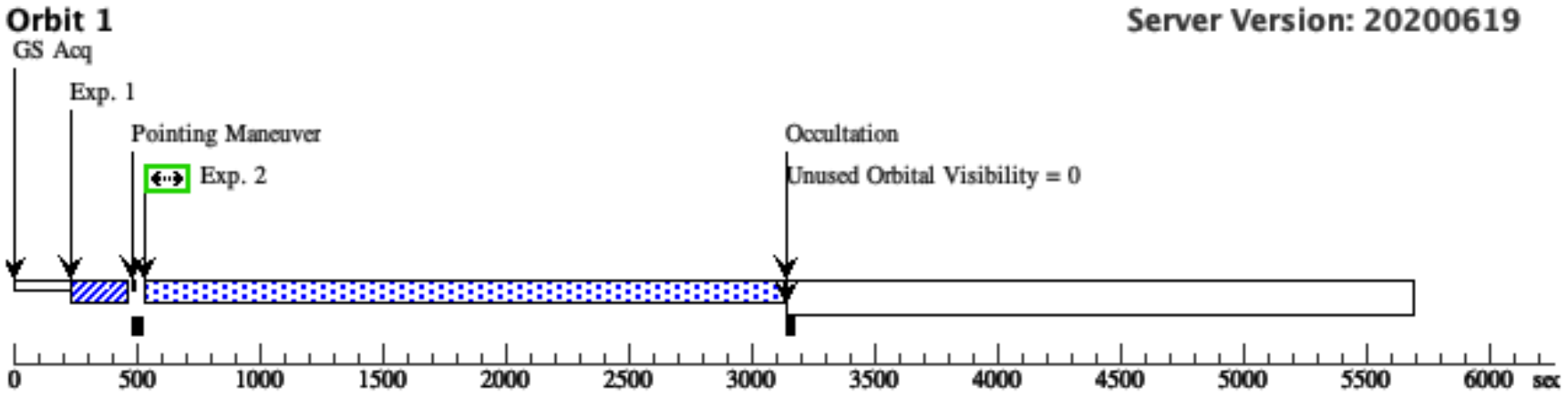
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | LEDA-46982 | RA: 13 25 48.6000 (201.4525000d)<br>Dec: -11 36 38.00 (-11.61056d)<br>Equinox: J2000 | Epoch of Position: 2000<br>Redshift: 0.0041 | V=17.43+/-0.03 | Reference Frame: ICRS |

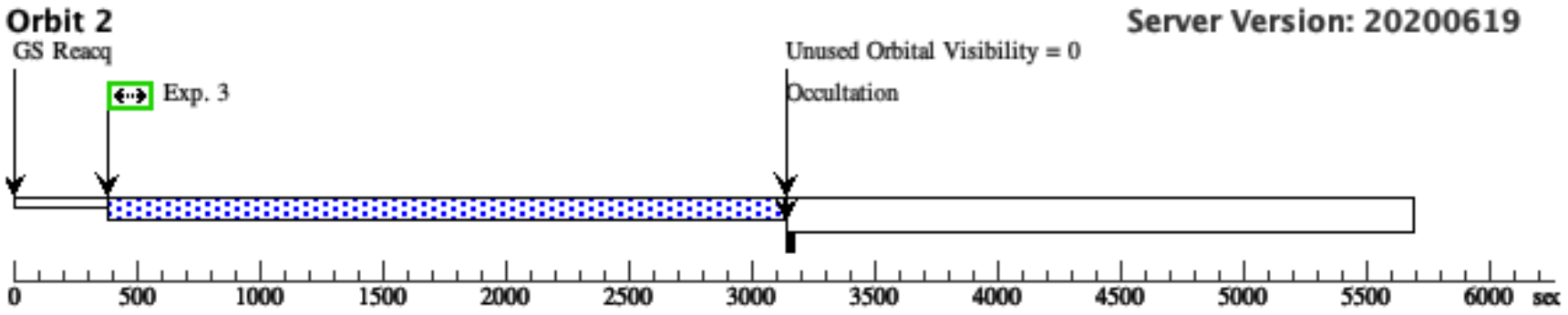
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*
*Category=GALAXY*
*Description=[DWARF COMPACT, STARBURST]*
*Extended=YES*

