# 17599 - The optical emission of the highest redshift lens system

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**


| *Name* | *Institution* |
|---|---|
| **Prof. Pieter van Dokkum (PI) (Contact)** | **Yale University** |
| Dr. Gabriel Brammer (CoI) (ESA Member) | University of Copenhagen, Niels Bohr Institute |
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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) JWST-ER1 | WFC3/UVIS | 2 | 03-Jul-2024 14:00:16.0 | yes |
| 02 | (1) JWST-ER1 | WFC3/UVIS | 2 | 03-Jul-2024 14:00:16.0 | yes |
| 03 | (1) JWST-ER1 | WFC3/UVIS | 2 | 03-Jul-2024 14:00:17.0 | yes |
| 04 | (1) JWST-ER1 | WFC3/UVIS | 2 | 03-Jul-2024 14:00:17.0 | yes |
| 54 | (1) JWST-ER1 | WFC3/UVIS | 1 | 03-Jul-2024 14:00:18.0 | yes |
| 05 | (1) JWST-ER1 | WFC3/UVIS | 2 | 03-Jul-2024 14:00:18.0 | yes |

11 Total Orbits Used

**ABSTRACT**

Extensive studies with HST have shown that the most massive galaxies at z~2 are very compact. These compact massive galaxies are thought to be the cores of today's giant ellipticals, observed prior to growing their outer envelopes through a succession of minor mergers. Recently one of these

galaxies was serendipitously found to have a complete Einstein ring in JWST images. It is the first JWST-discovered Einstein ring and also the highest redshift lens known to date. Currently there are only ground-based images of this system below 0.8 micron, making it impossible to separate the lens from the ring at optical wavelengths. Here we propose to complement the 4-band NIRCAM near-IR data for this system with 5-band UVIS imaging. The main goal is to disentangle the currently-blended optical emission sources. This will yield the redshift of the ring from the location of the Lyman break and provide much improved constraints on the stellar populations of both the lens and the ring. Given the expected interest in these data we waive the proprietary time.

**OBSERVING DESCRIPTION**

Images are taken in 5 medium band filters. The exposure time is the same for all filters: there are 4 exposure in 2 orbits, in 1 visit, for each filter. The exposure time per exposure is about 1300s.

The standard box dither pattern is used to improve sampling of the PSF.

5 electrons of FLASH is added to each exposure. There is a discrepancy between the ETC and the APT when it comes to the FLASH requirement: according to the ETC this is only needed for F845M but according to APT it is needed for all filters.  Conservatively it is applied to all filters.

# Proposal 17599 - Visit 01 - The optical emission of the highest redshift lens system

## Visit

**Proposal 17599, Visit 01, completed** Wed Jul 03 18:00:18 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(Visit 01) Warning (Orbit Planner): GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 01) special requirements) Warning (Form): The specified GS Acq Scenario is not in the current list of valid scenarios.

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-BOX<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.173<br>Line Spacing=0.112 | Coordinate Frame=POS-TARG<br>Pattern Orientation=23.884<br>Angle Between Sides=81.785<br>Center Pattern=false | | (1) |

