# 13788 - COS Views of Local Galaxies Approaching Primeval Conditions

Cycle: 22, 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) UGC-5340-1 | COS/FUV<br>COS/NUV | 7 | 24-Jul-2014 21:52:07.0 | yes |
| 02 | (2) I-ZW-18-SE | COS/FUV<br>COS/NUV | 7 | 24-Jul-2014 21:52:09.0 | yes |
| 03 | (3) SBS-0335-052-E | COS/FUV<br>COS/NUV | 4 | 24-Jul-2014 21:52:11.0 | yes |

18 Total Orbits Used

**ABSTRACT**

We will use COS G160M+G185M to observe the cosmollogically important lines C IV 1548+1551 A, He II 1640 A, O III] 1661+1666 A, and C III] 1907+1909 A in the three closest most metal-poor blue compact dwarf galaxies known. These galaxies approach primeval insterstellar and stellar conditions. One of the galaxies has no existing spectroscopic coverage in the UV. Available spectroscopy of the most metal-poor galaxies in the local universe are scarce, inhomogeneous, mostly low spectral-resolution, and are either noisy in main UV lines or lack their coverage. The proposed spectral resolution of about 20 km/s represents an order of magnitude improvement over existing HST data and allows us to disentangle stellar, nebular, and/or shock components to the lines. The high-quality constraints obtained in the framework of this proposal will make it possible to assess the relative likelihood of new spectral models of star-forming galaxies from different groups, in the best possible way achievable with current instrumentation. This will ensure that the best possible studies of early chemical enrichment of the universe can be achieved. The proposed observations are necessary to minimize large existing systematic uncertainties in the determination of high-redshift galaxy properties that JWST was in large part designed to measure.

**OBSERVING DESCRIPTION**

Goals. We will obtain target acquision NUV images and FUV+NUV spectroscopy for three star forming knots in three galaxies. Adopting IDs from the literature, the targets are: UGC-5340-1 (Pustilnik et al. 2005), I Zw-18-SE (Izotov et al. 1999), and SBS-0335-052-E (Izotov et al. 2005). The targets will be acquired via acq/search and acq/image exposures of bandpass=1700-3200 A and pixel-scale=0.024"/pixel, using COS, the NUV channel, the PSA, and mirror B. The spectra will have a nominal spectral resolution of ~20 km/s. They will be obtained using COS, the PSA, the G160M and G185M gratings each at one central wavelength position dependent on redshift, all segments of the FUV and NUV detectors, four focal plane positions per central wavelength, the flash=yes setting, and the time-tag mode.

Orbits. We request 18 orbits for our observations. To calculate the exposure times, we used the COS G160M and G185M spectra of I-Zw-18-NW (PIDs=11523 and 12028), which we completed with a Starburst99 model of the appropriate metallicity, redshifted to each target's redshift, and normalized to each target's UV continuum flux. This is because I-Zw-18-NW has the relevant metallicity and shows the lines of interest. For the normalization, we used FUV or NUV fluxes that we measured within an aperture of r=1.25", from these HST images: WFC3 UVIS F275W (UGC 5340, PID=13364), ACS SBC F125LP (I Zw 18, PID=11579), and ACS SBC F1140LP (SBS 0335-052, PID=9470). For SBS-0335-052 we checked consistency of the normalization with the existing COS G130M spectrum (PID=11579). For UGC 5340-1, fluxes at 1450 A were obtained by assuming that F=constant*wavelength^(-2.5). In order to meet our goals, we request a value of SNR=5-10 for the acq/search exposure, SNR=10 for the acq/image exposure, and SNR/resel = 4-10 for the lines of interest.

Coordinates. To measure the coordinates of UGC-5340-1 and I-Zw-18-SE in the ICRS reference frame, we used ds9 and HST images WFC3 UVIS F275W (PID=13364) and STIS FUV F25SFR2 (PID=9054), respectively. For SBS 0335-052-E, we use the coordinates of the existing COS G130M pointing (PID=11579).

## Visit

**Proposal 13788, UGC-5340-1 (01), implementation** Fri Jul 25 01:52:12 GMT 2014

**Diagnostic Status: Error**

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

## Diagnostics

(G185M-182 (01.004)Split 2 ) Error (Form): Orbit number out of range (must be equal to or 1 greater than that of the previous sub-exposure). To learn more about orbit numbers, please read the full error text in the Diagnostic Report.

## Fixed Targets

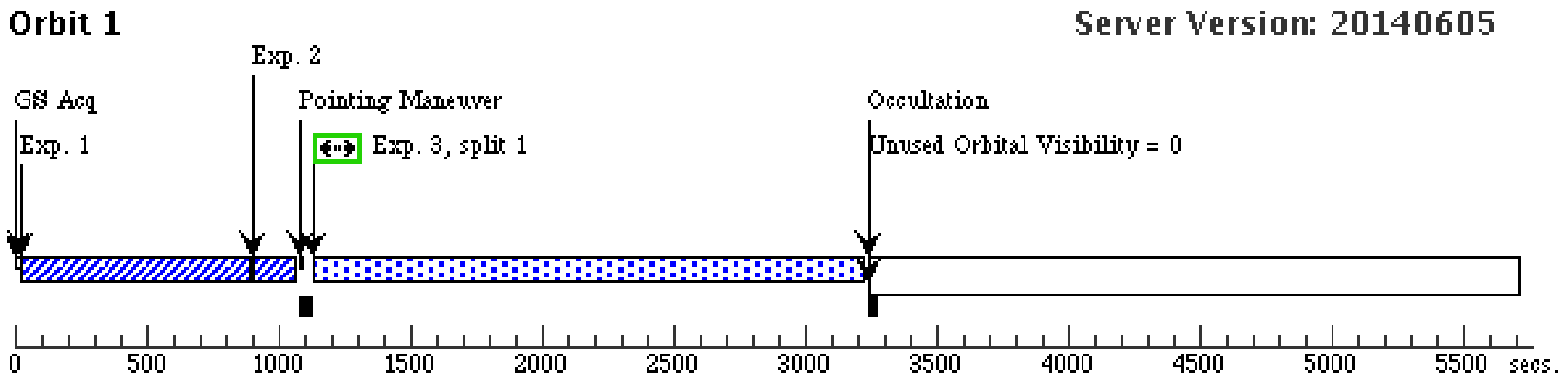
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | UGC-5340-1 | RA: 09 56 46.8000 (149.1950000d)<br>Dec: +28 50 10.55 (28.83626d)<br>Equinox: J2000 | Redshift: 0.001678 | V=18.05<br>2.38E-16 erg/s/cm^2 @ 2710 A,<br>UVIS/F275W,<br>r=1.25" | Reference Frame: ICRS |

