



14923 - LYCAT - LYman Continuum and Alpha in Tol1214-277

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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|---|------------------------|------------------------|
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VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i> | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 01 | (1) SCHG-1214-277 | WFC3/UVIS | 3 | 05-Jun-2017 21:01:14.0 | yes |
| 02 | (1) SCHG-1214-277 | ACS/SBC | 2 | 05-Jun-2017 21:01:16.0 | yes |
| 03 | (2) SCHG-1214-277-COSPOINT | COS/FUV COS/NUV | 2 | 05-Jun-2017 21:01:18.0 | yes |

7 Total Orbits Used

ABSTRACT

In terms of understanding the output and escape of ionising (Lyman continuum) and Lyman alpha photons from galaxies, Tololo 1214-277 appears to be a unique object in the local universe, and possibly a Rosetta stone for our understanding of how dwarfish galaxies might have contributed to the

Proposal 14923 (STScI Edit Number: 1, Created: Monday, June 5, 2017 8:01:19 PM EST) - Overview

reionisation of the universe. It is the only object known (from HST/GHRS observations) in the nearby universe to exhibit a symmetric Lyman alpha profile centered on the systemic velocity. This indicates that Lyman alpha has suffered very little scattering implying a low optical depth for Lyman continuum photons. Here we propose to obtain a new COS spectrum with higher spectral resolution, covering Lyman alpha as well as metal absorption lines to map the velocity and structure of the ISM, and imaging in Lyman alpha, Halpha, Hbeta, [OII], and [OIII]. The emission line maps will provide further diagnostics on the escape probability of Lyman continuum photons and pave way for a future direct detection experiment with COS.

OBSERVING DESCRIPTION

The program consists of 3 visits, one each with the following instruments: WFC3/UVIS, ACS/SBC and COS.

The purpose of the WFC3/UVIS visit is to do broad band imaging in the F336W, F439W and F775W filters, and to do emission line imaging in the narrow filters F502N (redshifted H-beta), FQ378N (redshifted [OII]), FQ508N (redshifted [OIII]) and FQ674N (redshifted Halpha). The latter 3 filters are quad filters. All filters use 2 dithered exposures, and post-flashing to reach the minimal recommended background of 12e/pixel.

The purpose of the ACS/SBC imaging is to do long-pass imaging in F125LP, F140LP, F150LP and F165LP. The F125LP is crucial as it contains the Lyman-alpha line and by taking the difference between F125LP and F140LP we form an effective narrowband filter for isolating the Ly-alpha line. The F140LP, F150LP and F165LP images sample the continuum longwards of Lyman-alpha. The F125LP and F140LP images are split in two dithered exposures each, while one exposure will be obtained for F150LP and F165LP each. We ask the schedulers to make sure that the SBC was not used or turned on in the preceding visit (by our or another program) in order to ensure a minimal dark current level.

