



12943 - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) SSA22-LAB ANY | ACS/WFC WFC3/UVIS | 4 | 19-Aug-2013 21:09:30.0 | yes |
| 02 | (1) SSA22-LAB ANY | ACS/WFC WFC3/UVIS | 4 | 19-Aug-2013 21:09:45.0 | yes |
| 03 | (1) SSA22-LAB ANY | ACS/WFC WFC3/UVIS | 4 | 19-Aug-2013 21:09:59.0 | yes |
| 04 | (1) SSA22-LAB ANY | ACS/WFC WFC3/UVIS | 4 | 19-Aug-2013 21:10:11.0 | yes |

| <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> |
|--------------|------------------------------|-------------------------------------|--------------------|-------------------------------|-------------------------------|
| 05 | (1) SSA22-LAB ANY | ACS/WFC WFC3/UVIS | 4 | 19-Aug-2013 21:10:23.0 | yes |

20 Total Orbits Used

ABSTRACT

We propose to use WFC3/F502N narrowband imaging to search for filamentary/stream structures within Ly-alpha blobs in the SSA22 proto-cluster of these objects at $z=3.1$. It has been suggested that these giant Ly-alpha emission line nebulae (typical sizes of $\sim 100\text{kpc}$) are massive galaxies onto which "cold gas streams" are being accreted. In this scenario, filamentary streams of Ly-alpha emission should be seen. The detailed morphology of the Ly-alpha-emitting gas has never been observed due to a lack of spatial resolution in ground-based imaging observations. By exploiting a narrowband filter that fortuitously coincides with Ly-alpha emission at the proto-cluster redshift, we can obtain deep, narrowband imaging at sufficient resolution for 5 Ly-alpha blobs and ~ 4 compact emitters in a single pointing. These data will allow us to spatially resolve the predicted streams and thereby confirm or disprove the cold mode accretion scenario for these most promising candidates for gas-accreting galaxies at high redshift. Furthermore, the proposed observations will provide the first direct constraints on theoretical models that explore the observational signatures of gas flows (in or out), which are vital to our understanding of galaxy formation and evolution.

OBSERVING DESCRIPTION

This proposal aims to study the detailed morphology of Ly-alpha emission around the two brightest Lyman alpha blobs (LABs) and look for filamentary/stream substructures of Ly-alpha-emitting gas.

General Information

1. We request to observe the extended Lyman alpha emission with WFC3/UVIS + F502N narrowband filter (total 18 orbits).
 2. We request to observe the embedded galaxies with WFC3/UVIS + F625W broadband filter to trace their UV continuum (2 orbits).
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Special Requests

There are two special requests in our program as follows, and all of them were requested and approved in the phase 1 proposal.

1. ORIENT Constraint:

The camera has to be oriented as requested, so that all the sources of interest will be imaged simultaneously. Two main sources are located at the corner of each chip diagonally. While we requested a stringent ORIENT constraint with $\Delta_{PA} \sim 20$ degrees in the phase 1 proposal, we found that fixing roll angle to a certain value (here roll angle = 74 or 254 degree) do not affect the schedulability in the Visit planner, so we set the ORIENT requirement to these two values.

2. LOW-SKY:

Because our target is very faint, we request low-sky constraint to minimize the sky background. This will reduce the visibility slightly, its effect should be minimal.

3. Post-flash

In order to mitigate the CTE issue, we use the post-flash of 12e- for the F502N narrowband observations. Originally, we considered to use 3x3 binning, but we decided to use no binning and post-flash after consulting the instrument scientists in STScI.

Visits & Orbits

We split our allocated orbits into 6 visits each with 2 or 4 orbits. In F502N narrowband observations, we do not dither during a visit (4 orbits) to accumulate the signal into the same pixels, but apply small offsets (using POS TARG, ± 0.16 or 0.08 arcsec) between the visits.

Summary:

setup = 1x1 binning, ORIENT, LOW-SKY

visit1 : 4 orbits = 3 x F502N + 1 x F625W

visit2 : 4 orbits = 3 x F502N + 1 x F625W

visit3 : 4 orbits = 4 x F502N

visit4 : 4 orbits = 4 x F502N

visit5 : 4 orbits = 4 x F502N

REAL TIME JUSTIFICATION

N/A

CALIBRATION JUSTIFICATION

N/A

ADDITIONAL COMMENTS

Coordinated parallel observations:

1. We attached parallel ACS/G800L-grism observations for the primary F502N narrowband imaging (18 orbits). For each visit, we obtain only one or two direct images (F606W) to obtain zero point of grism data. Due to long exposure times (1 exposure per orbit) in both primary and parallel observations, there is no issues related to buffer dumps.
2. But we did not attached any parallel observation for the primary F625W broadband imaging (2 orbits) because of the limitations on buffer dumps (there are already three readouts with dithering).

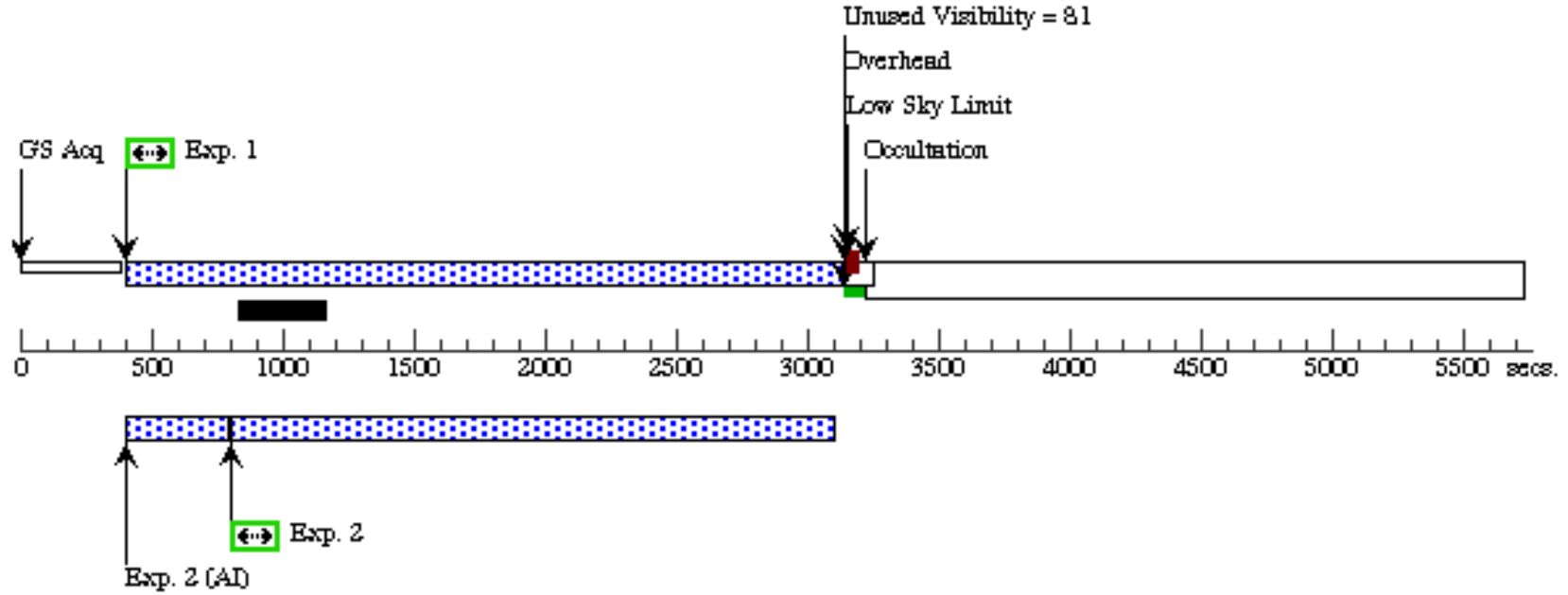
Proposal 12943 - F502N+F625W (01) - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Tue Aug 20 01:10:32 GMT 2013