## Fixed Targets

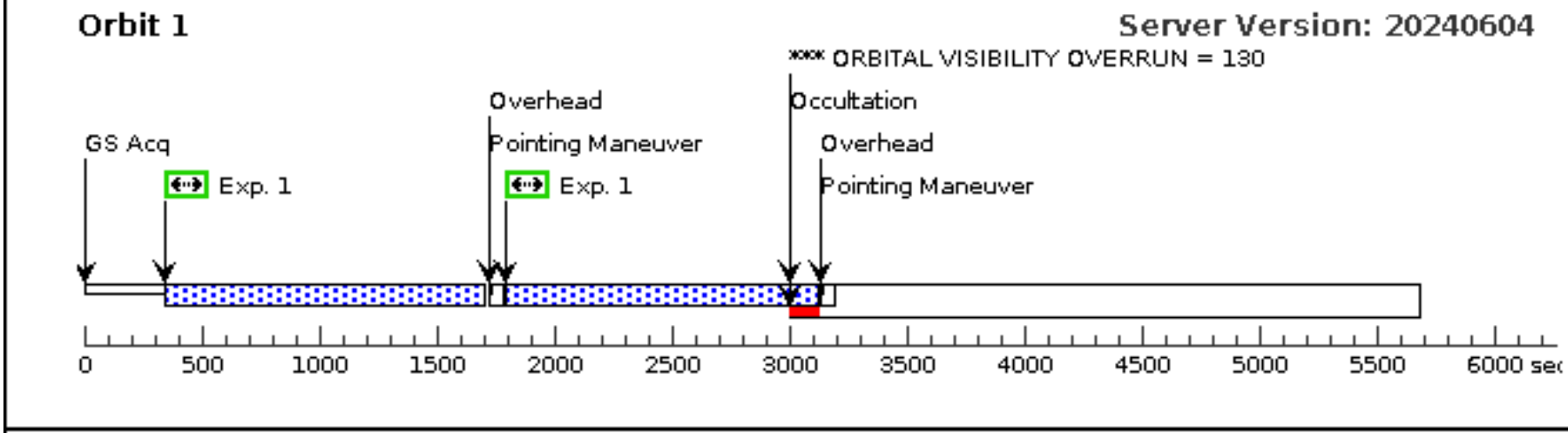
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

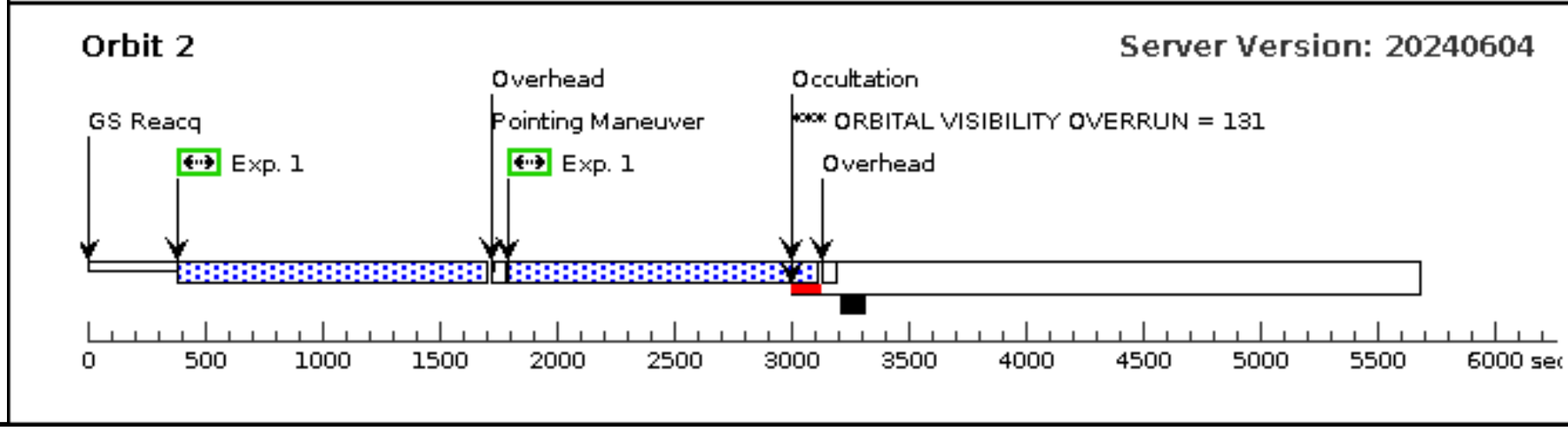
*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F547M | | GS ACQ SCENARIO BASE1B3 | Pattern 1, Exps 1-1 in Visit 01 (1) | 1250 Secs (5308 Secs) | |
| | | | | | | | | *[==>1329.0 Secs (Pattern 1)]*<br>*[==>1329.0 Secs (Pattern 2)]* | ***[1]*** |
| | | | | | | | | *[==>1325.0 Secs (Pattern 3)]*<br>*[==>1325.0 Secs (Pattern 4)]* | ***[2]*** |

Orbit Structure



## Visit

**Proposal 17599, Visit 02, completed** Wed Jul 03 18:00:18 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(Visit 02) Warning (Orbit Planner): GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 02) special requirements) Warning (Form): The specified GS Acq Scenario is not in the current list of valid scenarios.