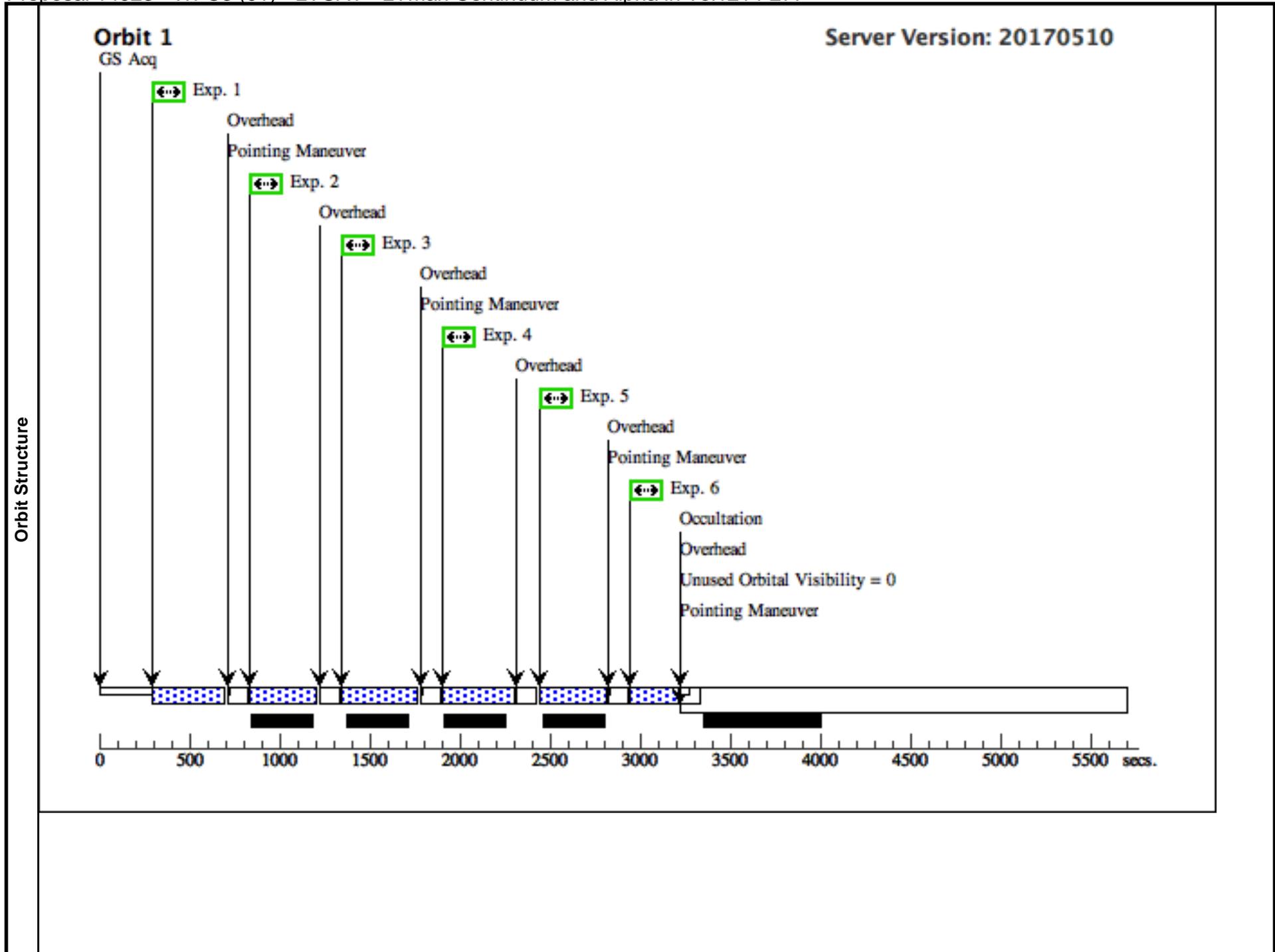
The purpose of the COS visit is to obtain deep G130M spectroscopy. In order to enable an optimum target acquisition, we ask for the COS visit to be put on-hold until at least one week after the UVIS and SBC visits have been obtained. We will use the F140LP and F336W images to interpolate an approximate

COS NUV image. Following this, we will be able to use the normal ACQ/IMAGE mode, followed by 4 exposures with G130M at cenwave 1318, using all the 4 FP-POS settings. (Should it not be possible to put the COS visit on hold, the ACQ/IMAGE will have to be preceded by an ACQ/SEARCH exposure).