| Visit | Proposal 12943, F502N+F625W (01), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 74D TO 74 D; ORIENT 254D TO 254 D | | | | | | | | | |
|---------------|---|--|---|-------------------------------|---|-----------------------|-----------------------|--|--|-------|
| | Patterns | # | Primary Pattern | Secondary Pattern | Exposures | | | | | |
| | (1) | Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing= | Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=true | | (7) | | | | | |
| Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | |
| | (1) | SSA22-LAB | RA: 22 17 32.5108 (334.3854617d) Dec: +00 13 2.99 (.21750d) Equinox: J2000 | Redshift: 3.09 | V=(?) Flux(Lyman-alpha) ~ 1e-16 erg/ s/cm^2 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0,0; LOW-SKY | Prime + Parallel Group 1-2 in F502N+F625W (01) | 2700 Secs (2700 Secs) [==>] | [1] |
| | 2 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 1-2 in F502N+F625W (01) | 2150 Secs (2150 Secs) [==>] | [1] |
| | 3 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0,0; LOW-SKY | Prime + Parallel Group 3-4 in F502N+F625W (01) | 2730 Secs (2730 Secs) [==>] | [2] |
| | 4 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 3-4 in F502N+F625W (01) | 2600 Secs (2600 Secs) [==>] | [2] |
| | 5 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0,0; LOW-SKY | Prime + Parallel Group 5-6 in F502N+F625W (01) | 2730 Secs (2730 Secs) [==>] | [3] |
| | 6 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 5-6 in F502N+F625W (01) | 2600 Secs (2600 Secs) [==>] | [3] |
| | 7 | F625W | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F625W | | | Pattern 1, Exps 7-7 in F502N+F625W (01) (1) | 850 Secs (2550 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] | [4] |