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-BOX<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.173<br>Line Spacing=0.112 | Coordinate Frame=POS-TARG<br>Pattern Orientation=23.884<br>Angle Between Sides=81.785<br>Center Pattern=false | | (1) |

## Fixed Targets

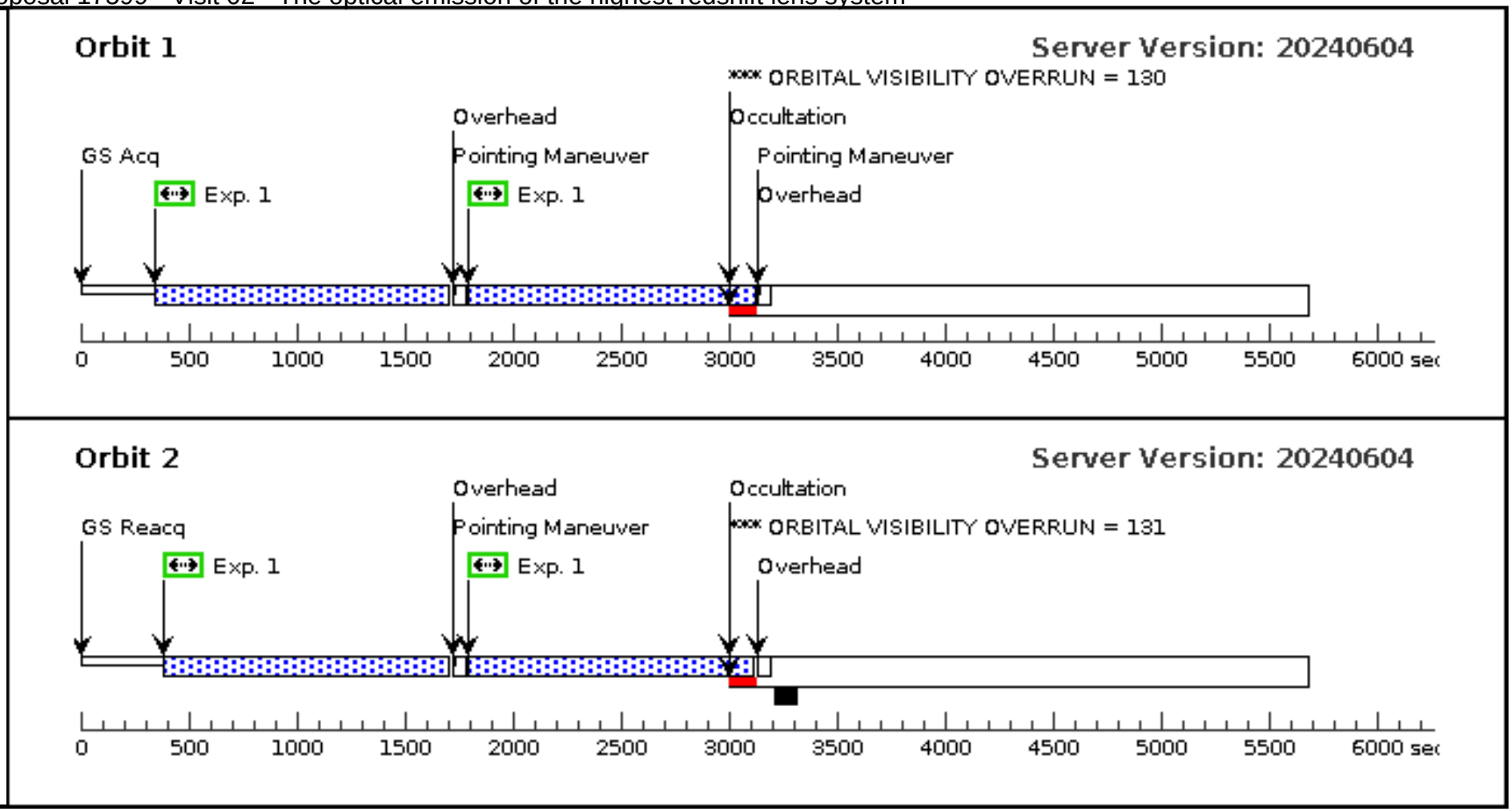
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F621M | | GS ACQ SCENARIO BASE1B3 | Pattern 1, Exps 1-1 in Visit 02 (1) | 1250 Secs (5308 Secs) | |
| | | | | | | | | *[==>1329.0 Secs (Pattern 1)]*<br>*[==>1329.0 Secs (Pattern 2)]* | ***[1]*** |
| | | | | | | | | *[==>1325.0 Secs (Pattern 3)]*<br>*[==>1325.0 Secs (Pattern 4)]* | ***[2]*** |