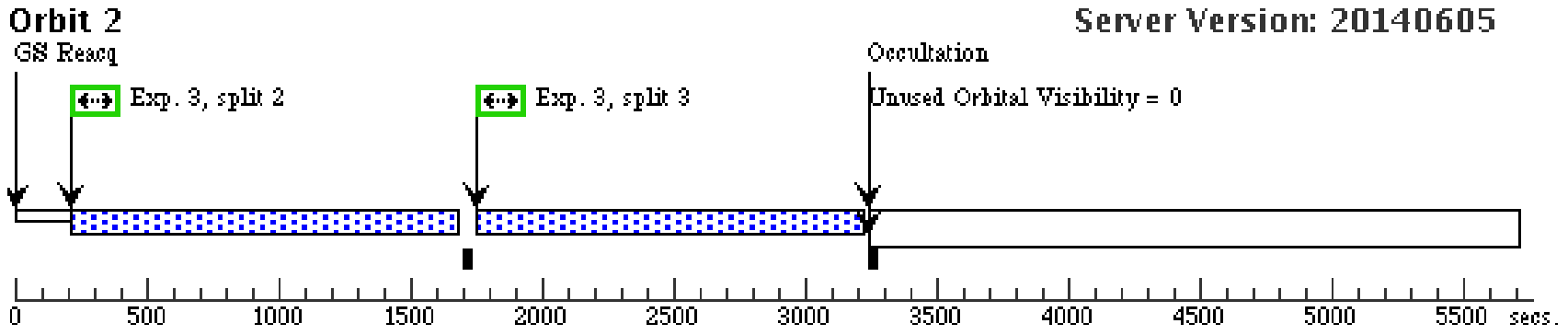
*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*