Orbit 1

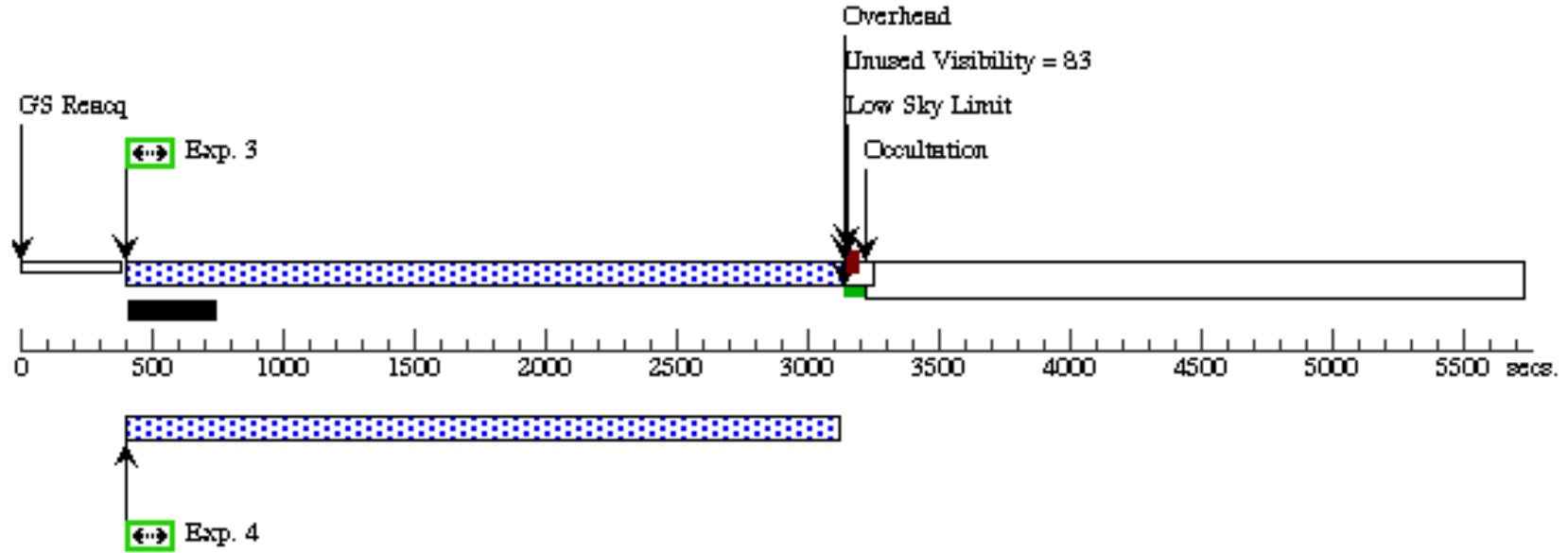
Server Version: 20130722



Orbit Structure

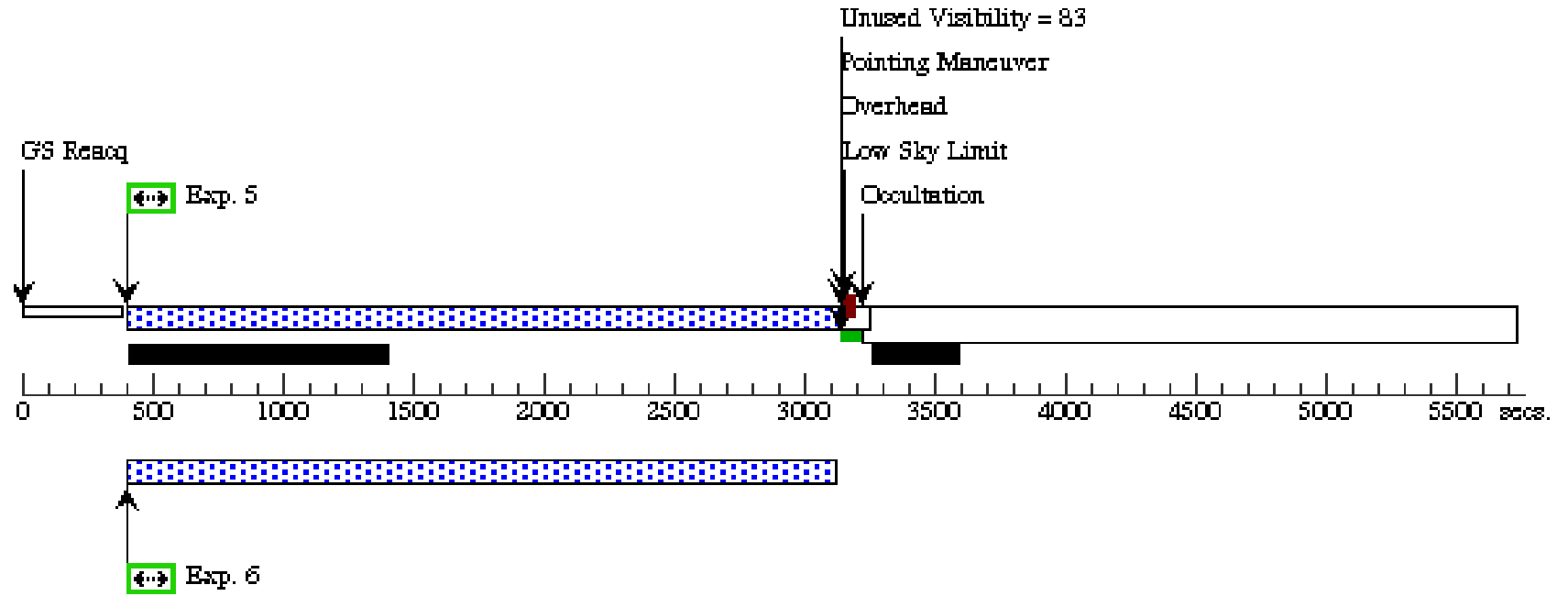
Orbit 2

Server Version: 20130722



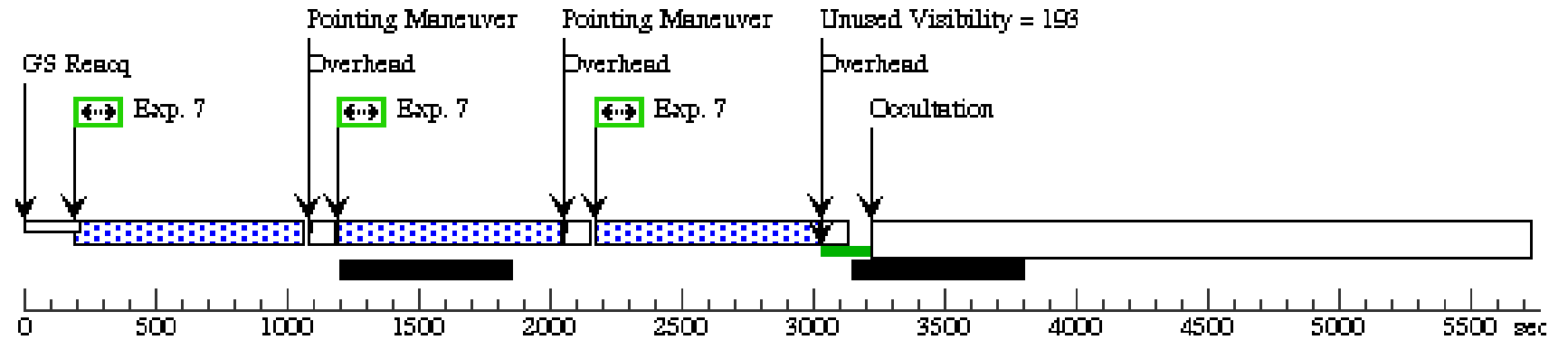
Orbit 3

Server Version: 20130722



Orbit 4

Server Version: 20130722



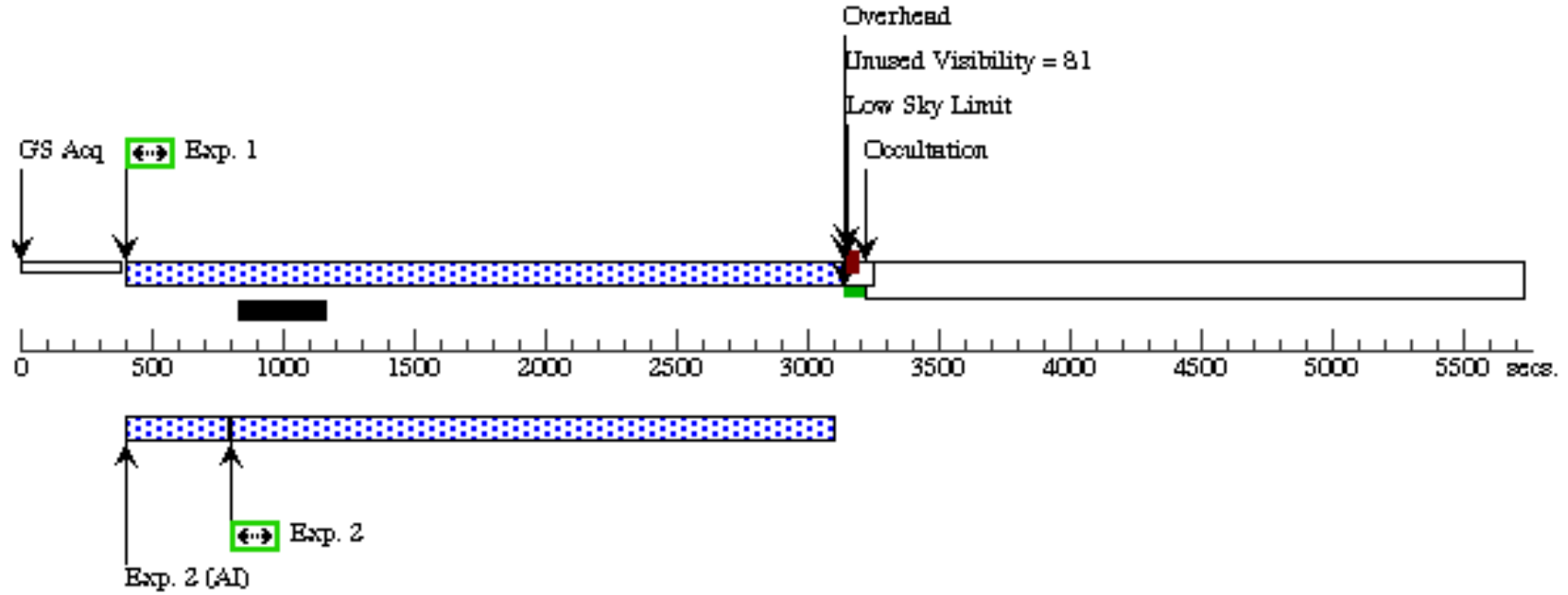
Proposal 12943 - F502N+F625W (02) - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Tue Aug 20 01:10:35 GMT 2013

| | | | | | | | | | | |
|----------------------|---|--|---|---------------------------------|---|-----------------------|---------------------------------|--|--|--------------|
| Visit | Proposal 12943, F502N+F625W (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 74D TO 74 D; ORIENT 254D TO 254 D | | | | | | | | | |
| | | | | | | | | | | |
| Patterns | # | Primary Pattern | | Secondary Pattern | Exposures | | | | | |
| | (1) | Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing= | Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=true | | (7) | | | | | |
| Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | |
