# 14466 - Lyman Alpha halo in a confirmed Lyman Continuum leaker

Cycle: 23, Proposal Category: GO

(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) J0925+1403 | ACS/SBC | 2 | 15-Dec-2015 21:20:44.0 | yes |
| 02 | (1) J0925+1403 | ACS/SBC | 1 | 15-Dec-2015 21:20:45.0 | yes |
| 03 | (1) J0925+1403 | WFC3/UVIS | 1 | 15-Dec-2015 21:20:46.0 | yes |
| 04 | (1) J0925+1403 | ACS/WFC | 1 | 15-Dec-2015 21:20:48.0 | yes |

5 Total Orbits Used

**ABSTRACT**

The Lyman-alpha (Lya) line is a tool of prime cosmological importance, bright enough to detect galaxies out to extreme redshifts. Spatially resolved studies both at low and high redshift have shown that much of the Lya emission often comes from a diffuse "halo" component extending beyond several galactic radii. The origin of the halos is currently being debated: scattering of Lya radiation produced in star-forming regions, or in situ production of Lya photons. We predict that if the Lya halos are due to scattering of Lya radiation from star-forming regions, then the halos should be missing or weak in galaxies which are transparent to their ionizing Lyman continuum. We have obtained HST time in Cycle 23 to test this hypothesis. At the time of proposal submission, no suitable targets with confirmed Lyman continuum escape were known, we therefore based our classification on their Lya properties. Since then, we have detected Lyman continuum escaping from a compact, star-forming, Green Pea galaxy J0925+1403. In the present proposal, we will image the galaxy in Lya, far-UV continuum, and optical filters in order to probe the extent and radial profile of the Lya halo emission as compared to the other filters. This study will provide a direct test to our predictions, and will complement results of our regular Cycle 23 program GO 14131.

**OBSERVING DESCRIPTION**

This program will image the compact dwarf galaxies J0925+1403 with two ACS/SBC filters to synthesize a Lya bandpass (F150LP and F165LP - 3 orbits), two WFC3/UVIS filters (F475W and F547M - 1 orbit), ACS/WFC F850LP and ACS ramp filter FR853N (1 orbit). This amounts to 5 orbits, organized into 4 visits.

The SBC visits should be scheduled so that the SBC HAS NOT BEEN IN USE FOR THE PAST 24 hours to minimize the dark current. We have split the SBC observations into 2 visits to prevent heatup of the detector.

The WFC3/UVIS visit utilises a 3 point dither to step over droplets.
ACS/WFC is used for ramp filter imaging and F850LP, utilising SMALL pos-targs.

Health/safety flag has been raised by the Bright Object Tool (BOT) at ACS/SBC F150LP for a star present in the field of view. It is due to a star at RA=09 25 32.7, DEC=+14 02 40.7 of V=15mag and unknown FUV magnitude. However, its NUV = 20.5 mag, and no warning is issued by the GALEX catalogue. This is proven by the ETC calculation, even if we assume an O5V stellar type (ACS.im.756629).
All the other targets present in the field are safe, including the observed galaxy.

The same star issues a warning at WFC3 filters to possibly cause a degradation of the science.
However, the angular distance between this source and our science target is large (>30"), and the
target is compact (1"), therefore we expect no impact.

The galaxy that we target is compact (1 arcsec). Our ETC calculations show that the observations are feasible in all the filters, and we attain limiting fluxes appropriate for our scientific goals (for ACS/SBC filters: ACS.im.756748, ACS.im.756749). Central parts of the galaxy are two magnitudes brighter, but will not result in detector saturation. Post-flash values for WFC3/UVIS and ACS/WFC were determined using ETC and were adjusted so as to avoid APT warnings.