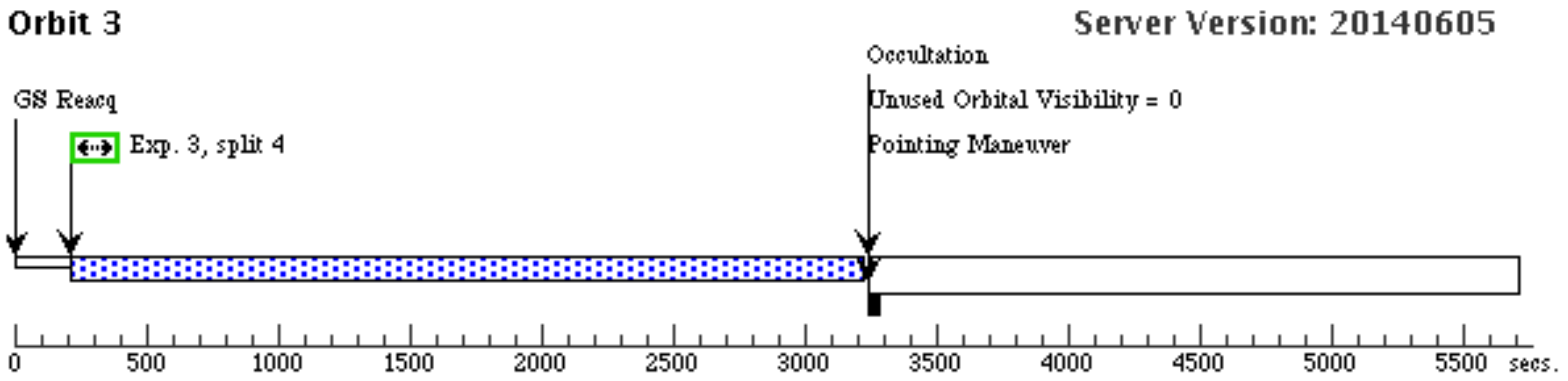
## Exposures

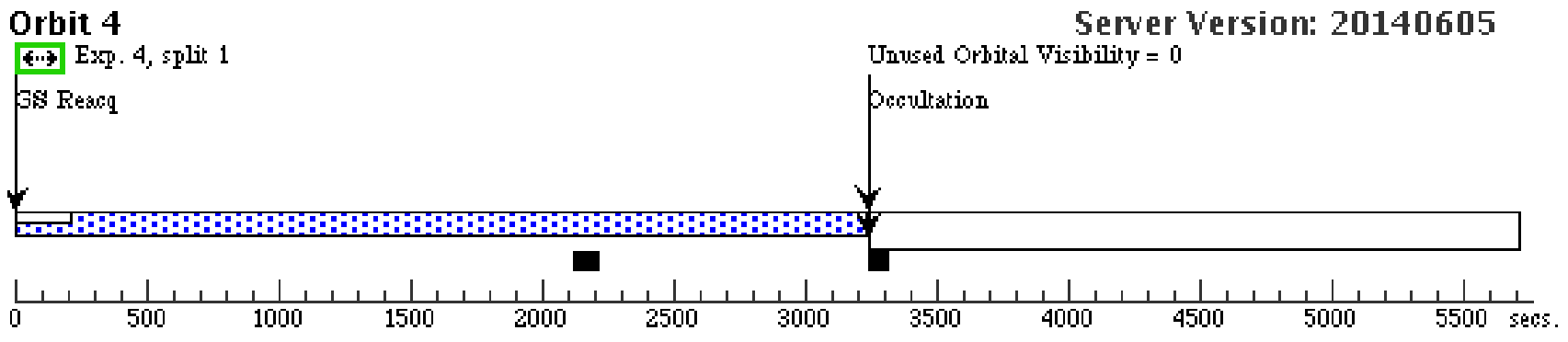
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACQ/SE (626007) | (1) UGC-5340-1 | COS/NUV, ACQ/SEARCH, PSA | MIRRORB | SCAN-SIZE=2 | | | 103 Secs (103 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| | *Comments: COS.ta.626007*<br>*Requested Signal/Noise Ratio = 5. gives: Time = 103.2391 seconds* | | | | | | | | |
| 2 | ACQ/IM (626009) | (1) UGC-5340-1 | COS/NUV, ACQ/IMAGE, PSA | MIRRORB | | | | 22 Secs (22 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| | *Comments: COS.ta.626009*<br>*Requested Signal/Noise Ratio = 10.0 gives: Time = 21.9440 seconds* | | | | | | | | |
| 3 | G160M-161 (625981) | (1) UGC-5340-1 | COS/FUV, TIME-TAG, PSA | G160M<br>1611 A | BUFFER-TIME=1.1 E4;<br>FLASH=YES;<br>FP-POS=ALL;<br>SEGMENT=BOTH | | | 890 Secs (7666 Secs) | |
| | | | | | | | | *[==>1871.0 Secs (Split 1)]* | ***[1]*** |
| | | | | | | | | *[==>1420.0 Secs (Split 2)]*<br>*[==>1420.0 Secs (Split 3)]* | ***[2]*** |
| | | | | | | | | *[==>2955.0 Secs (Split 4)]* | ***[3]*** |
| | *Comments: COS.sp.625981*<br>*Exposure time (seconds) = 7,398 at wavelength 1554.7 A gives: SNR = 5.9 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 1.1E4* | | | | | | | | |
| 4 | G185M-182 (625982) | (1) UGC-5340-1 | COS/NUV, TIME-TAG, PSA | G185M<br>1817 A | BUFFER-TIME=1.9 E3;<br>FLASH=YES;<br>FP-POS=ALL | | | 3200 Secs (11966 Secs) | |
| | | | | | | | | *[==>2990.0 Secs (Split 1)]* | ***[3]*** |
| | | | | | | | | *[==>2992.0 Secs (Split 2)]* | ***[5]*** |
| | | | | | | | | *[==>2992.0 Secs (Split 3)]* | ***[6]*** |
| | | | | | | | | *[==>2992.0 Secs (Split 4)]* | ***[7]*** |
| | *Comments: COS.sp.625982*<br>*Exposure time (seconds) = 11,966 at wavelength 1910.7 A gives: SNR = 3.7 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 1.9E3* | | | | | | | | |

Orbit Structure

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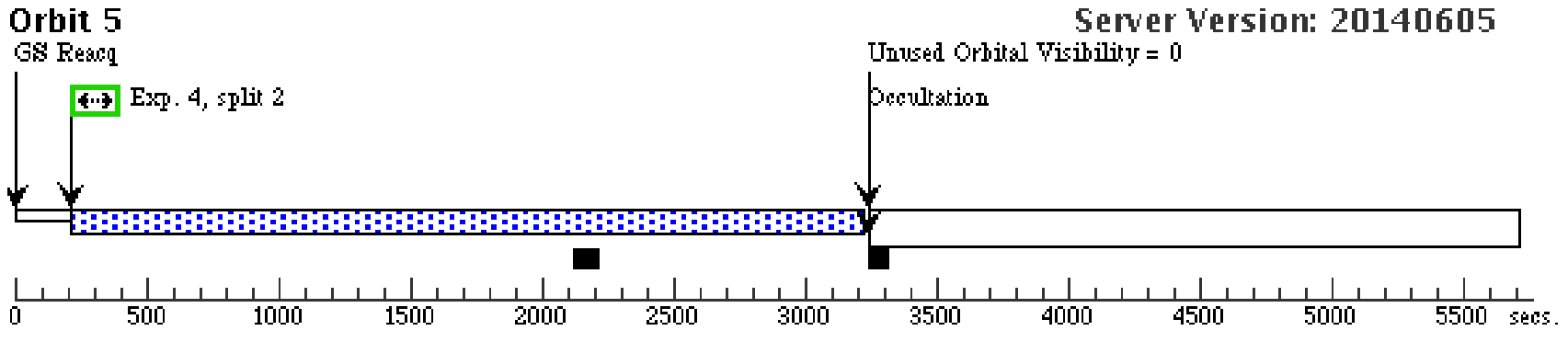
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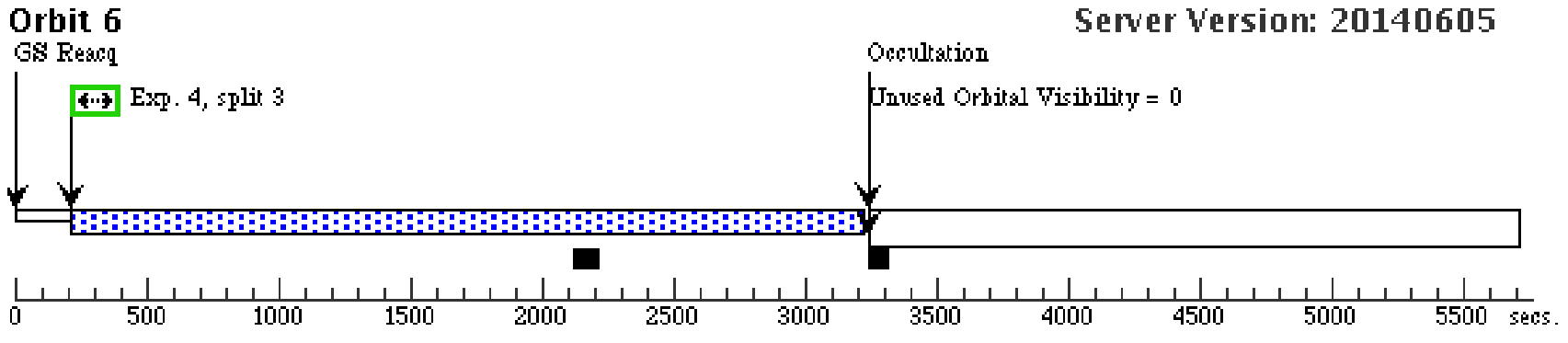
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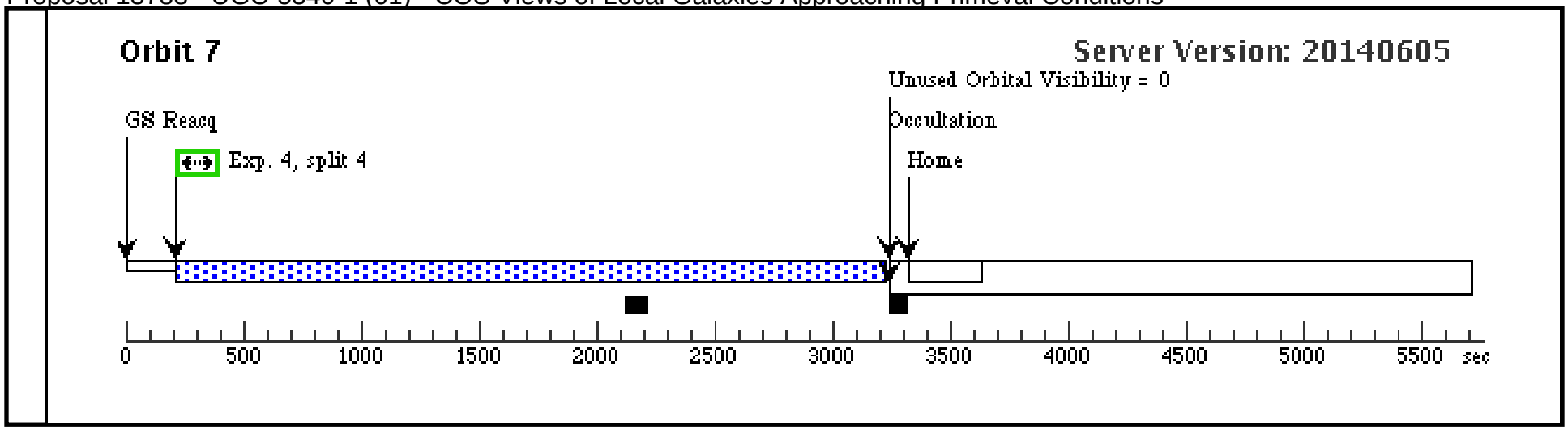
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Exp. 4, split 4
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sec