| | (1) | SSA22-LAB | RA: 22 17 32.5108 (334.3854617d) Dec: +00 13 2.99 (.21750d) Equinox: J2000 | Redshift: 3.09 | V=(?) Flux(Lyman-alpha) ~ 1e-16 erg/ s/cm^2 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.08,-0.08; LOW-SKY | Prime + Parallel Group 1-2 in F502N+F625W (02) | 2700 Secs (2700 Secs) [==>] | [1] |
| | 2 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 1-2 in F502N+F625W (02) | 2150 Secs (2150 Secs) [==>] | [1] |
| | 3 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.08,-0.08; LOW-SKY | Prime + Parallel Group 3-4 in F502N+F625W (02) | 2730 Secs (2730 Secs) [==>] | [2] |
| | 4 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 3-4 in F502N+F625W (02) | 2600 Secs (2600 Secs) [==>] | [2] |
| | 5 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.08,-0.08; LOW-SKY | Prime + Parallel Group 5-6 in F502N+F625W (02) | 2730 Secs (2730 Secs) [==>] | [3] |
| | 6 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 5-6 in F502N+F625W (02) | 2600 Secs (2600 Secs) [==>] | [3] |
| | 7 | F625W | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F625W | | | Pattern 1, Exps 7-7 in F502N+F625W (02) (1) | 850 Secs (2550 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] | [4] |

