



## 16081 - Let's Point Hubble at a Bubble!

Cycle: 27, Proposal Category: GO

(JWST 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           | (24) COSMOS-Z7-FIELD-1       | WFC3/IR                             | 3                  | 02-Apr-2020 15:00:35.0        | yes                           |
| 02           | (23) COSMOS-Z7-FIELD-2       | WFC3/IR                             | 3                  | 02-Apr-2020 15:00:37.0        | yes                           |

6 Total Orbits Used

### ABSTRACT

## Proposal 16081 (STScI Edit Number: 0, Created: Thursday, April 2, 2020 at 2:00:37 PM Eastern Standard Time) - Overview

We have an opportunity to study an ionized region in the redshift 7 universe that has just been identified, after extensive imaging searches followed by spectroscopic confirmation of five Lyman alpha emitting galaxies in the last month. Most of these galaxies have Lyman-alpha equivalent widths incompatible with a neutral intergalactic medium (IGM), and they cluster in small region of the survey, pointing to an ionized bubble in the IGM which allows LyA to escape. All five can be observed in a single imaging field of WFC3-IR. We here request 6 orbits of HST mid-cycle time to (1) reliably measure continuum fluxes and equivalent widths (2) look for fainter, non-LyA emitting neighbors and achieve a more complete census of ionizing photons in this region, and (3) study the sizes of redshift 7 galaxies both in starlight and in Lyman alpha light. Midcycle observations will best enable the results to inform timely JWST observations of the epoch of reionization.

This combination of wide field searches for such bubbles, as indicated by LyA galaxies, followed by deep observations with Hubble, is uniquely powerful. It provides huge synergy to study both the progress of reionization in this crucial, central phase, and also the nature of the galaxies that drive this change.