## Visit

**Proposal 13788, I-Zw-18-SE (02), implementation** Fri Jul 25 01:52:13 GMT 2014

**Diagnostic Status: Error**

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

## Diagnostics

(G185M-182 (02.004)Split 2 ) Error (Form): Orbit number out of range (must be equal to or 1 greater than that of the previous sub-exposure). To learn more about orbit numbers, please read the full error text in the Diagnostic Report.

## Fixed Targets

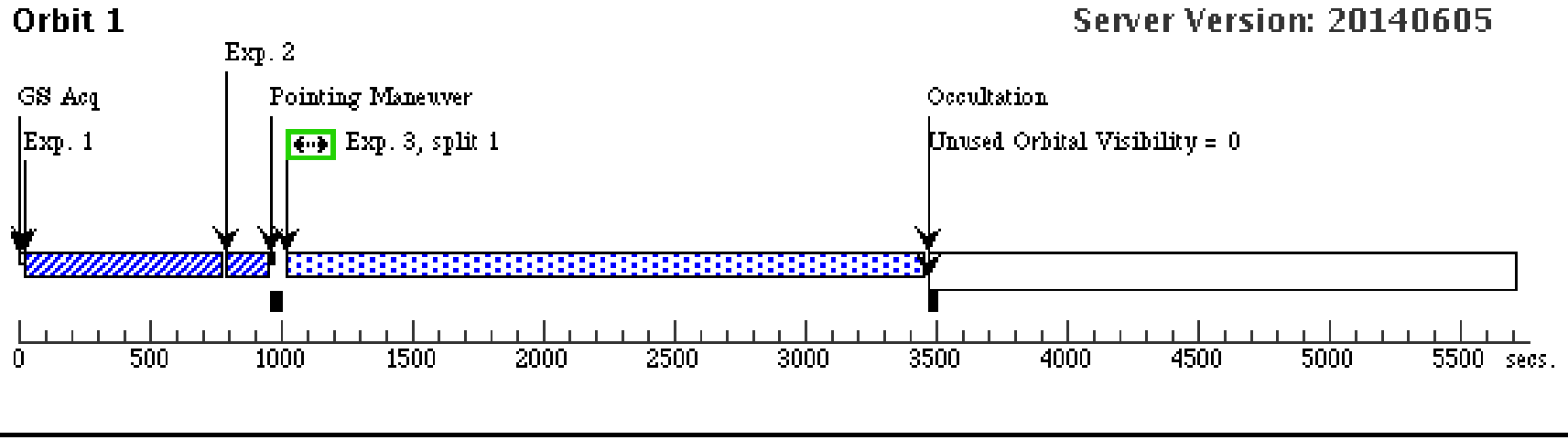
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (2) | I-ZW-18-SE | RA: 09 34 2.3500 (143.5097917d)<br>Dec: +55 14 23.42 (55.23984d)<br>Equinox: J2000 | Redshift: 0.002505 | V=17.57<br>1.45E-15 erg/s/cm^2 @ 1438 A,<br>SBC/F125LP,<br>r=1.25" | Reference Frame: ICRS |