Orbit Structure



# Proposal 17599 - Visit 03 - The optical emission of the highest redshift lens system

## Visit

**Proposal 17599, Visit 03, completed** Wed Jul 03 18:00:19 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(Visit 03) Warning (Orbit Planner): GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE

(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 03) special requirements) Warning (Form): The specified GS Acq Scenario is not in the current list of valid scenarios.

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-BOX<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.173<br>Line Spacing=0.112 | Coordinate Frame=POS-TARG<br>Pattern Orientation=23.884<br>Angle Between Sides=81.785<br>Center Pattern=false | | (1) |

## Fixed Targets

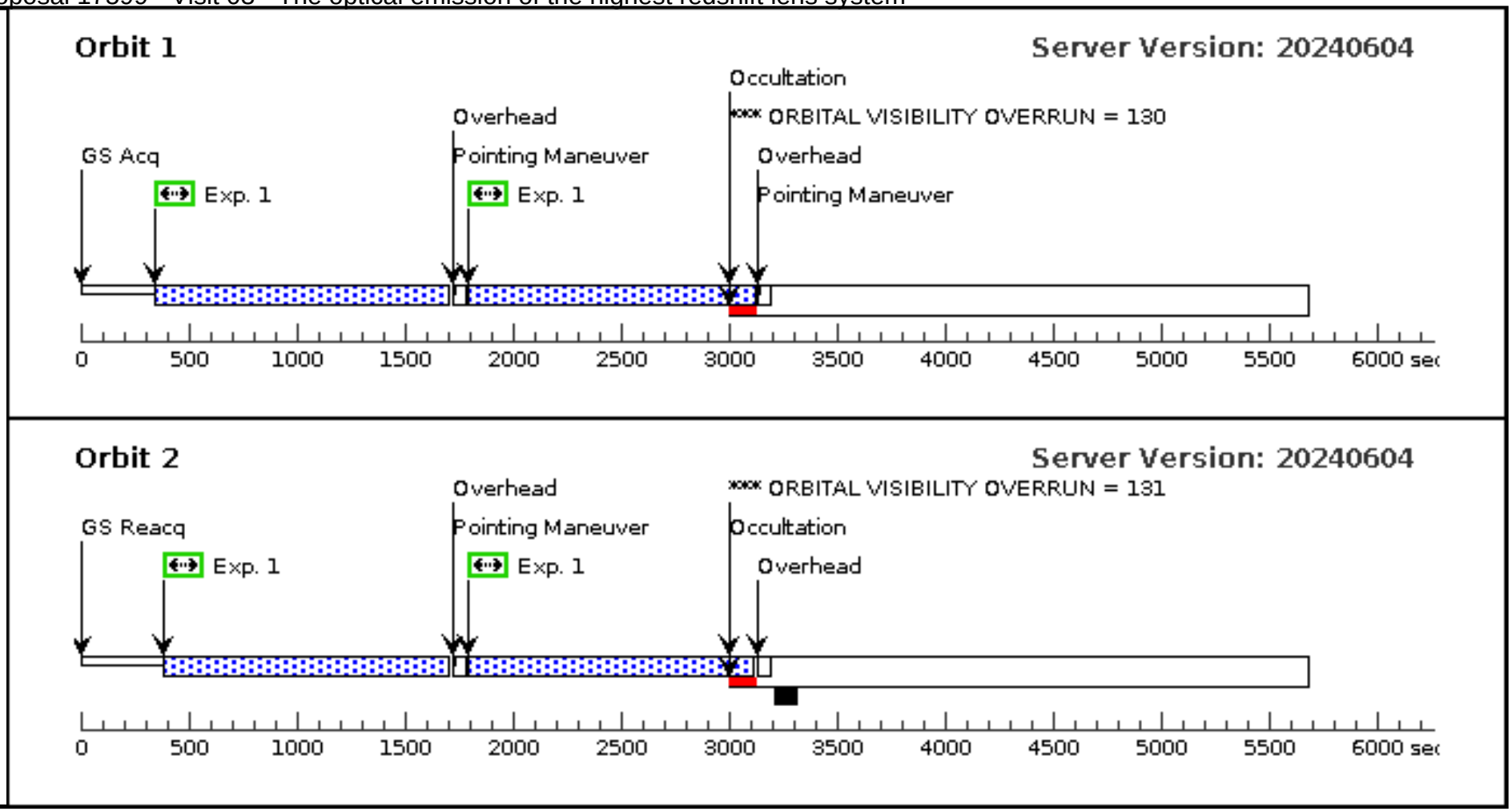
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F689M | | GS ACQ SCENARIO BASE1B3 | Pattern 1, Exps 1-1 in Visit 03 (1) | 1250 Secs (5308 Secs) | |
| | | | | | | | | *[==>1329.0 Secs (Pattern 1)]*<br>*[==>1329.0 Secs (Pattern 2)]* | ***[1]*** |
| | | | | | | | | *[==>1325.0 Secs (Pattern 3)]*<br>*[==>1325.0 Secs (Pattern 4)]* | ***[2]*** |