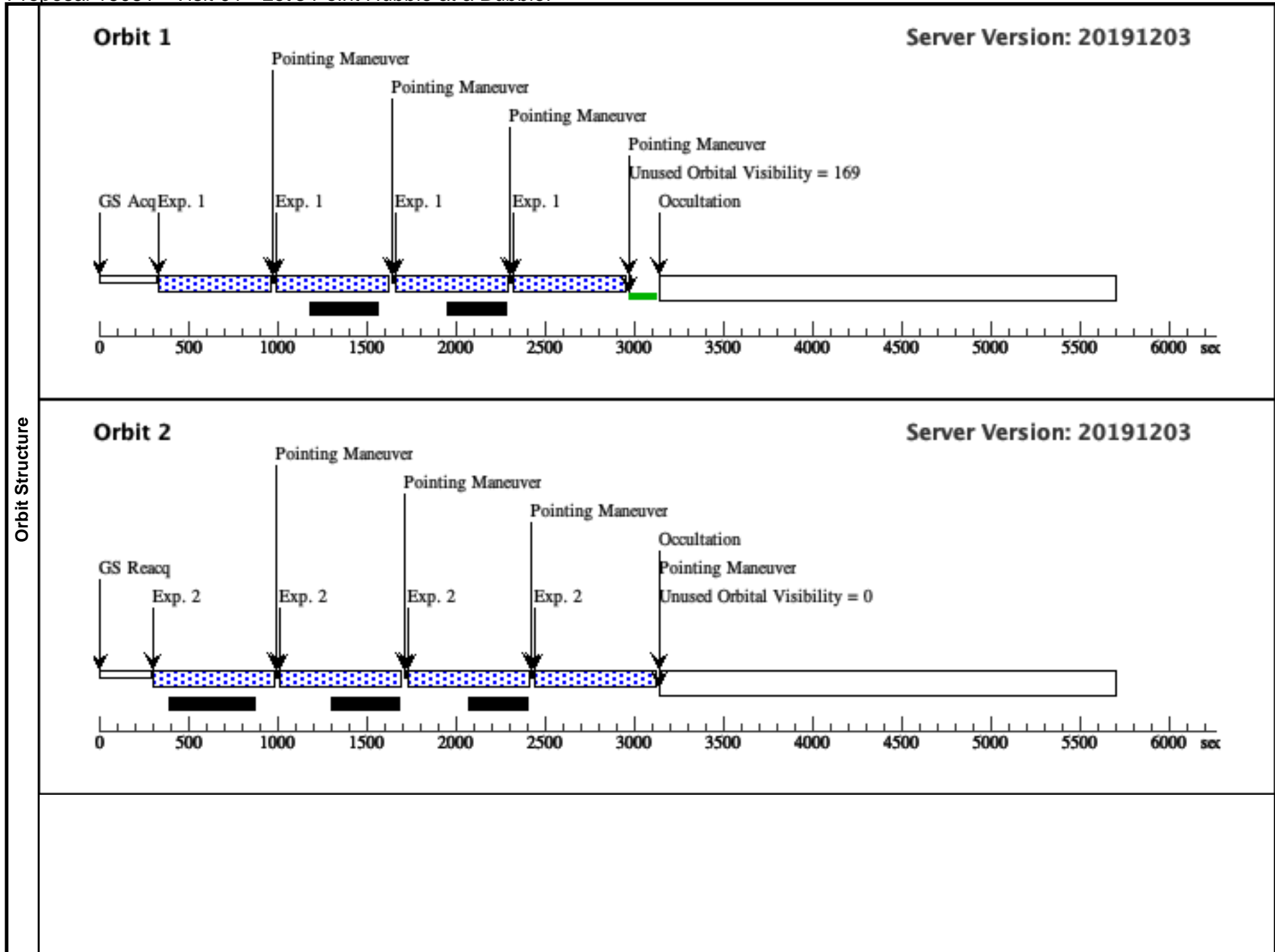
### **OBSERVING DESCRIPTION**

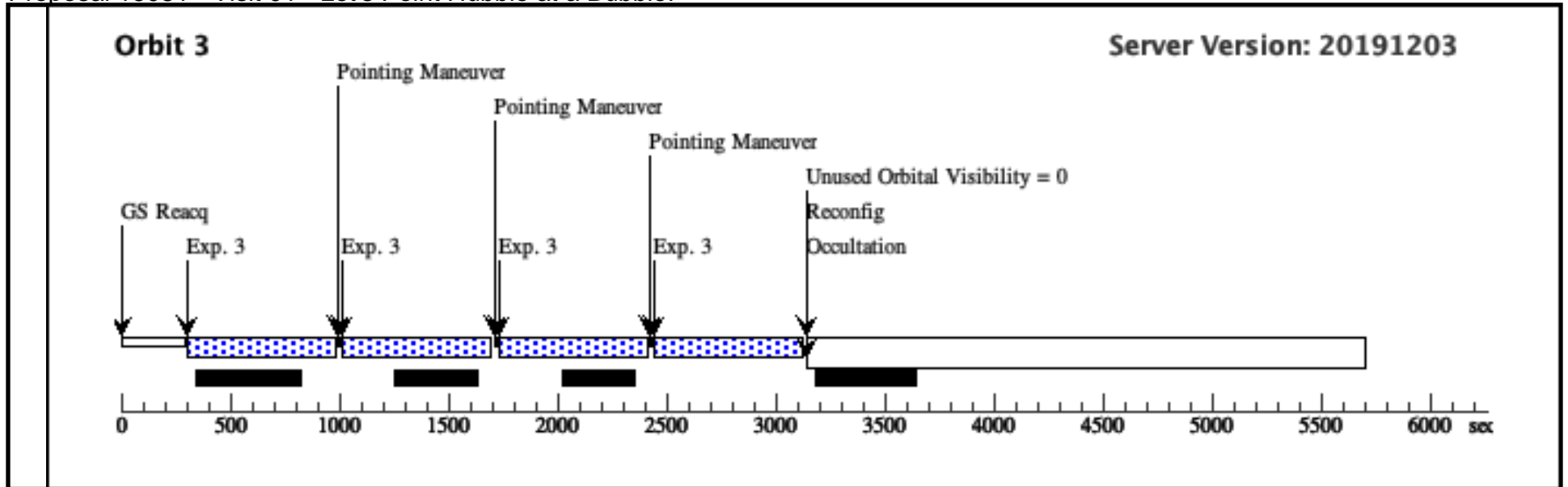
Six orbits to do three filters. One field. A bit of dithering.

Proposal 16081 - Visit 01 - Let's Point Hubble at a Bubble!