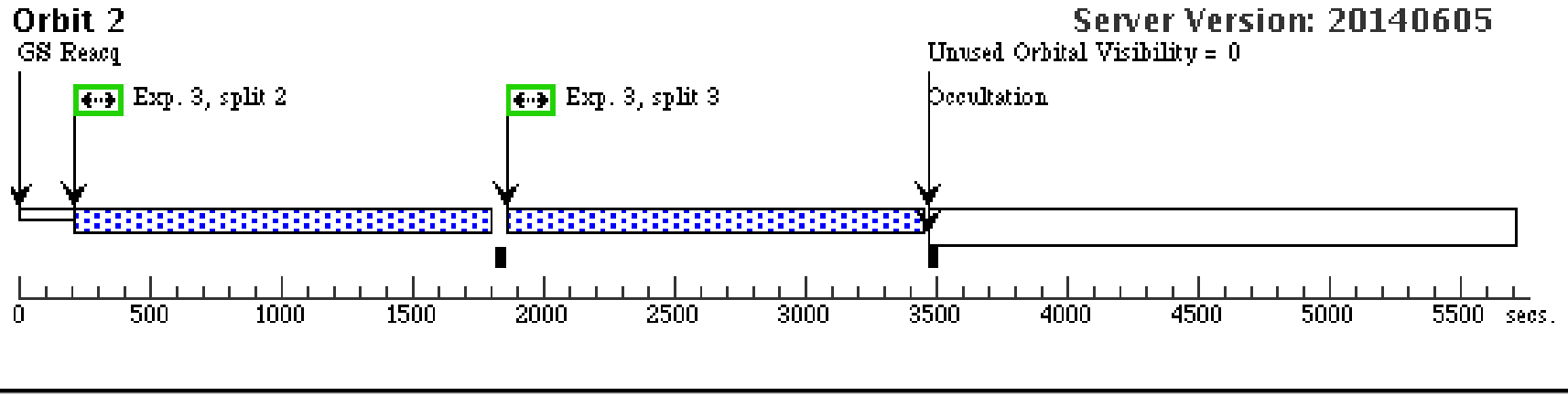
*Comments: This object was generated by the targetselector and retrieved from the NED database.*

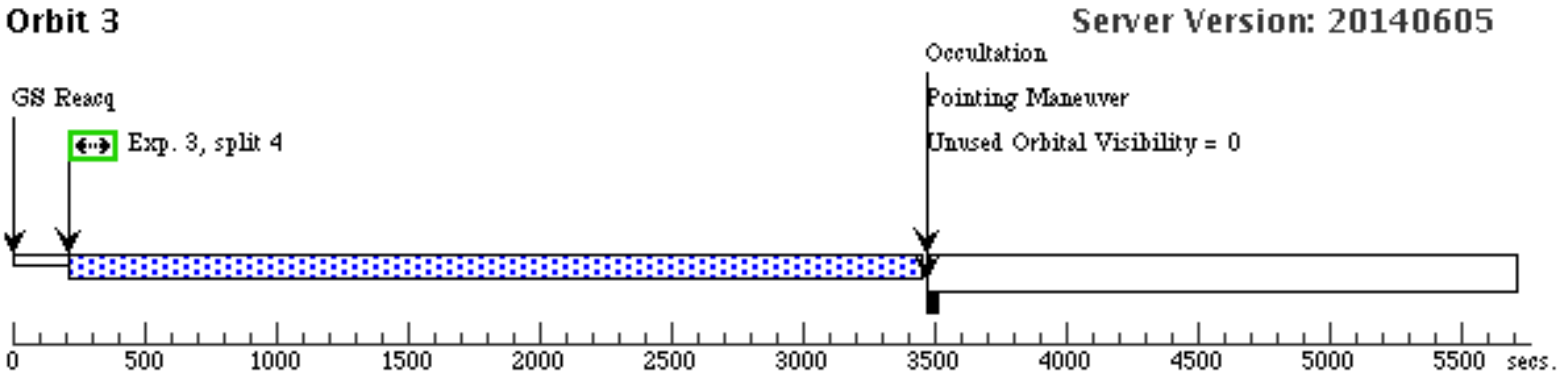
## Exposures

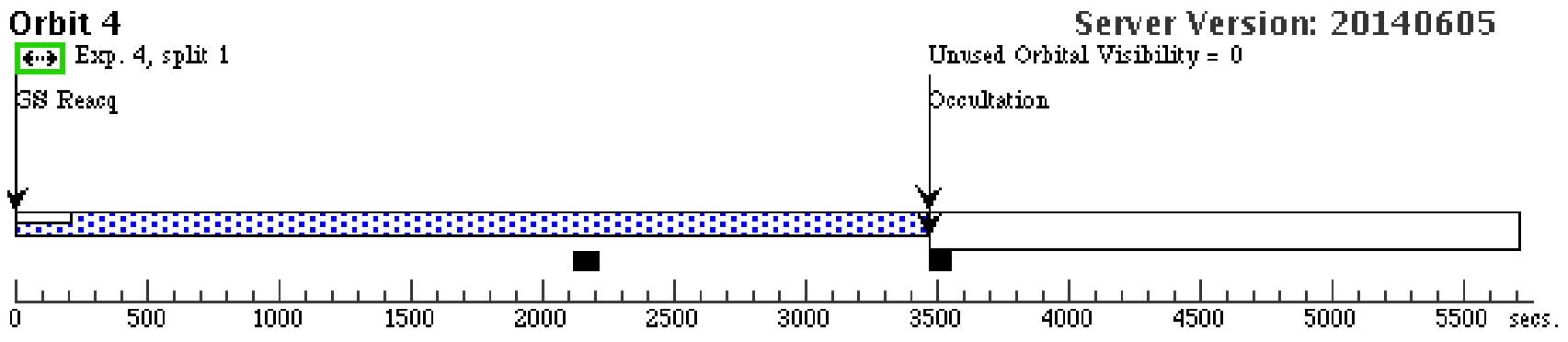
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACQ/SE (626011) | (2) I-ZW-18-SE | COS/NUV, ACQ/SEARCH, PSA | MIRRORB | SCAN-SIZE=2 | GS ACQ SCENARIO BASE1B3 | | 75 Secs (75 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| | *Comments: COS.ta.626011*<br>*Requested Signal/Noise Ratio = 5.0 gives: Time = 75.5036 seconds* | | | | | | | | |
| 2 | ACQ/IM (625886) | (2) I-ZW-18-SE | COS/NUV, ACQ/IMAGE, PSA | MIRRORB | | | | 19 Secs (19 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| | *Comments: COS.ta.625886*<br>*Requested Signal/Noise Ratio = 10.0 gives: Time = 18.6362 seconds* | | | | | | | | |
| 3 | G160M-161 (625975) | (2) I-ZW-18-SE | COS/FUV, TIME-TAG, PSA | G160M 1611 A | BUFFER-TIME=1.1E4;<br>FLASH=YES;<br>FP-POS=ALL;<br>SEGMENT=BOTH | | | 890 Secs (8471 Secs) | |
| | | | | | | | | *[==>2218.0 Secs (Split 1)]* | ***[1]*** |
| | | | | | | | | *[==>1534.0 Secs (Split 2)]*<br>*[==>1535.0 Secs (Split 3)]* | ***[2]*** |
| | | | | | | | | *[==>3184.0 Secs (Split 4)]* | ***[3]*** |
| | *Comments: COS.sp.625975*<br>*Exposure time (seconds) = 8,480 at wavelength 1554.7 A gives: SNR = 6.7 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 1.1E4* | | | | | | | | |
| 4 | G185M-182 (625973) | (2) I-ZW-18-SE | COS/NUV, TIME-TAG, PSA | G185M 1817 A | BUFFER-TIME=1.9E3;<br>FLASH=YES;<br>FP-POS=ALL | | | 3100 Secs (12882 Secs) | |
| | | | | | | | | *[==>3219.0 Secs (Split 1)]* | ***[3]*** |
| | | | | | | | | *[==>3221.0 Secs (Split 2)]* | ***[5]*** |
| | | | | | | | | *[==>3221.0 Secs (Split 3)]* | ***[6]*** |
| | | | | | | | | *[==>3221.0 Secs (Split 4)]* | ***[7]*** |
| | *Comments: COS.sp.625973*<br>*Exposure time (seconds) = 12,882.0 at wavelength 1912.3 A gives: SNR = 4.5 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 1.9E3* | | | | | | | | |