Orbit 1

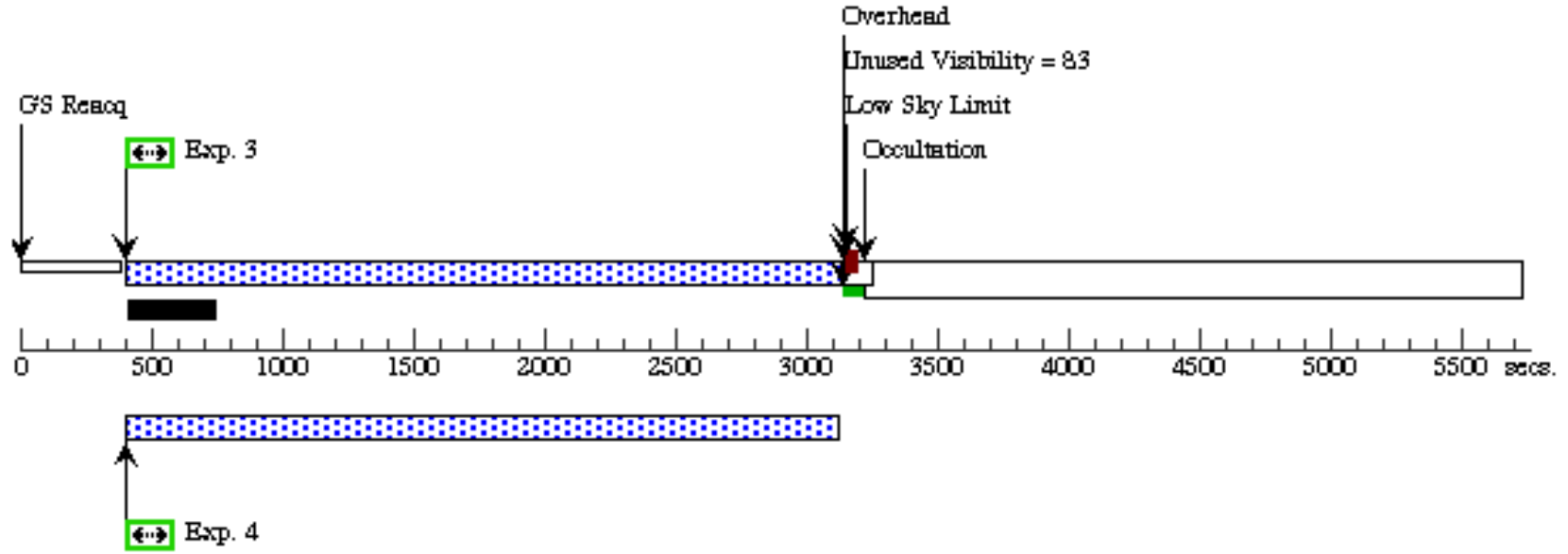
Server Version: 20130722



Orbit Structure

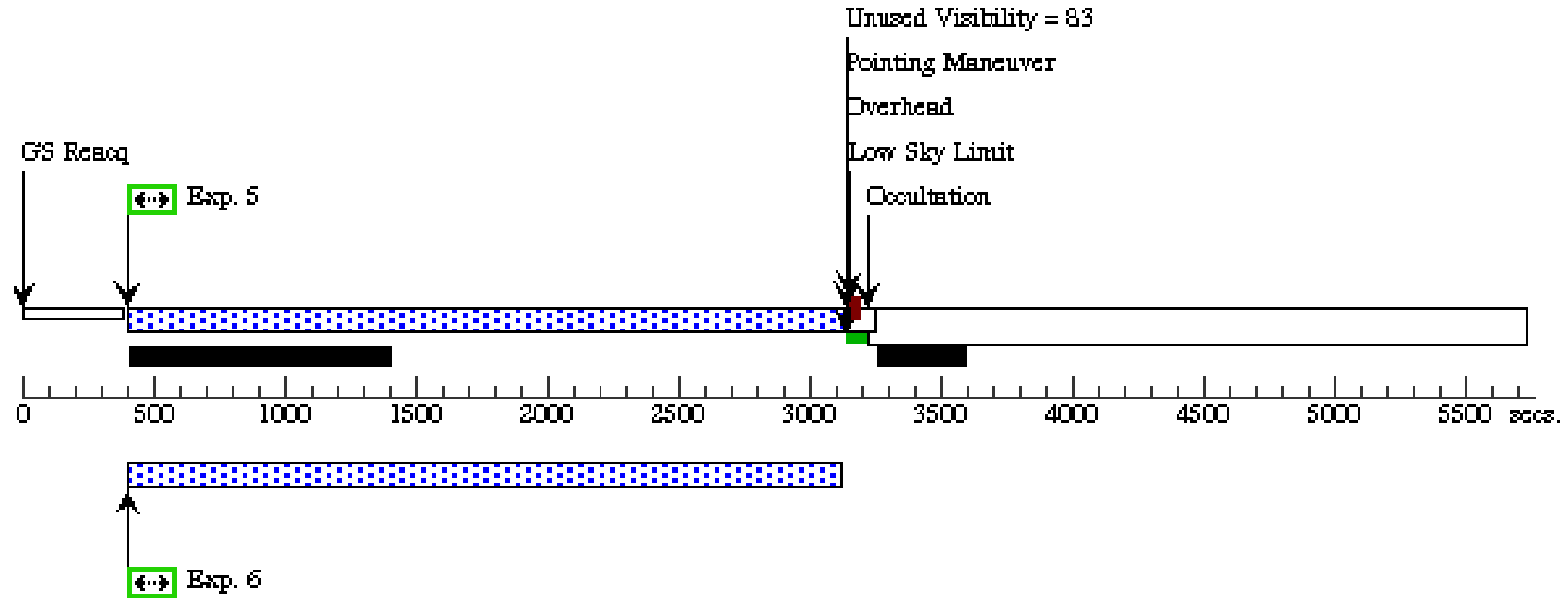
Orbit 2

Server Version: 20130722



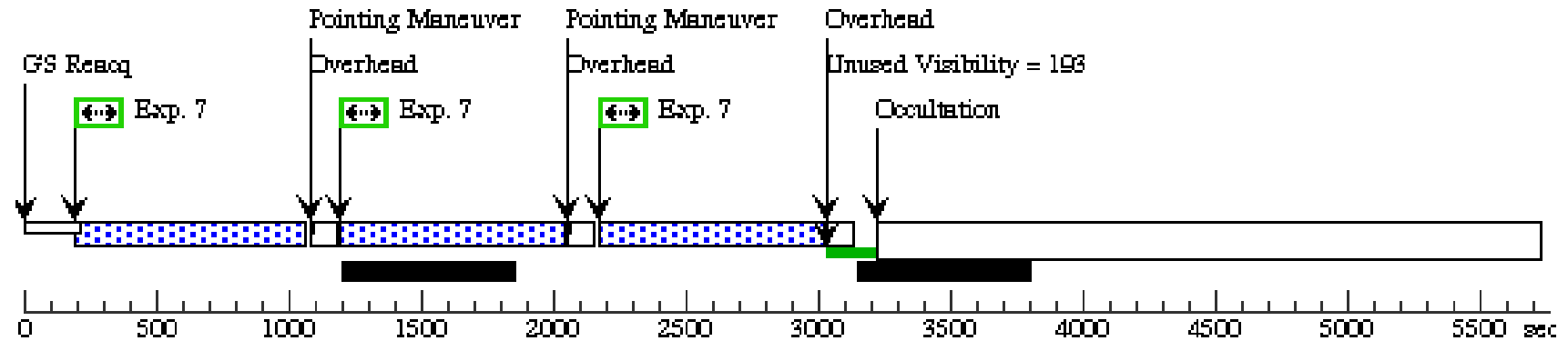
Orbit 3

Server Version: 20130722



Orbit 4

Server Version: 20130722



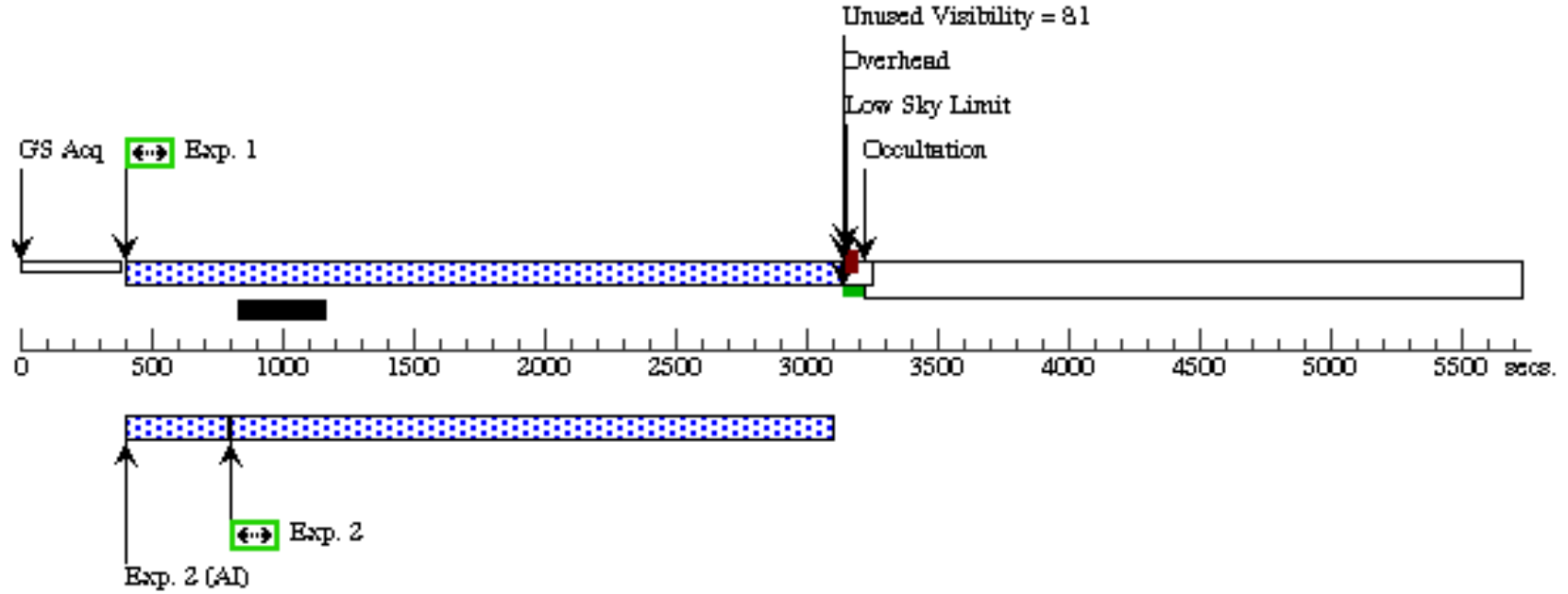
Proposal 12943 - F502N (03) - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Tue Aug 20 01:10:38 GMT 2013

| Visit | Proposal 12943, F502N (03), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 74D TO 74 D; ORIENT 254D TO 254 D | | | | | | | | | |
|-----------|---|-----------|--|-------------------------------|---|-----------------------|--|--|---------------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (1) | SSA22-LAB | RA: 22 17 32.5108 (334.3854617d) Dec: +00 13 2.99 (.21750d) Equinox: J2000 | Redshift: 3.09 | V=(?) Flux(Lyman-alpha) ~ 1e-16 erg/s/cm^2 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.16,0.16; LOW-SKY | Prime + Parallel Group 1-2 in F502N (03) | 2700 Secs (2700 Secs) [==>] | [1] |
| | 2 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 1-2 in F502N (03) | 2150 Secs (2150 Secs) [==>] | [1] |
| | 3 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.16,0.16; LOW-SKY | Prime + Parallel Group 3-4 in F502N (03) | 2730 Secs (2730 Secs) [==>] | [2] |
| | 4 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 3-4 in F502N (03) | 2600 Secs (2600 Secs) [==>] | [2] |
| | 5 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.16,0.16; LOW-SKY | Prime + Parallel Group 5-6 in F502N (03) | 2730 Secs (2730 Secs) [==>] | [3] |
| | 6 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 5-6 in F502N (03) | 2220 Secs (2220 Secs) [==>] | [3] |
| | 7 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG 0.16,0.16; LOW-SKY | Prime + Parallel Group 7-8 in F502N (03) | 2730 Secs (2730 Secs) [==>] | [4] |
| 8 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 7-8 in F502N (03) | 2600 Secs (2600 Secs) [==>] | [4] | |