Proposal 14923 - WFC3 (01) - LYCAT - LYman Continuum and Alpha in Tol1214-277

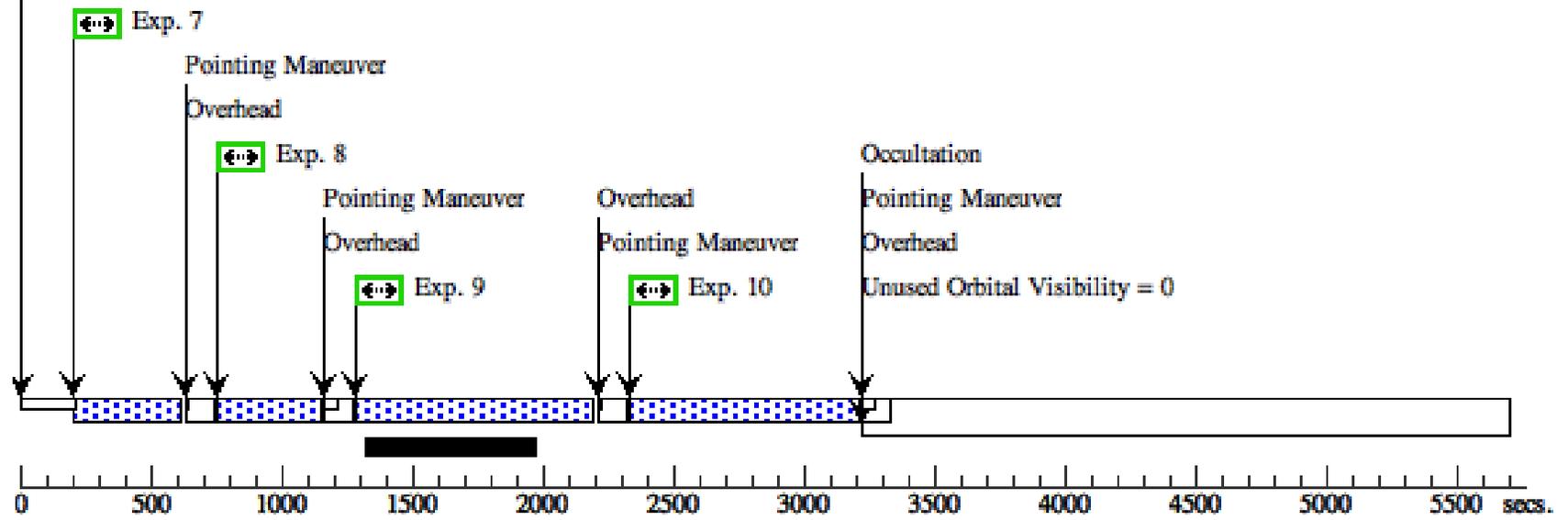
Tue Jun 06 01:01:19 GMT 2017

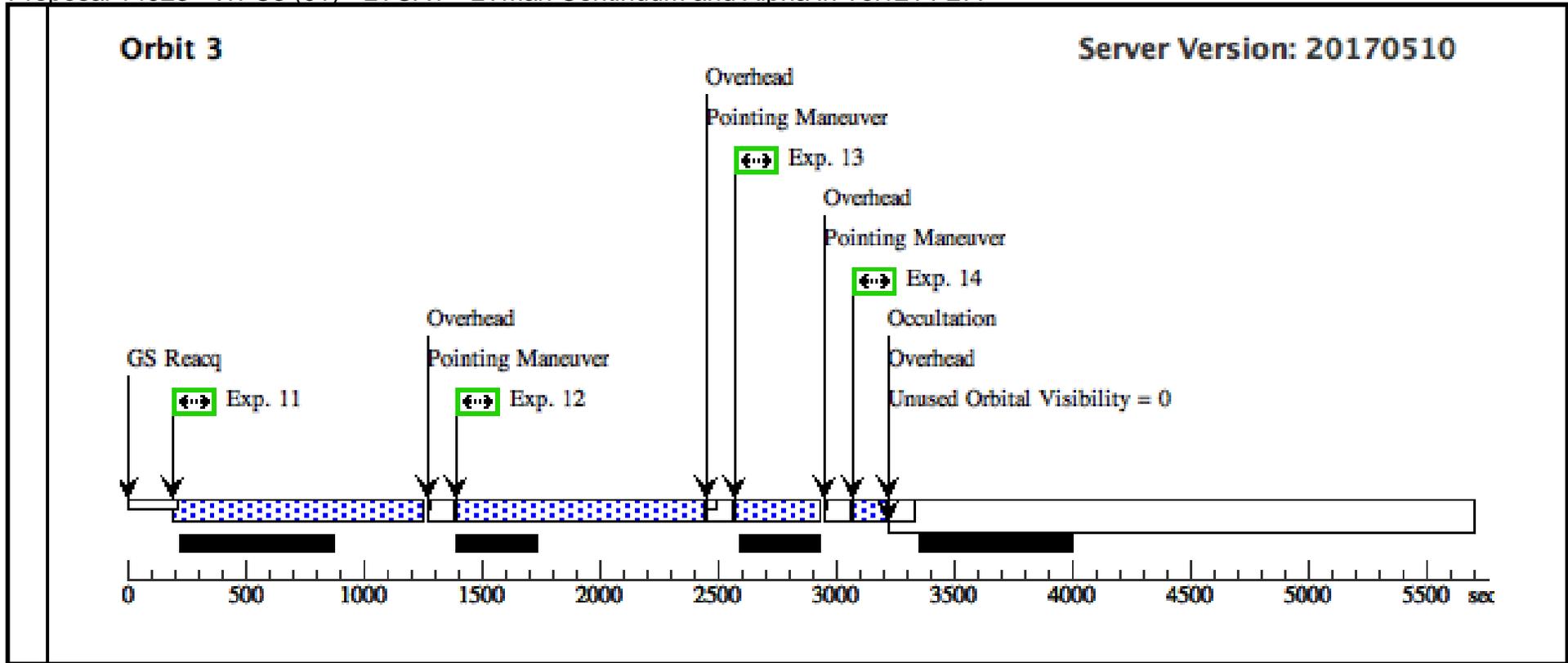
| Visit | Proposal 14923, WFC3 (01), completed Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none) | | | | | | | | | |
|---|---|--|------------------------------------|--|--------------------------|------------------------|--------------------------|------------------------------|--------------------------------|---------------------------------|
| | Diagnostics | (Ha-1 (01.007)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. (Ha-2 (01.008)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. (OII-1 (01.011)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. (OII-2 (01.012)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. (OIII-1 (01.013)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. (OIII-2 (01.014)) Warning (Form): POS TARG & PATTERN should be used carefully with WFC3 quad filters to avoid placing the target on the vignetted part of the field of view or moving it to another quadrant. | | | | | | | | |
| Fixed Targets | | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | | (1) | SCHG-1214-277 | RA: 12 17 17.0833 (184.3211804d) Dec: -28 02 32.74 (-28.04243d) Equinox: J2000 | | V=17.5 FUV=19.3 mag | Reference Frame: NED | | | |
| Comments: This object was generated by the target selector and retrieved from the NED database. Extended=YES | | | | | | | | | | |
| Exposures | | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] |
| | 1 | b-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F438W | FLASH=9 | POS TARG -32.5,-1 1.5 | | 375 Secs (375 Secs) [==>] | [1] |