## Visit

**Proposal 14466, J0925-SBC (01), implementation** Wed Dec 16 02:20:49 GMT 2015

**Diagnostic Status: No Diagnostics**

Scientific Instruments: ACS/SBC

Special Requirements: (none)

*Comments: We request that the SBC not be used 24 hours before this visit in order to mitigate the effects of dark current.*

*The SBC observations are split in two visits to prevent heatup (and associated increase in dark current) of detector.*

## Fixed Targets

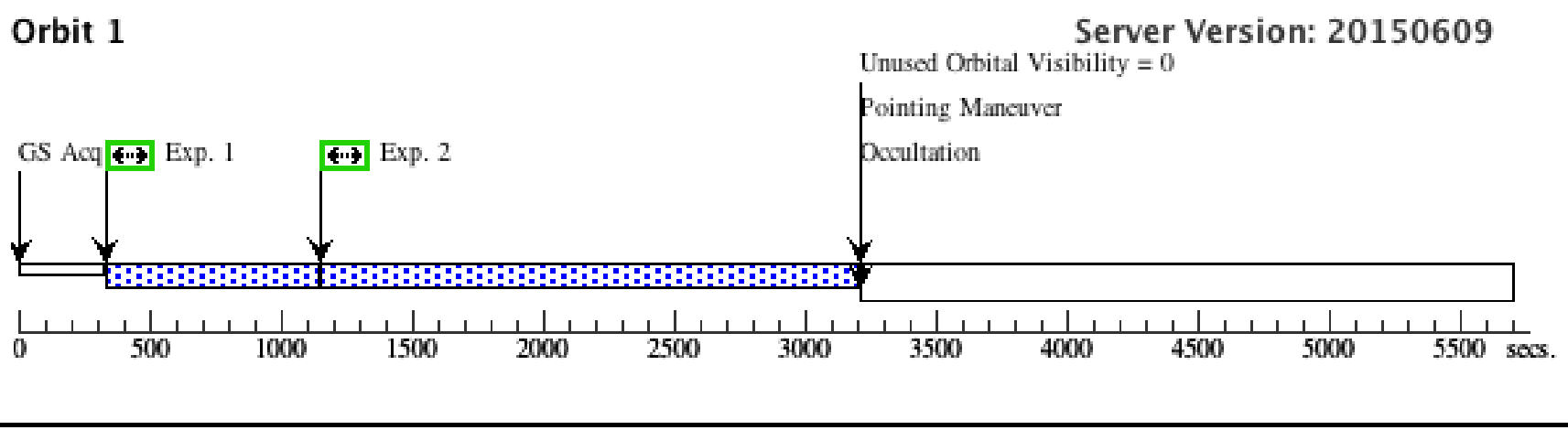
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | J0925+1403 | RA: 09 25 32.3700 (141.3848750d)<br>Dec: +14 03 13.06 (14.05363d)<br>Equinox: J2000 | Redshift: 0.3012 | V=20.71+/-0.05<br>FUV=20.71+/-0.05,<br>NUV=20.75+/-0.04 | Reference Frame: ICRS |

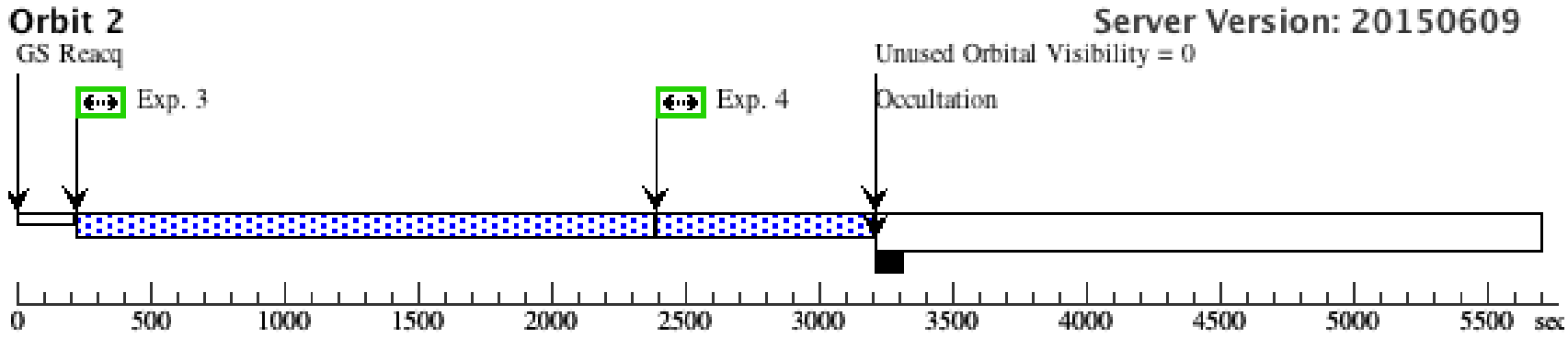
*Comments: Extended=YES*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F150-I (ACS.im.756629) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F150LP | | | | 742 Secs (742 Secs)<br>*[==>]* | ***[1]*** |
| 2 | F165-I (ACS.im.756632) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F165LP | | SAME POS AS 1 | | 2000 Secs (2000 Secs)<br>*[==>]* | ***[1]*** |
| 3 | F165-II (ACS.im.756632) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F165LP | | POS TARG -0.5205 196687938966,-0.9500606943305857 | | 2133 Secs (2133 Secs)<br>*[==>]* | ***[2]*** |
| 4 | F150-II (ACS.im.756629) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F150LP | | SAME POS AS 3 | | 760 Secs (760 Secs)<br>*[==>]* | ***[2]*** |