Orbit 1

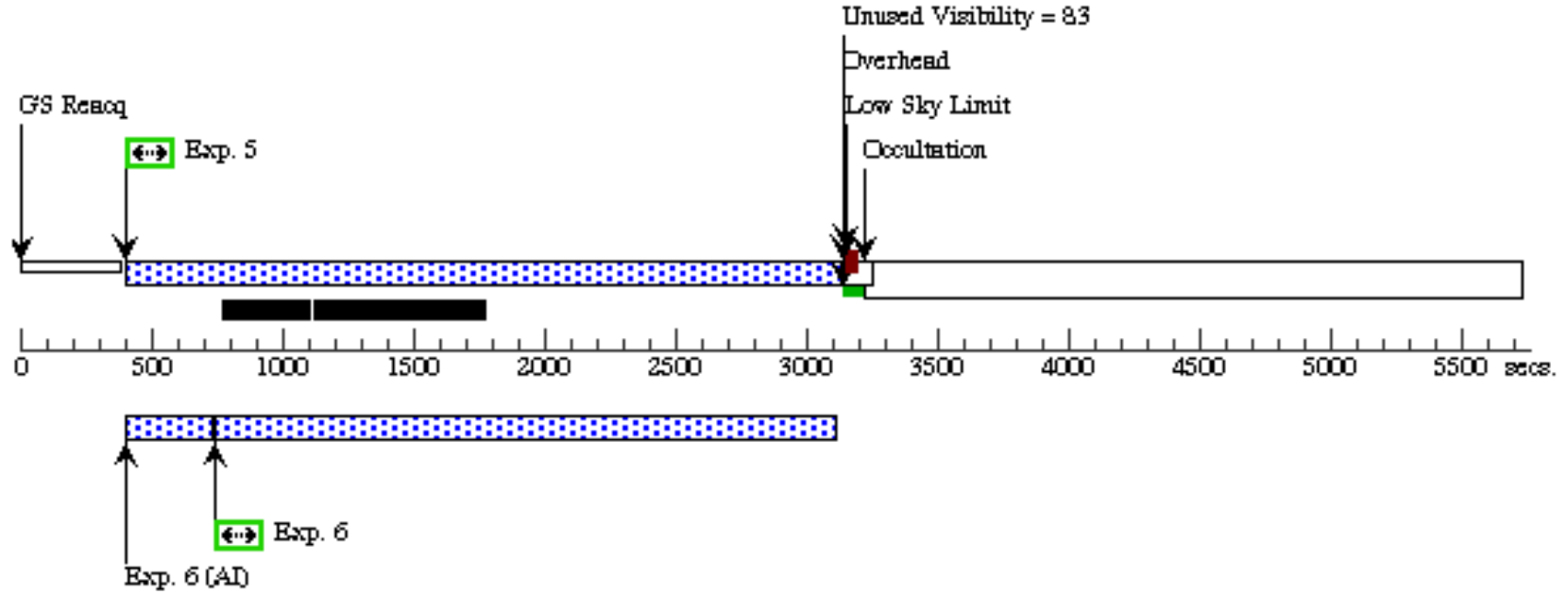
Server Version: 20130722

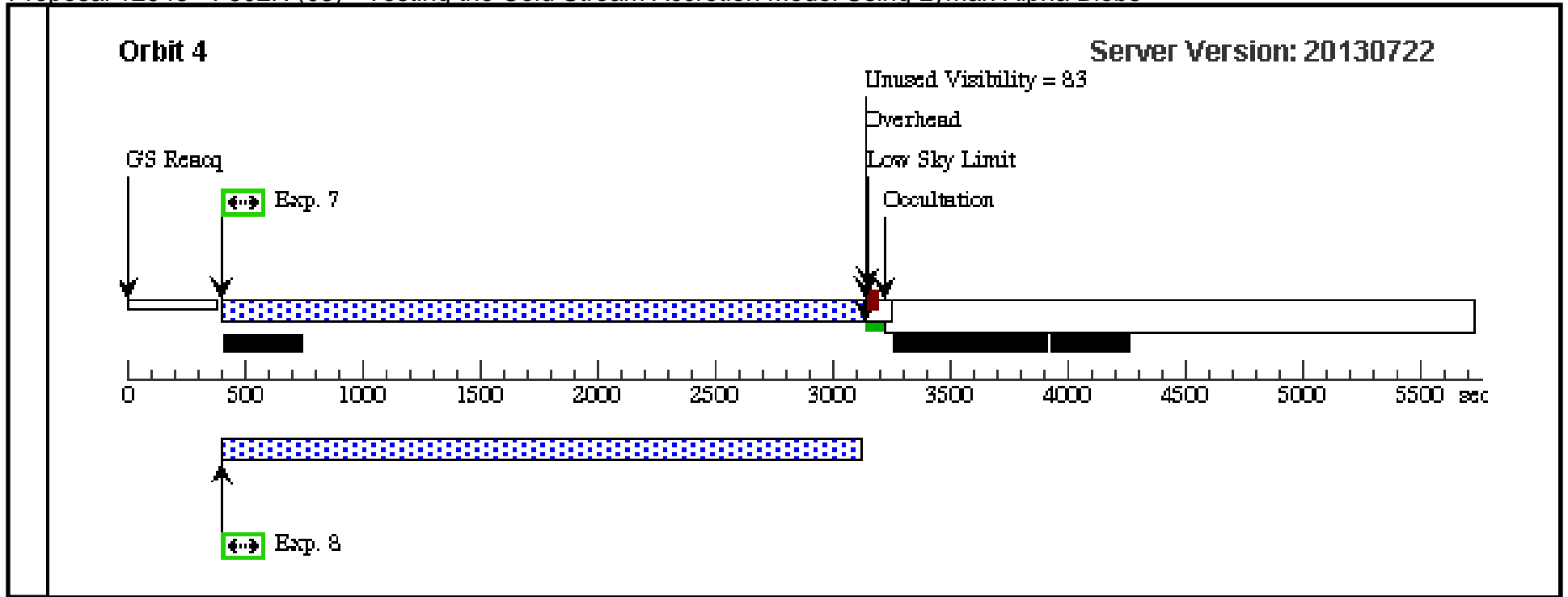


Orbit Structure

Orbit 3

Server Version: 20130722





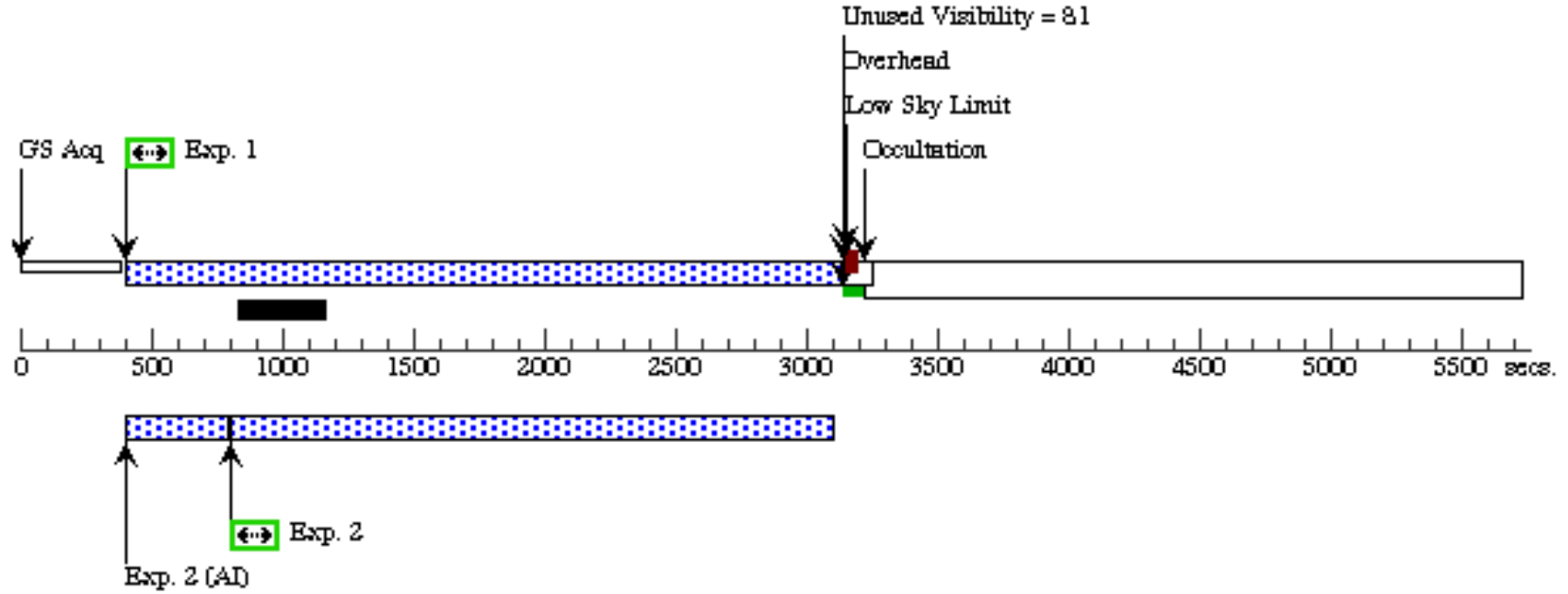
Proposal 12943 - F502N (04) - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Tue Aug 20 01:10:39 GMT 2013

| Visit | Proposal 12943, F502N (04), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 74D TO 74 D; ORIENT 254D TO 254 D | | | | | | | | | |
|-----------|---|-----------|--|-------------------------------|---|-----------------------|----------------------------------|--|---------------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (1) | SSA22-LAB | RA: 22 17 32.5108 (334.3854617d) Dec: +00 13 2.99 (.21750d) Equinox: J2000 | Redshift: 3.09 | V=(?) Flux(Lyman-alpha) ~ 1e-16 erg/s/cm^2 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.16,-0.16; LOW-SKY | Prime + Parallel Group 1-2 in F502N (04) | 2700 Secs (2700 Secs) [==>] | [1] |
| | 2 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 1-2 in F502N (04) | 2150 Secs (2150 Secs) [==>] | [1] |
| | 3 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.16,-0.16; LOW-SKY | Prime + Parallel Group 3-4 in F502N (04) | 2730 Secs (2730 Secs) [==>] | [2] |
| | 4 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 3-4 in F502N (04) | 2600 Secs (2600 Secs) [==>] | [2] |
| | 5 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.16,-0.16; LOW-SKY | Prime + Parallel Group 5-6 in F502N (04) | 2730 Secs (2730 Secs) [==>] | [3] |
| | 6 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 5-6 in F502N (04) | 2220 Secs (2220 Secs) [==>] | [3] |
| | 7 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.16,-0.16; LOW-SKY | Prime + Parallel Group 7-8 in F502N (04) | 2730 Secs (2730 Secs) [==>] | [4] |
| | 8 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 7-8 in F502N (04) | 2600 Secs (2600 Secs) [==>] | [4] |