Orbit Structure

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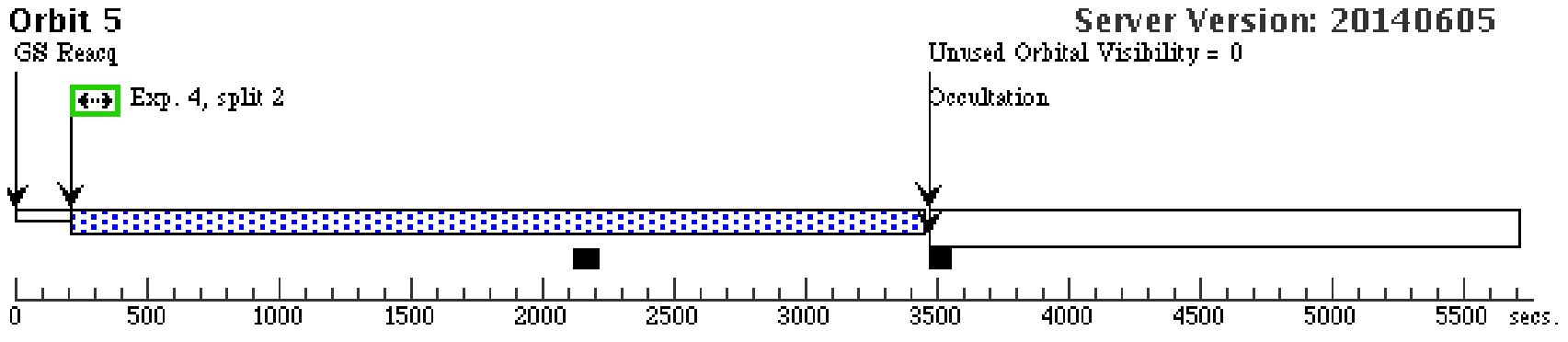
secs.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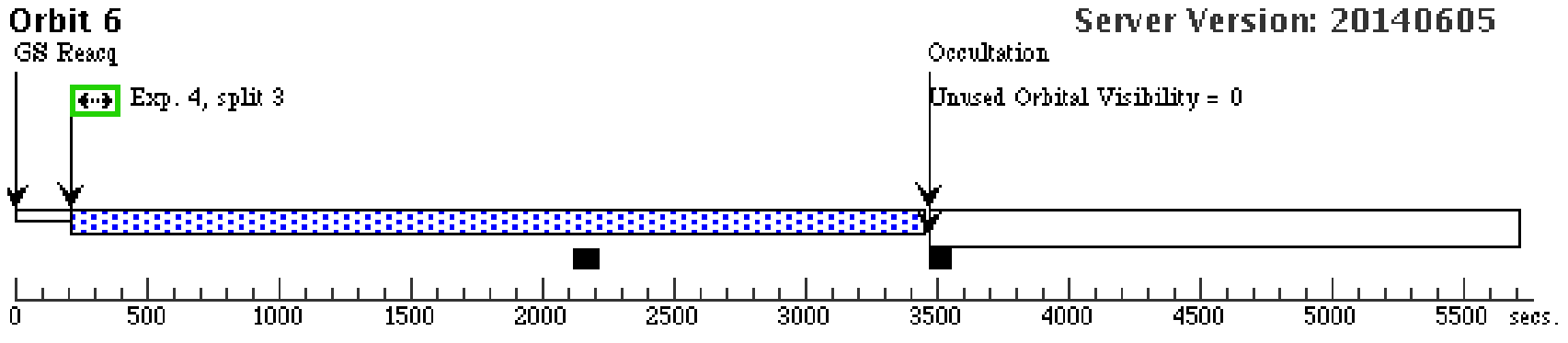
secs.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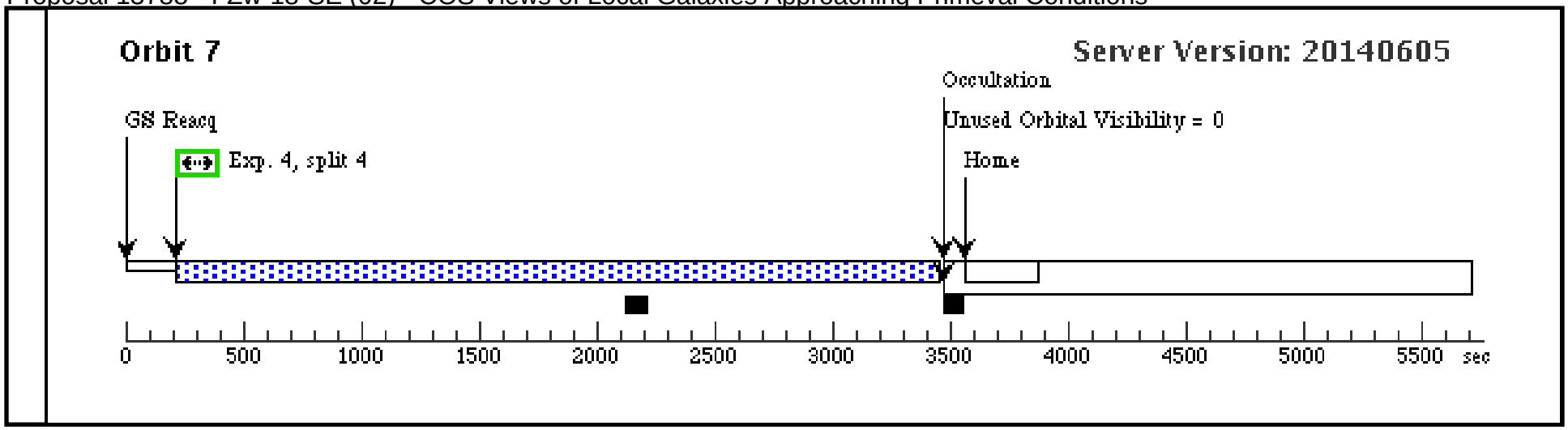
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4500
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5500
sec