Orbit Structure



## Visit

**Proposal 14466, J0925-SBC2 (02), implementation** Wed Dec 16 02:20:49 GMT 2015

**Diagnostic Status: No Diagnostics**

Scientific Instruments: ACS/SBC

Special Requirements: (none)

*Comments: We request that the SBC not be used 24 hours before this visit in order to mitigate the effects of dark current.*

*The SBC observations are split in two visits to prevent heatup (and associated increase in dark current) of detector.*

## Fixed Targets

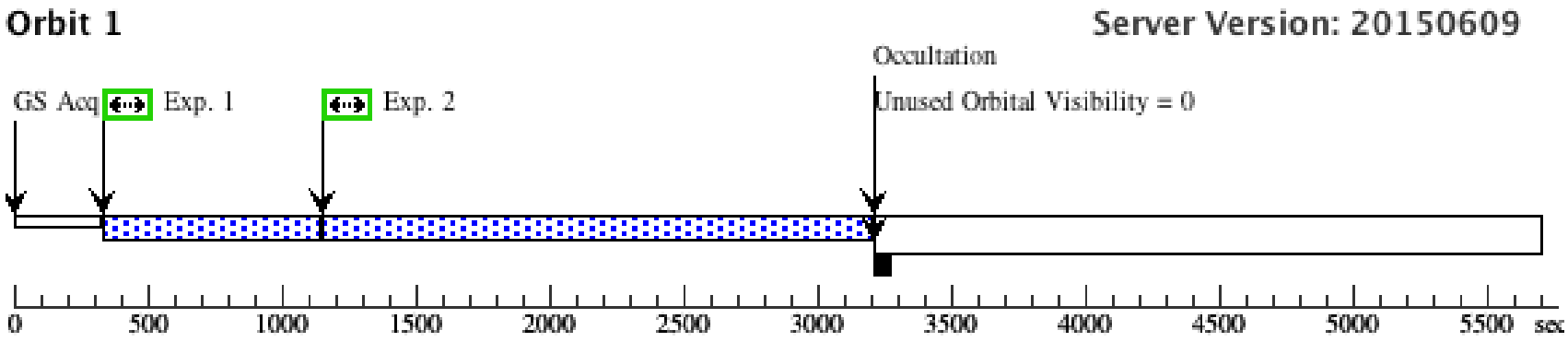
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | J0925+1403 | RA: 09 25 32.3700 (141.3848750d)<br>Dec: +14 03 13.06 (14.05363d)<br>Equinox: J2000 | Redshift: 0.3012 | V=20.71+/-0.05<br>FUV=20.71+/-0.05,<br>NUV=20.75+/-0.04 | Reference Frame: ICRS |

*Comments: Extended=YES*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F150-III (ACS.im.756629) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F150LP | | POS TARG 0.58424 73570133007,0.9493 177058268445 | | 742 Secs (742 Secs)<br>*[==>]* | *[1]* |
| 2 | F165-III (ACS.im.756632) | (1) J0925+1403 | ACS/SBC, ACCUM, SBC | F165LP | | SAME POS AS 1 | | 2000 Secs (2000 Secs)<br>*[==>]* | *[1]* |