| | 2 | b-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F438W | FLASH=9 | POS TARG -30,-10 | | 375 Secs (375 Secs) [==>] | [1] |
| | 3 | u-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F336W | FLASH=11 | SAME POS AS 2 | | 400 Secs (400 Secs) [==>] | [1] |
| | 4 | u-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F336W | FLASH=11 | SAME POS AS 1 | | 400 Secs (400 Secs) [==>] | [1] |
| | 5 | i-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F775W | FLASH=5 | SAME POS AS 1 | | 352 Secs (352 Secs) [==>] | [1] |
| | 6 | i-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F775W | FLASH=7 | SAME POS AS 2 | | 273 Secs (273 Secs) [==>] | [1] |
| | 7 | Ha-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ674N | FLASH=12 | POS TARG 2.5,5 | | 400 Secs (400 Secs) [==>] | [2] |
| | 8 | Ha-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ674N | FLASH=12 | POS TARG 5,6.5 | | 400 Secs (400 Secs) [==>] | [2] |
| | 9 | Hb-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F502N | FLASH=10 | POS TARG -32.5,-1 1.5 | | 883 Secs (883 Secs) [==>] | [2] |
| | 10 | Hb-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS2 | F502N | FLASH=10 | POS TARG -30,-10 | | 883 Secs (883 Secs) [==>] | [2] |
| | 11 | OII-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ378N | FLASH=11 | POS TARG 2.5,5 | | 1040 Secs (1040 Secs) [==>] | [3] |
| | 12 | OII-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ378N | FLASH=11 | POS TARG 5,6.5 | | 1048 Secs (1048 Secs) [==>] | [3] |
| | 13 | OIII-1 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ508N | FLASH=12 | POS TARG 0,5 | | 350 Secs (350 Secs) [==>] | [3] |
| 14 | OIII-2 | (1) SCHG-1214-277 | WFC3/UVIS, ACCUM, UVIS-QUAD-FIX | FQ508N | FLASH=12 | POS TARG -2.5,6.5 | | 140 Secs (140 Secs) [==>] | [3] | |