## Visit

**Proposal 13788, SBS-0335-052-E (03), implementation** Fri Jul 25 01:52:13 GMT 2014

**Diagnostic Status: No Diagnostics**

Scientific Instruments: COS/NUV, COS/FUV

Special Requirements: (none)

## Fixed Targets

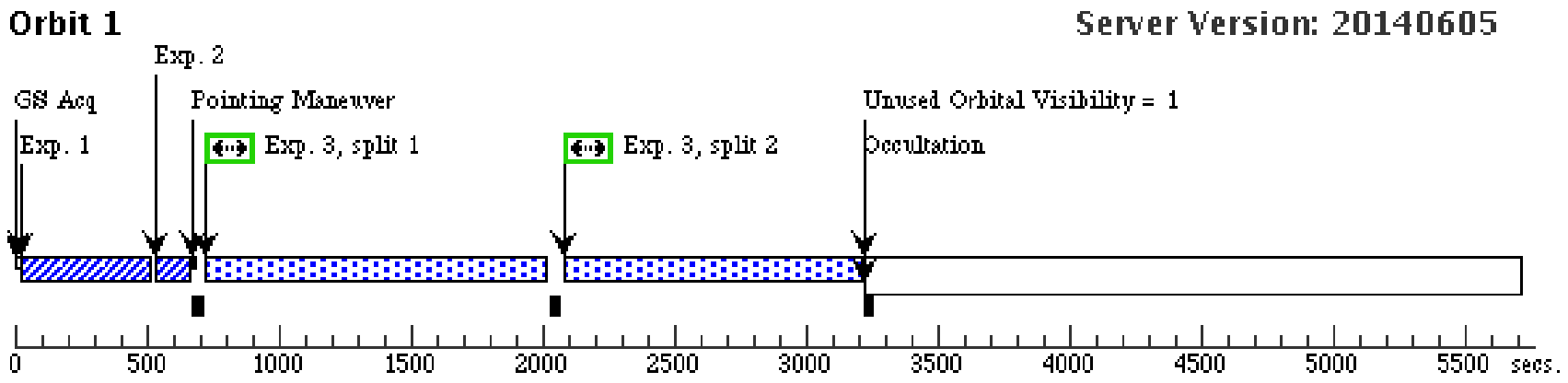
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (3) | SBS-0335-052-E | RA: 03 37 43.9800 (54.4332500d)<br>Dec: -05 02 38.90 (-5.04414d)<br>Equinox: J2000 | Redshift: 0.013519 | V=16.3<br>5.6E-15 erg/s/cm^2 @ 1527 A,<br>SBC/F140LP,<br>r=1.25" | Reference Frame: ICRS |

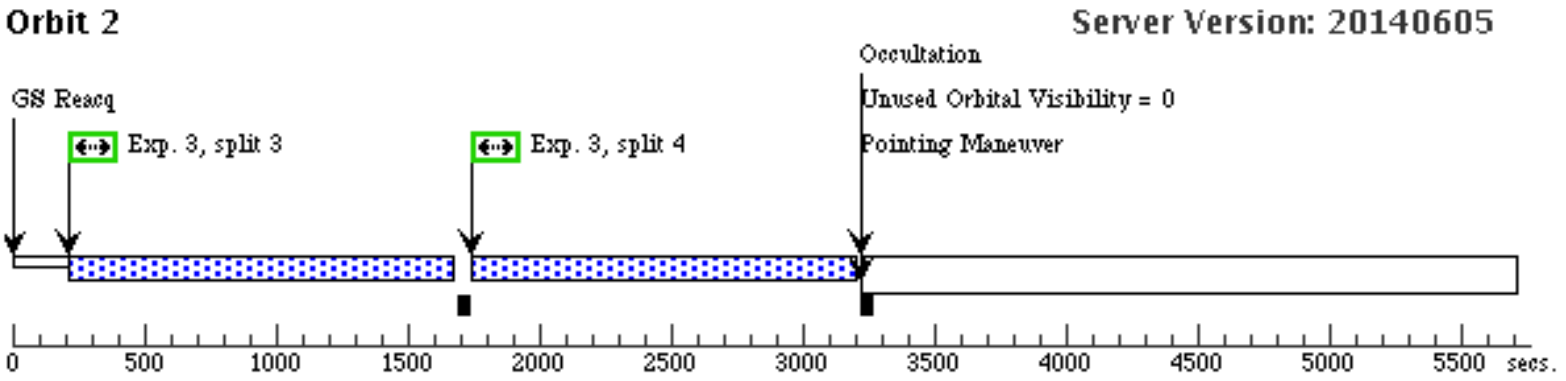
*Comments: This object was generated by the targetselector and retrieved from the NED database.*