## Orbit Structure



## Visit

**Proposal 14466, J0925-WFC3 (03), implementation** Wed Dec 16 02:20:49 GMT 2015

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

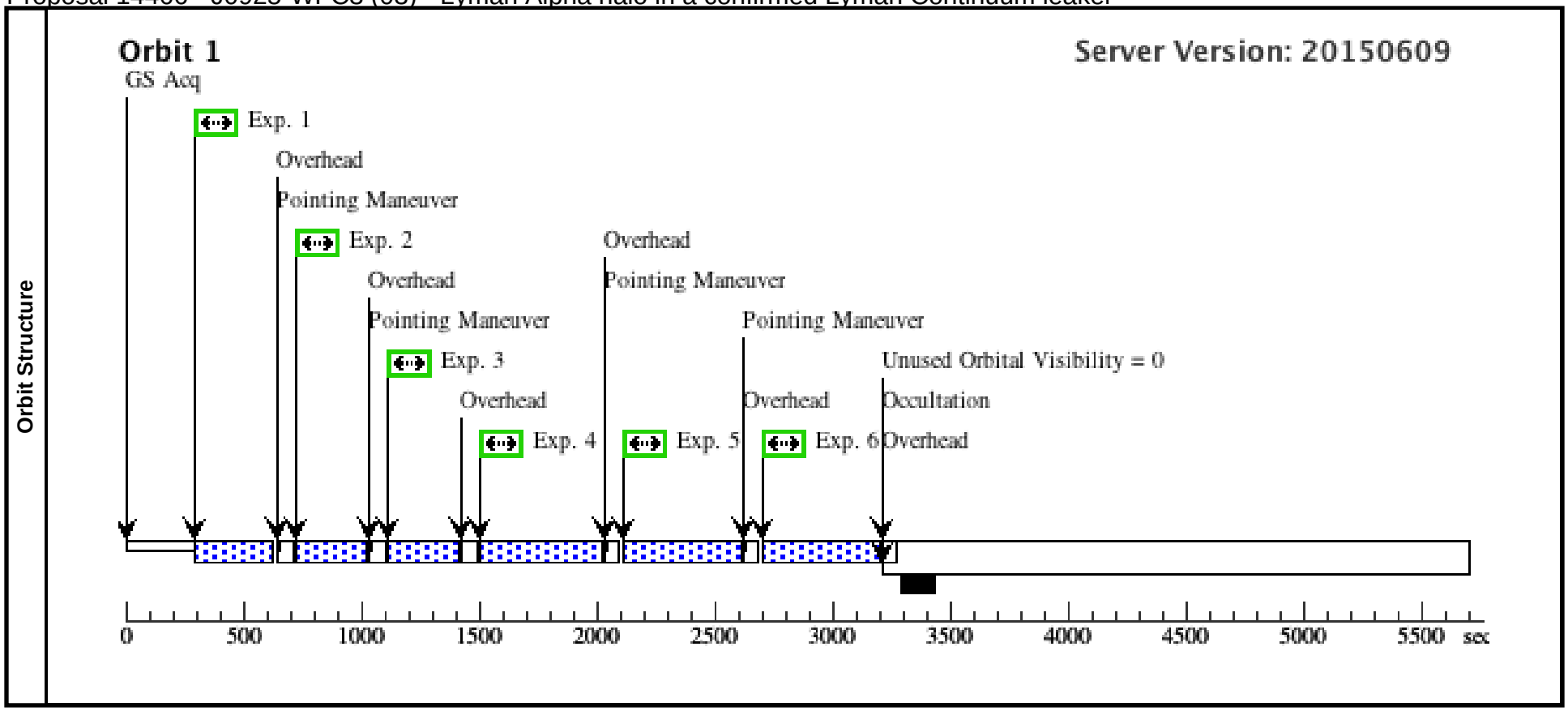
## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | J0925+1403 | RA: 09 25 32.3700 (141.3848750d)<br>Dec: +14 03 13.06 (14.05363d)<br>Equinox: J2000 | Redshift: 0.3012 | V=20.71+/-0.05<br>FUV=20.71+/-0.05,<br>NUV=20.75+/-0.04 | Reference Frame: ICRS |