Orbit 2

GS Reacq

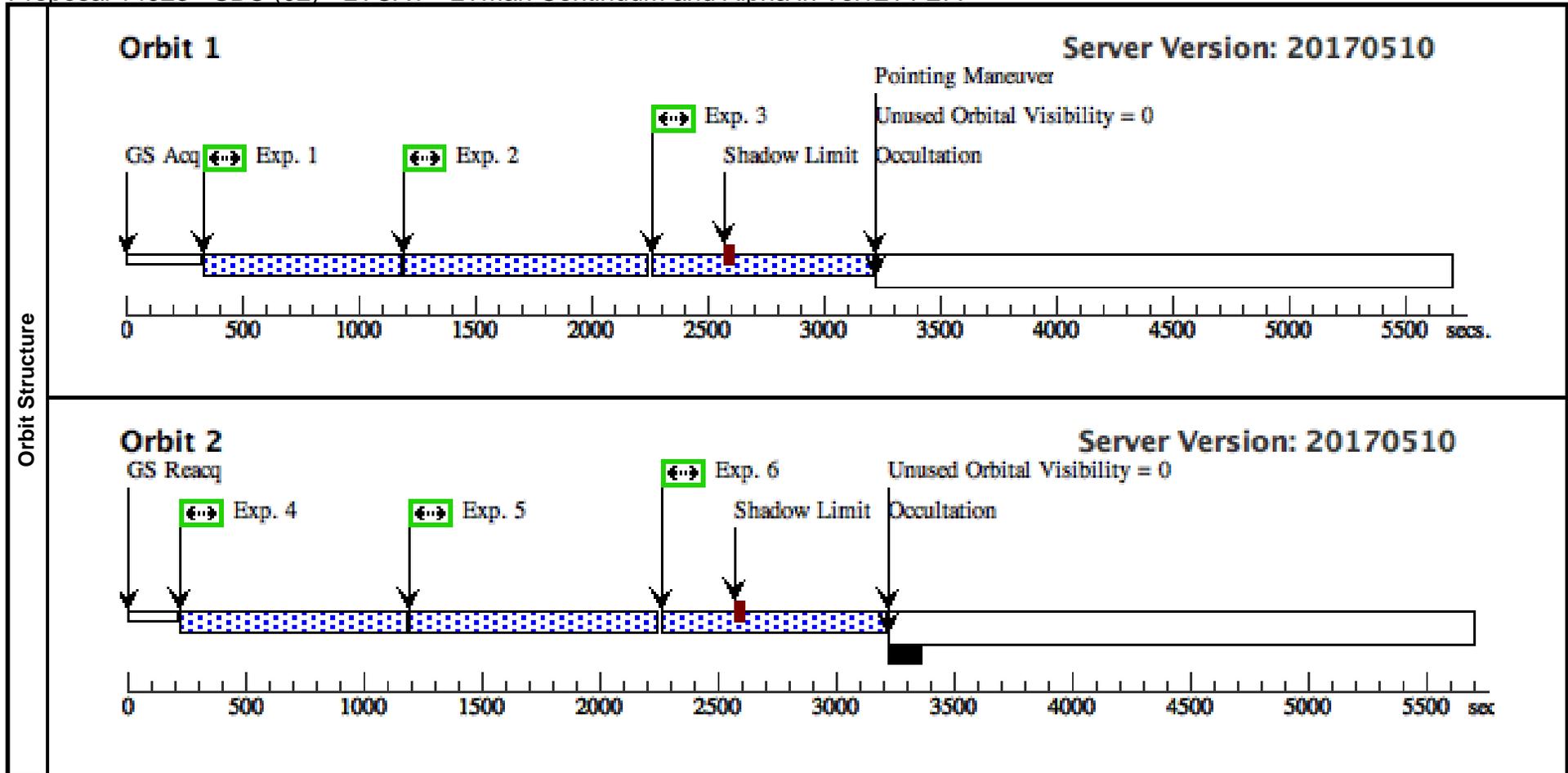




Proposal 14923 - SBC (02) - LYCAT - LYman Continuum and Alpha in Tol1214-277

Tue Jun 06 01:01:19 GMT 2017

| Visit | Proposal 14923, SBC (02), completed Diagnostic Status: No Diagnostics Scientific Instruments: ACS/SBC Special Requirements: (none) <i>Comments: Schedulers, please try to ascertain that the SBC was not used in the preceding visit.</i> | | | | | | | | | |
|-----------|---|-----------------|--|----------------------|--------------------------|----------------------|--------------------------|--------|---------------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (1) | SCHG-1214-277 | RA: 12 17 17.0833 (184.3211804d) Dec: -28 02 32.74 (-28.04243d) Equinox: J2000 | | V=17.5 FUV=19.3 mag | Reference Frame: NED | | | | |
| | <i>Comments: This object was generated by the target selector and retrieved from the NED database. Extended=YES</i> | | | | | | | | | |
| Exposures | # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | f150-1 (919415) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F150LP | | | | 785 Secs (785 Secs) [==>] | [1] |
| | 2 | f125-1 (919416) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F125LP | | SHADOW | | 1000 Secs (1000 Secs) [==>] | [1] |
| | 3 | f140-1 (919417) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F140LP | | | | 900 Secs (900 Secs) [==>] | [1] |
| | 4 | f150-2 (919418) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F150LP | | POS TARG 0.35385, 0.3465 | | 919 Secs (919 Secs) [==>] | [2] |
| | 5 | f125-2 (919416) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F125LP | | SAME POS AS 4; SHADOW | | 1000 Secs (1000 Secs) [==>] | [2] |
| | 6 | f140-2 (919417) | (1) SCHG-1214-277 | ACS/SBC, ACCUM, SBC | F140LP | | SAME POS AS 4 | | 900 Secs (900 Secs) [==>] | [2] |