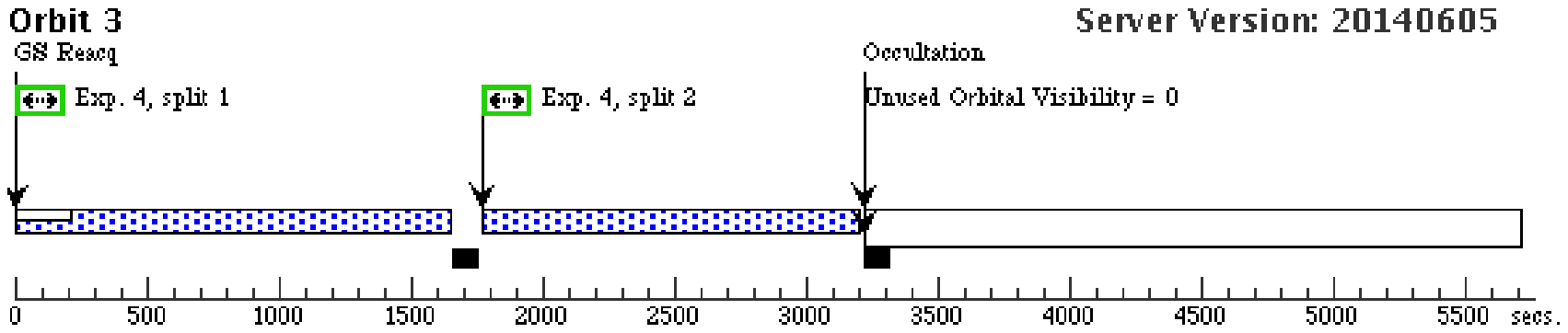
## Exposures

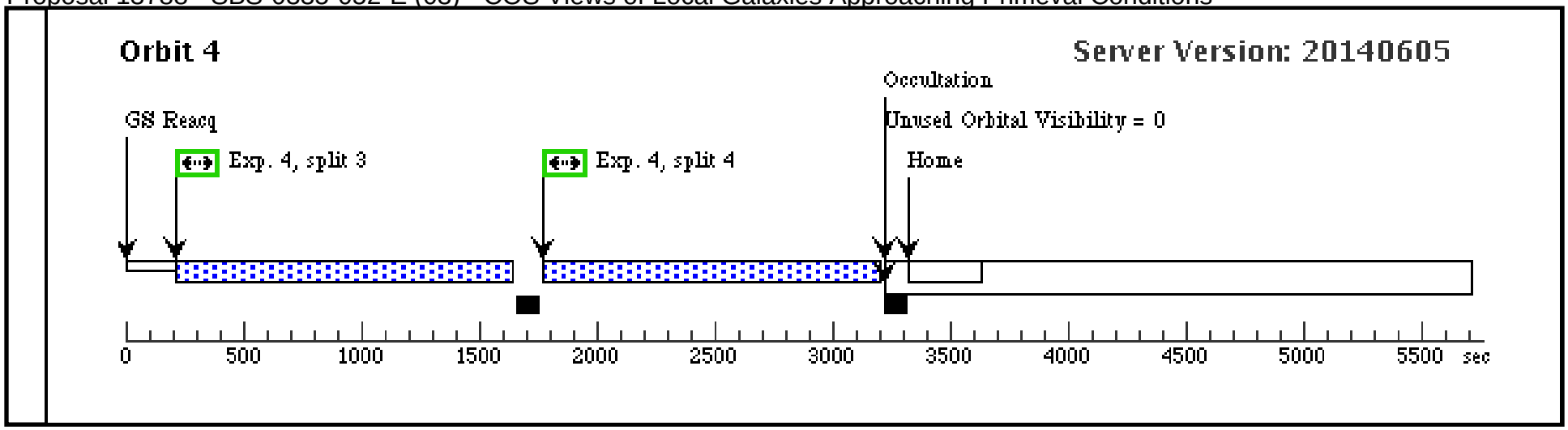
| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ACQ/SE (625200) | (3) SBS-0335-052-E | COS/NUV, ACQ/SEARCH, PSA | MIRRORB | SCAN-SIZE=2 | | | 10 Secs (10 Secs)<br>*[==>]* | <br>***[1]*** |
| | *Comments: COS.ta.625200*<br>*Requested Signal/Noise Ratio = 10.0 gives: Time = 9.6004 seconds* | | | | | | | | |
| 2 | ACQ/IM (625202) | (3) SBS-0335-052-E | COS/NUV, ACQ/IMAGE, PSA | MIRRORB | | | | 3 Secs (3 Secs)<br>*[==>]* | <br>***[1]*** |
| | *Comments: COS.ta.625202*<br>*Requested Signal/Noise Ratio = 10.0 gives: Time = 2.8440 seconds* | | | | | | | | |
| 3 | G160M-161 (625933) | (3) SBS-0335-052-E | COS/FUV, TIME-TAG, PSA | G160M<br>1611 A | BUFFER-TIME=6.0 E3;<br>FLASH=YES;<br>FP-POS=ALL;<br>SEGMENT=BOTH | | | 1100 Secs (4958 Secs)<br>*[==>1073.0 Secs (Split 1)]*<br>*[==>1073.0 Secs (Split 2)]*<br>*[==>1406.0 Secs (Split 3)]*<br>*[==>1406.0 Secs (Split 4)]* | <br>***[1]***<br>***[2]*** |
| | *Comments: COS.sp.625933*<br>*Exposure time (seconds) = 4,958 at wavelength 1662.2 gives: SNR = 8.7 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 6.0E3* | | | | | | | | |
| 4 | G185M-183 (625931) | (3) SBS-0335-052-E | COS/NUV, TIME-TAG, PSA | G185M<br>1835 A | BUFFER-TIME=1.8 e3;<br>FLASH=YES;<br>FP-POS=ALL | | | 1400 Secs (5674 Secs)<br>*[==>1418.0 Secs (Split 1)]*<br>*[==>1418.0 Secs (Split 2)]*<br>*[==>1419.0 Secs (Split 3)]*<br>*[==>1419.0 Secs (Split 4)]* | <br>***[2]***<br>***[3]***<br>***[4]*** |
| | *Comments: COS.sp.625931*<br>*Exposure time (seconds) = 5,674 at wavelength 1933.3 A gives: SNR = 10.3 (per resolution element)*<br>*2/3 * Buffer Time (sec) = 1.8E3* | | | | | | | | |

Orbit Structure

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