*Comments: Extended=YES*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F438W-I (WFC3UVIS.im.756701) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F438W | FLASH=10 | GS ACQ SCENARIO BASE1B3 | | 300 Secs (300 Secs)<br>*[==>]* | <br>***[1]*** |
| 2 | F438W-II (WFC3UVIS.im.756701) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F438W | FLASH=10 | POS TARG 2.9568,2.9568 | | 300 Secs (300 Secs)<br>*[==>]* | <br>***[1]*** |
| 3 | F438W-III (WFC3UVIS.im.756701) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F438W | FLASH=10 | POS TARG 5.9136,5.9136 | | 300 Secs (300 Secs)<br>*[==>]* | <br>***[1]*** |
| 4 | F547M (WFC3UVIS.im.756714) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F547M | FLASH=6 | SAME POS AS 3 | | 500 Secs (500 Secs)<br>*[==>]* | <br>***[1]*** |
| 5 | F547M (WFC3UVIS.im.756714) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F547M | FLASH=6 | SAME POS AS 2 | | 500 Secs (500 Secs)<br>*[==>]* | <br>***[1]*** |
| 6 | F547M (WFC3UVIS.im.756714) | (1) J0925+1403 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F547M | FLASH=6 | SAME POS AS 1 | | 499 Secs (499 Secs)<br>*[==>]* | <br>***[1]*** |


Orbit Structure
Orbit 1
Server Version: 20150609
GS Acq
Exp. 1
Overhead
Pointing Maneuver
Exp. 2
Overhead
Pointing Maneuver
Exp. 3
Overhead
Exp. 4
Overhead
Pointing Maneuver
Exp. 5
Pointing Maneuver
Overhead
Exp. 6
Unused Orbital Visibility = 0
Occultation
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 14466, J0925-ACS (04), implementation** Wed Dec 16 02:20:49 GMT 2015

**Diagnostic Status: Warning**

Scientific Instruments: ACS/WFC

Special Requirements: (none)

## Diagnostics

(J0925-ACS (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(J0925-ACS (04)) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(Ha-II (04.002)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

(Ha-III (04.003)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | J0925+1403 | RA: 09 25 32.3700 (141.3848750d)<br>Dec: +14 03 13.06 (14.05363d)<br>Equinox: J2000 | Redshift: 0.3012 | V=20.71+/-0.05<br>FUV=20.71+/-0.05,<br>NUV=20.75+/-0.04 | Reference Frame: ICRS |

*Comments: Extended=YES*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ha-I (ACS.rf.756687) | (1) J0925+1403 | ACS/WFC, ACCUM, WFC1-IRAMP | FR853N 8542 A | FLASH=16 | | | 400 Secs (400 Secs)<br>*[==>]* | *[1]* |
| 2 | Ha-II (ACS.rf.756687) | (1) J0925+1403 | ACS/WFC, ACCUM, WFC1-IRAMP | FR853N 8542 A | FLASH=16 | POS TARG 0.115,0.125 | | 400 Secs (400 Secs)<br>*[==>]* | *[1]* |
| 3 | Ha-III (ACS.rf.756687) | (1) J0925+1403 | ACS/WFC, ACCUM, WFC1-IRAMP | FR853N 8542 A | FLASH=16 | POS TARG 0.231,0.259 | | 400 Secs (400 Secs)<br>*[==>]* | *[1]* |
| 4 | F850LP-I (ACS.im.756690) | (1) J0925+1403 | ACS/WFC, ACCUM, WFC | F850LP | | SAME POS AS 3 | | 388 Secs (388 Secs)<br>*[==>]* | *[1]* |
| 5 | F850LP-II (ACS.im.756690) | (1) J0925+1403 | ACS/WFC, ACCUM, WFC | F850LP | | SAME POS AS 1 | | 388 Secs (388 Secs)<br>*[==>]* | *[1]* |

## Orbit Structure