Orbit 1

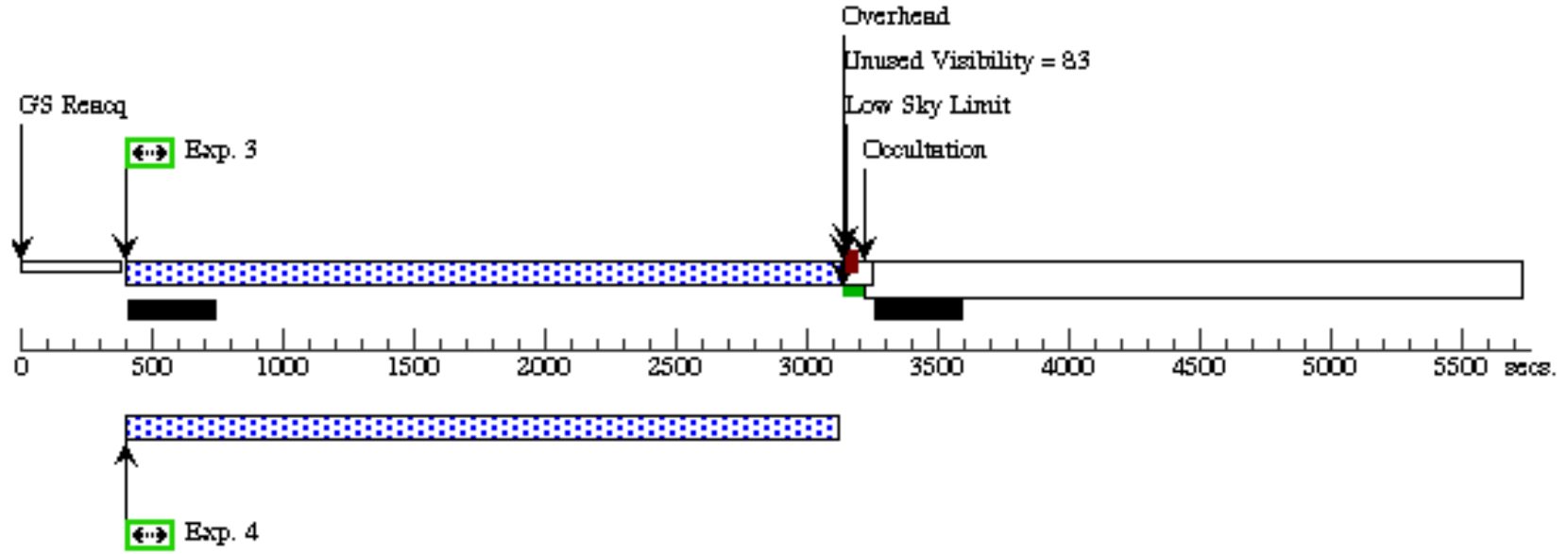
Server Version: 20130722



Orbit Structure

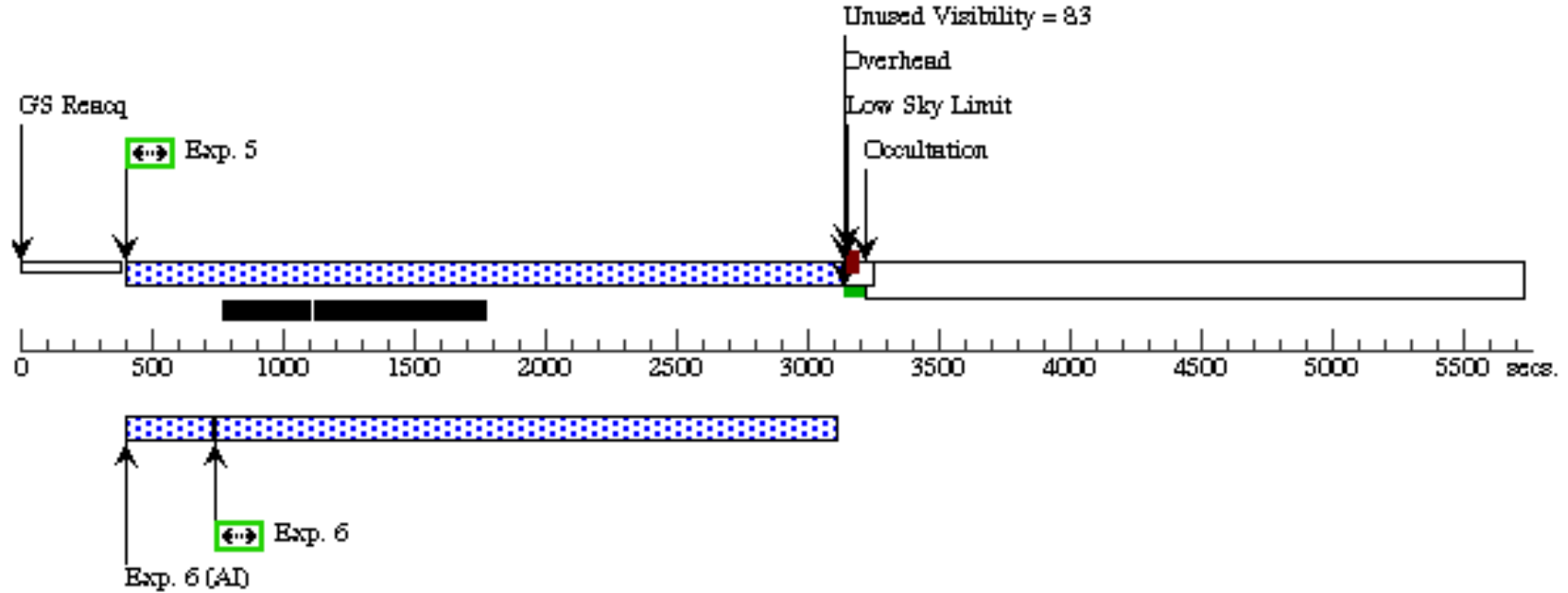
Orbit 2

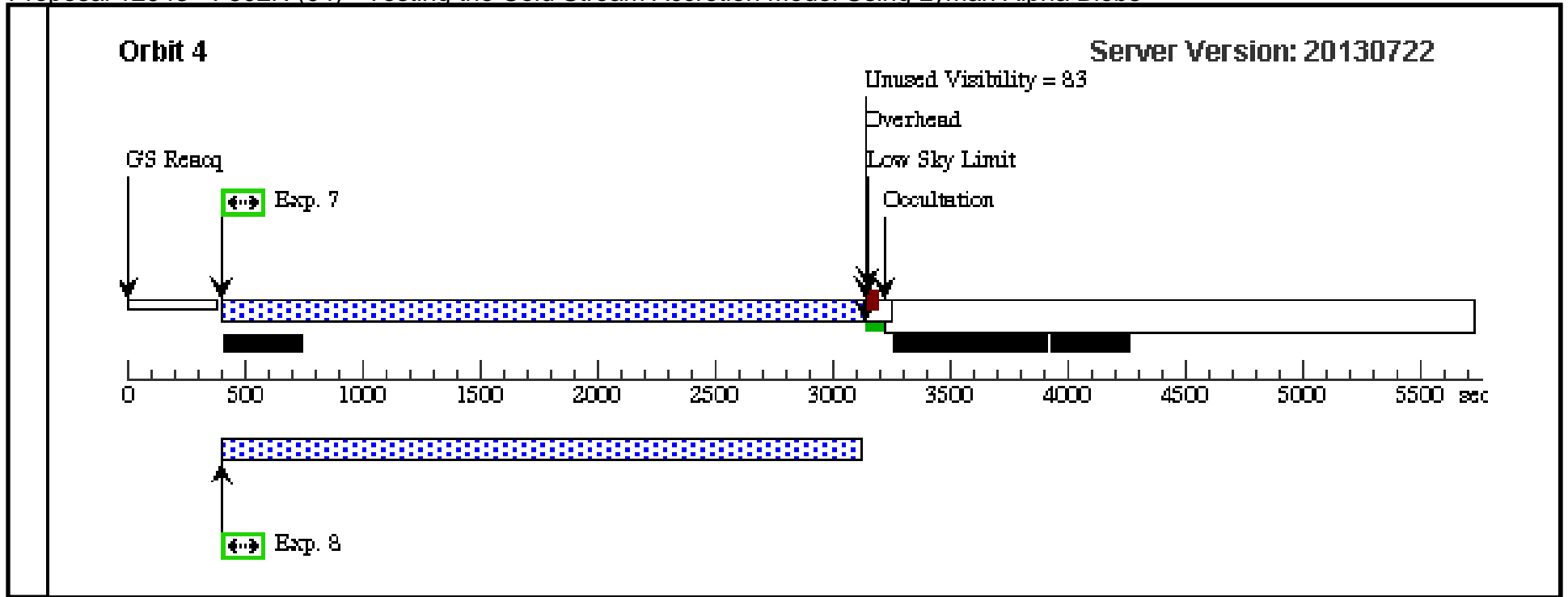
Server Version: 20130722



Orbit 3

Server Version: 20130722





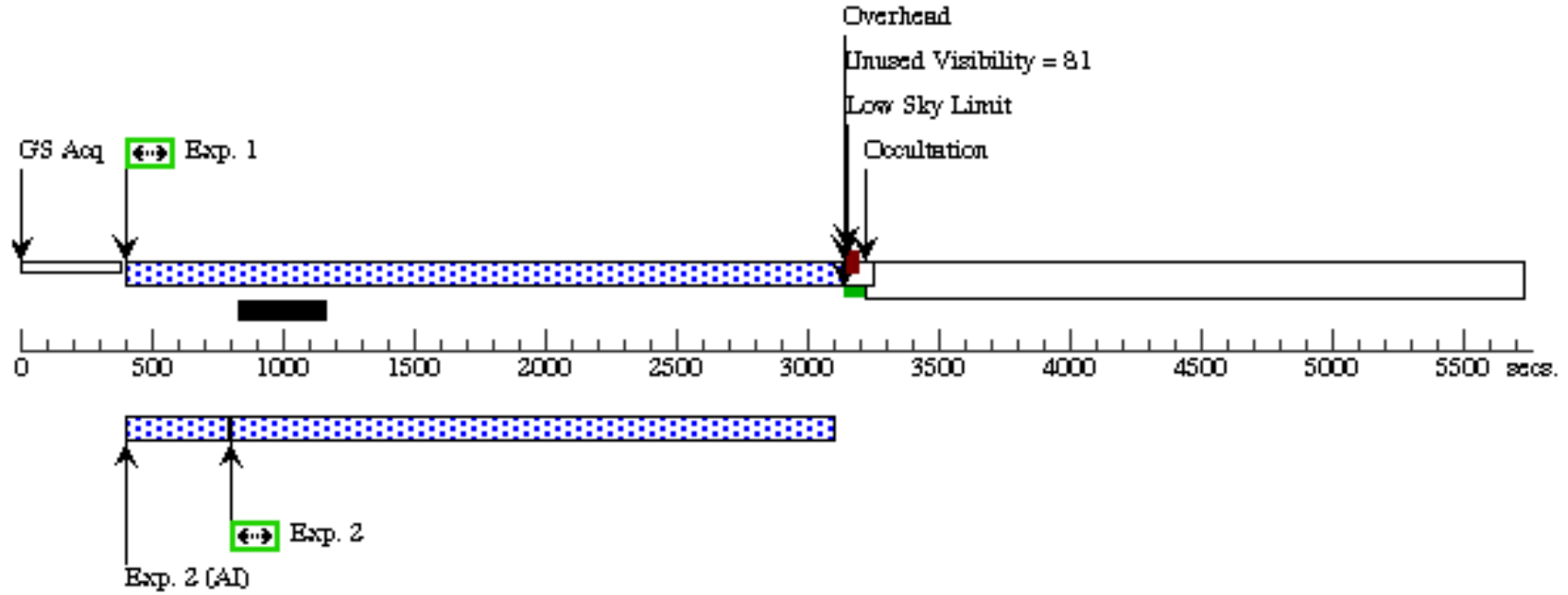
Proposal 12943 - F502N (05) - Testing the Cold Stream Accretion Model Using Lyman Alpha Blobs

Tue Aug 20 01:10:43 GMT 2013

| Visit | Proposal 12943, F502N (05), implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 74D TO 74 D; ORIENT 254D TO 254 D | | | | | | | | | |
|-----------|---|-----------|--|-------------------------------|---|-----------------------|---------------------------------|--|---------------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (1) | SSA22-LAB | RA: 22 17 32.5108 (334.3854617d) Dec: +00 13 2.99 (.21750d) Equinox: J2000 | Redshift: 3.09 | V=(?) Flux(Lyman-alpha) ~ 1e-16 erg/s/cm^2 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
| | 1 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.08,0.08; LOW-SKY | Prime + Parallel Group 1-2 in F502N (05) | 2700 Secs (2700 Secs) [==>] | [1] |
| | 2 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 1-2 in F502N (05) | 2150 Secs (2150 Secs) [==>] | [1] |