Thu Apr 02 19:00:37 GMT 2020

| Visit         | <b>Proposal 16081, Visit 01</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/IR<br>Special Requirements: (none) |  |  |                             |  |                                   |                                     |  |  |       |
|---------------|--|--|--|-----------------------------|--|-----------------------------------|-------------------------------------|--|--|-------|
|               | Patterns   | #  | Primary Pattern  | Secondary Pattern           | Exposures  |                                   |                                     |  |  |       |
|               | (1)  | Pattern Type=WFC3-IR-DITHER-BOX-MIN<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.572<br>Line Spacing=0.365 | Coordinate Frame=POS-TARG<br>Pattern Orientation=18.528<br>Angle Between Sides=74.653<br>Center Pattern=true |                             | (1), (2), (3)  |                                   |                                     |  |  |       |
| Fixed Targets | #  | Name   | Target Coordinates   | Targ. Coord. Corrections    | Fluxes   | Miscellaneous                     |                                     |  |  |       |
|               | (24)   | COSMOS-Z7-FIELD-1  | RA: 10 03 35.6621 (150.8985921d)<br>Dec: +02 08 9.62 (2.13601d)<br>Equinox: J2000                            |                             | V=29+/-1<br>NB=24.3,<br>y=27. Coords are center of field | Reference Frame: ICRS             |                                     |  |  |       |
|               | <i>Comments:</i><br>Category=GALAXY<br>Description=[HIGH REDSHIFT GALAXY]  |  |  |                             |  |                                   |                                     |  |  |       |
| Exposures     | #  | Label  | Target   | Config,Mode,Aperture        | Spectral Els.  | Opt. Params.                      | Special Reqs.                       | Groups   | Exp. Time (Total)/[Actual Dur.]  | Orbit |
|               | 1  |  | (24) COSMOS-Z7-FIELD-1   | WFC3/IR, MULTIACCUM, IR-FIX | F125W  | NSAMP=13;<br>SAMP-SEQ=SPAR<br>S50 |                                     | Pattern 1, Exps 1-1 in Visit 01 (1)  | 602.937703 Secs (2411.751 Secs)  |       |
|               |  |  |  |                             |  |                                   |                                     |  | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [1]   |
|               | 2  |  | (24) COSMOS-Z7-FIELD-1   | WFC3/IR, MULTIACCUM, IR-FIX | F098M  | NSAMP=14;<br>SAMP-SEQ=SPAR<br>S50 |                                     | Pattern 1, Exps 2-2 in Visit 01 (1)  | 652.938154 Secs (2611.753 Secs)  |       |
|               |  |  |  |                             |  |                                   |                                     | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [2]  |       |
| 3             |  | (24) COSMOS-Z7-FIELD-1   | WFC3/IR, MULTIACCUM, IR-FIX  | F160W                       | NSAMP=14;<br>SAMP-SEQ=SPAR<br>S50                        |                                   | Pattern 1, Exps 3-3 in Visit 01 (1) | 652.938154 Secs (2611.753 Secs)  |  |       |
|               |  |  |  |                             |  |                                   |                                     | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [3]  |       |





Proposal 16081 - Visit 02 - Let's Point Hubble at a Bubble!

Thu Apr 02 19:00:38 GMT 2020

| Visit         | <b>Proposal 16081, Visit 02</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: WFC3/IR<br>Special Requirements: (none) |  |  |                             |  |                                   |               |  |  |       |
|---------------|--|--|--|-----------------------------|--|-----------------------------------|---------------|--|--|-------|
|               | Patterns   | #  | Primary Pattern  | Secondary Pattern           | Exposures  |                                   |               |  |  |       |
|               | (1)  | Pattern Type=WFC3-IR-DITHER-BOX-MIN<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.572<br>Line Spacing=0.365 | Coordinate Frame=POS-TARG<br>Pattern Orientation=18.528<br>Angle Between Sides=74.653<br>Center Pattern=true |                             | (1), (2), (3)  |                                   |               |  |  |       |
| Fixed Targets | #  | Name   | Target Coordinates   | Targ. Coord. Corrections    | Fluxes   | Miscellaneous                     |               |  |  |       |
|               | (23)   | COSMOS-Z7-FIELD-2  | RA: 10 03 31.6431 (150.8818463d)<br>Dec: +02 08 28.06 (2.14113d)<br>Equinox: J2000                           |                             | V=29+/-1<br>NB=24.3,<br>y=27. Coords are center of field | Reference Frame: ICRS             |               |  |  |       |
|               | <i>Comments:</i><br>Category=GALAXY<br>Description=[HIGH REDSHIFT GALAXY]  |  |  |                             |  |                                   |               |  |  |       |
| Exposures     | #  | Label  | Target   | Config,Mode,Aperture        | Spectral Els.  | Opt. Params.                      | Special Reqs. | Groups   | Exp. Time (Total)/[Actual Dur.]  | Orbit |
|               | 1  |  | (23) COSMOS-Z7-FIELD-2   | WFC3/IR, MULTIACCUM, IR-FIX | F125W  | NSAMP=13;<br>SAMP-SEQ=SPAR<br>S50 |               | Pattern 1, Exps 1-1 in Visit 02 (1)  | 602.937703 Secs (2411.751 Secs)  |       |
|               |  |  |  |                             |  |                                   |               |  | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [1]   |
|               | 2  |  | (23) COSMOS-Z7-FIELD-2   | WFC3/IR, MULTIACCUM, IR-FIX | F098M  | NSAMP=14;<br>SAMP-SEQ=SPAR<br>S50 |               | Pattern 1, Exps 2-2 in Visit 02 (1)  | 652.938154 Secs (2611.753 Secs)  |       |
|               |  |  |  |                             |  |                                   |               | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [2]  |       |
|               | 3  |  | (23) COSMOS-Z7-FIELD-2   | WFC3/IR, MULTIACCUM, IR-FIX | F160W  | NSAMP=14;<br>SAMP-SEQ=SPAR<br>S50 |               | Pattern 1, Exps 3-3 in Visit 02 (1)  | 652.938154 Secs (2611.753 Secs)  |       |
|               |  |  |  |                             |  |                                   |               | [==>(Pattern 1)]<br>[==>(Pattern 2)]<br>[==>(Pattern 3)]<br>[==>(Pattern 4)] | [3]  |       |