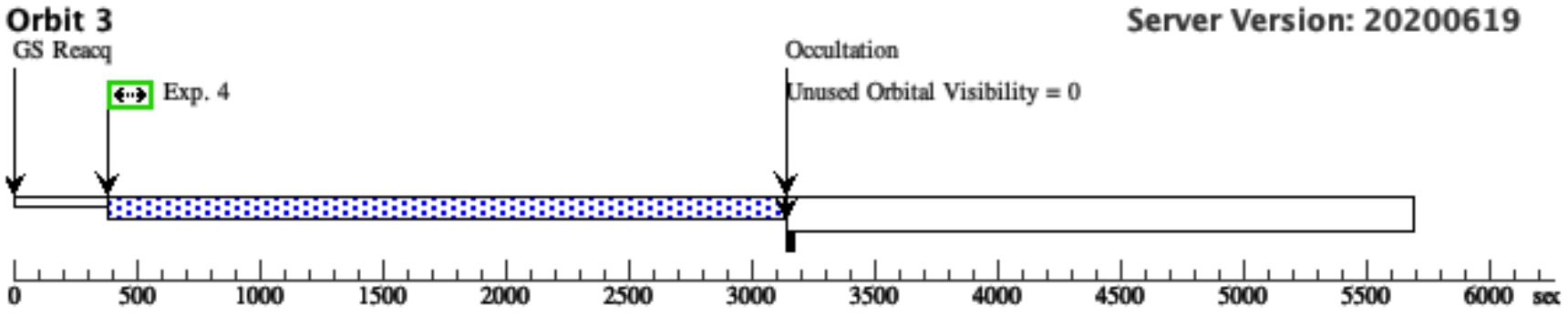
## Exposures

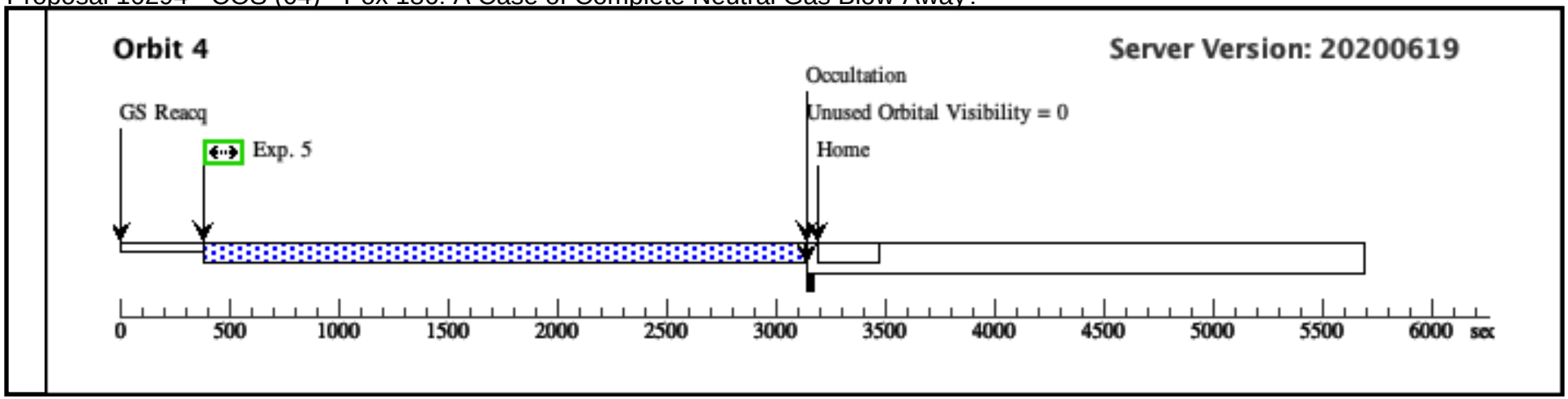
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Acq/image (1446614) | (1) LEDA-46982 | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | 7 Secs (7 Secs)<br>*[==>]* | ***[1]*** |
| 2 | G160M (1430070) | (1) LEDA-46982 | COS/FUV, TIME-TAG, PSA | G160M<br>1533 A | FLASH=YES;<br>FP-POS=1;<br>BUFFER-TIME=18885 | | | 2377 Secs (2377 Secs)<br>*[==>]* | ***[1]*** |
| 3 | G160M (1430070) | (1) LEDA-46982 | COS/FUV, TIME-TAG, PSA | G160M<br>1533 A | FLASH=YES;<br>FP-POS=2;<br>BUFFER-TIME=18885 | | | 2693 Secs (2693 Secs)<br>*[==>]* | ***[2]*** |
| 4 | G160M (1430070) | (1) LEDA-46982 | COS/FUV, TIME-TAG, PSA | G160M<br>1533 A | FLASH=YES;<br>FP-POS=3;<br>BUFFER-TIME=18885 | | | 2693 Secs (2693 Secs)<br>*[==>]* | ***[3]*** |
| 5 | G160M (1430070) | (1) LEDA-46982 | COS/FUV, TIME-TAG, PSA | G160M<br>1533 A | FLASH=YES;<br>FP-POS=4;<br>BUFFER-TIME=18885 | | | 2693 Secs (2693 Secs)<br>*[==>]* | ***[4]*** |

Orbit Structure




Orbit 4
Server Version: 20200619
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 5
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5500
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sec