| | 3 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.08,0.08; LOW-SKY | Prime + Parallel Group 3-4 in F502N (05) | 2730 Secs (2730 Secs) [==>] | [2] |
| | 4 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 3-4 in F502N (05) | 2600 Secs (2600 Secs) [==>] | [2] |
| | 5 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.08,0.08; LOW-SKY | Prime + Parallel Group 5-6 in F502N (05) | 2730 Secs (2730 Secs) [==>] | [3] |
| | 6 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | | | Prime + Parallel Group 5-6 in F502N (05) | 2220 Secs (2220 Secs) [==>] | [3] |
| | 7 | F502N | (1) SSA22-LAB | WFC3/UVIS, ACCUM, UVIS-CENTER | F502N | FLASH=12 | POS TARG -0.08,0.08; LOW-SKY | Prime + Parallel Group 7-8 in F502N (05) | 2730 Secs (2730 Secs) [==>] | [4] |
| | 8 | ACS grism | ANY | ACS/WFC, ACCUM, WFC | G800L | AUTOIMAGE=NO | | Prime + Parallel Group 7-8 in F502N (05) | 2600 Secs (2600 Secs) [==>] | [4] |

Orbit 1

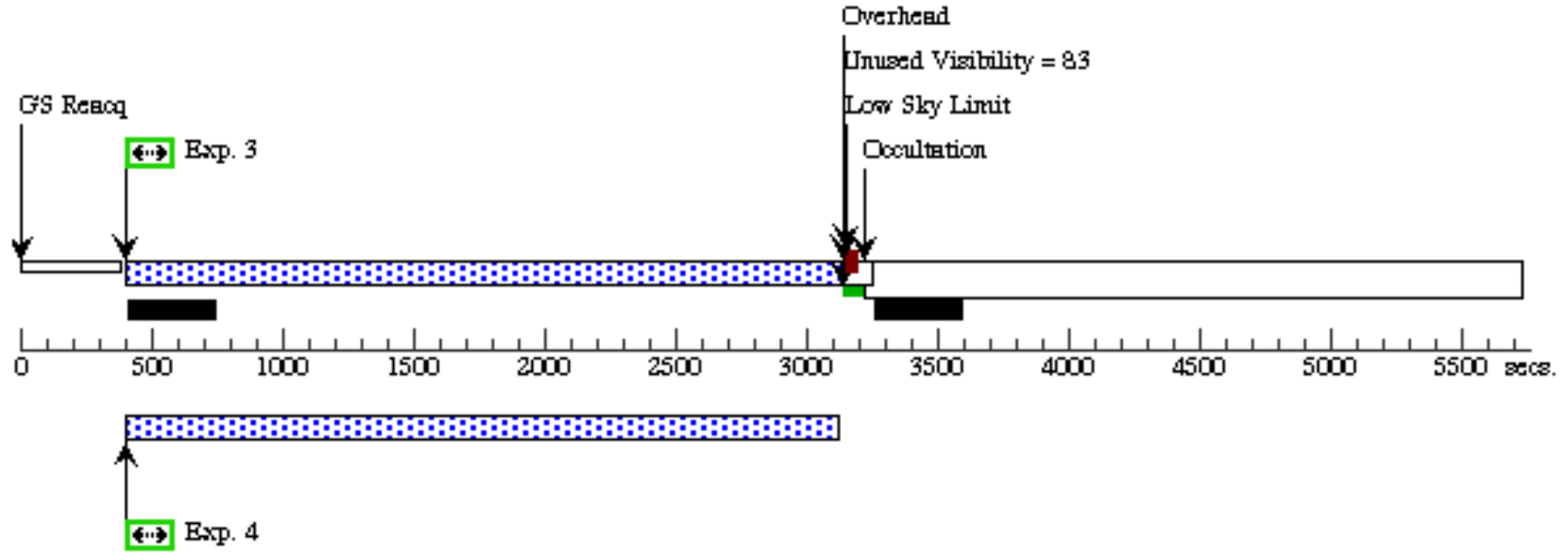
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Orbit Structure

Orbit 2

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Orbit 3

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