| Visit | <p>Proposal 14923, COS new (03)</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: COS/FUV, COS/NUV</p> <p>Special Requirements: ON HOLD</p> <p><i>Comments: Photometry that guides target acquisition and integration times is done with HST data from visits 01 and 02 from this program. Flux was measured on the brightest UV source in 0.2 arcsec (acquisition) and 1.25 arcsec (spectroscopic observation) apertures, using the F140LP and F336W filters. Then we interpolated (power-law) between the two, to lambda=2300 AA. Fluxes are quoted below. These numbers (and the beta slope) were entered into the acquisition and spectroscopic ETCs.</i></p> <p><i>HST Imaging Datasets for Photometry:</i> F140LP 14923 jdew02030 F336W 14923 idew01020</p> <p>FUV full = 44.741 adu/sec = 1.2138e-15 cgs/AA FUV ACQ = 24.773 adu/sec = 6.7205e-16 cgs/AA</p> <p>Uband full = 190.037 adu/sec = 2.702e-16 cgs/AA Uband ACQ = 114.645 adu/sec = 1.63e-16 cgs/AA</p> <p>Beta full = -1.9093 Beta ACQ = -1.8003</p> <p><i>Resulting estimates for COS/NUV:</i> COS/NUV full = 6.386e-16 cgs/AA COS/NUV ACQ = 3.6679e-16 cgs/AA</p> <p><i>We use 4 different spectral settings to cover all lines of interest and cover the detector gap, but instead of using a single CENWAVE with 4 FP-POS we use two different CENWAVE, each with two FP-POS.</i></p> <p><i>On Hold Comments: We request to put COS observations on hold until a minimum of 1 week after delivery of the WFC3/UVIS and ACS/SBC images. These images will be used for optimal target acquisition.</i></p> | | | | | | | | | | | | | | | | |
|----------------------|--|--|--------------------|--------------------------|-----------------------|---------------|------|--------------------|--------------------------|--------|---------------|-----|------------------------|--|--|------------------------|-----------------------|
| | <p>(COS new (03)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.</p> | | | | | | | | | | | | | | | | |
| Fixed Targets | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(2)</td> <td>SCHG-1214-277-COSPOINT</td> <td>RA: 12 17 17.1710 (184.3215458d) Dec: -28 02 31.90 (-28.04219d) Equinox: J2000</td> <td></td> <td>V=17.5 FUV=19.3 mag</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <p><i>Comments: This target was defined by imaging from this programme</i> Extended=NO</p> | | | | | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | (2) | SCHG-1214-277-COSPOINT | RA: 12 17 17.1710 (184.3215458d) Dec: -28 02 31.90 (-28.04219d) Equinox: J2000 | | V=17.5 FUV=19.3 mag | Reference Frame: ICRS |
| | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | | | | | | | | |
| (2) | SCHG-1214-277-COSPOINT | RA: 12 17 17.1710 (184.3215458d) Dec: -28 02 31.90 (-28.04219d) Equinox: J2000 | | V=17.5 FUV=19.3 mag | Reference Frame: ICRS | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

Proposal 14923 - COS new (03) - LYCAT - LYman Continuum and Alpha in Tol1214-277

| Exposures | # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit | |
|-----------|---|---|--------------------------------|-------------------------|-----------------|---|---------------|--------|---------------------------------|----------------------------|-----|
| | 1 | NUV/ACQ/I MAGE (COS.ta.997 026) | (2) SCHG-1214-277- COSPOINT | COS/NUV, ACQ/IMAGE, PSA | MIRRORA | | | | | 22 Secs (22 Secs) [==>] | [1] |
| | 2 | G130M-131 8-fp-pos1 (COS.sp.997 027) | (2) SCHG-1214-277- COSPOINT | COS/FUV, TIME-TAG, PSA | G130M 1318 A | FP-POS=1; BUFFER-TIME=52 61; FLASH=YES | | | 1205 Secs (1205 Secs) [==>] | [1] | |
| | 3 | G130M-131 8-fp-pos2 (COS.sp.997 027) | (2) SCHG-1214-277- COSPOINT | COS/FUV, TIME-TAG, PSA | G130M 1318 A | FP-POS=2; BUFFER-TIME=52 61; FLASH=YES | | | 1204 Secs (1204 Secs) [==>] | [1] | |
| | 4 | G130M-129 1-fp-pos1 (COS.sp.997 027) | (2) SCHG-1214-277- COSPOINT | COS/FUV, TIME-TAG, PSA | G130M 1291 A | FP-POS=1; BUFFER-TIME=52 61; FLASH=YES | | | 1410 Secs (1410 Secs) [==>] | [2] | |
| | 5 | G130M-129 1-fp-pos4 (COS.sp.997 027) | (2) SCHG-1214-277- COSPOINT | COS/FUV, TIME-TAG, PSA | G130M 1291 A | FP-POS=4; BUFFER-TIME=52 61; FLASH=YES | | | 1409 Secs (1409 Secs) [==>] | [2] | |