Orbit Structure



## Visit

**Proposal 17599, Visit 04, failed** Wed Jul 03 18:00:19 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(Visit 04) Warning (Orbit Planner): GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE

(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 04) special requirements) Warning (Form): The specified GS Acq Scenario is not in the current list of valid scenarios.

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-BOX<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.173<br>Line Spacing=0.112 | Coordinate Frame=POS-TARG<br>Pattern Orientation=23.884<br>Angle Between Sides=81.785<br>Center Pattern=false | | (1) |

## Fixed Targets

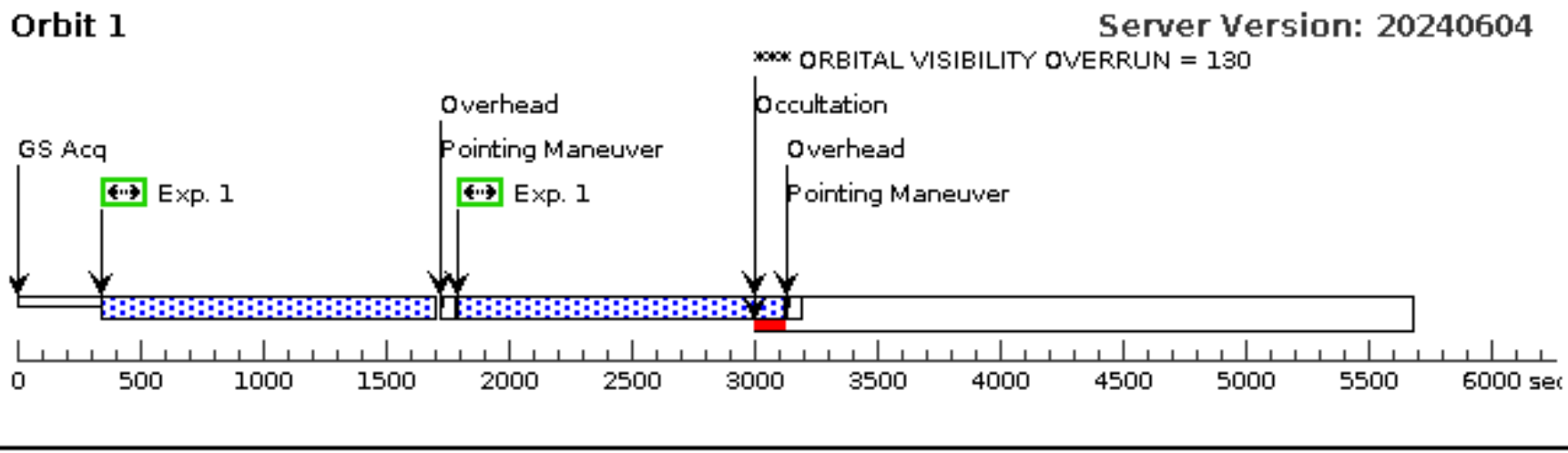
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

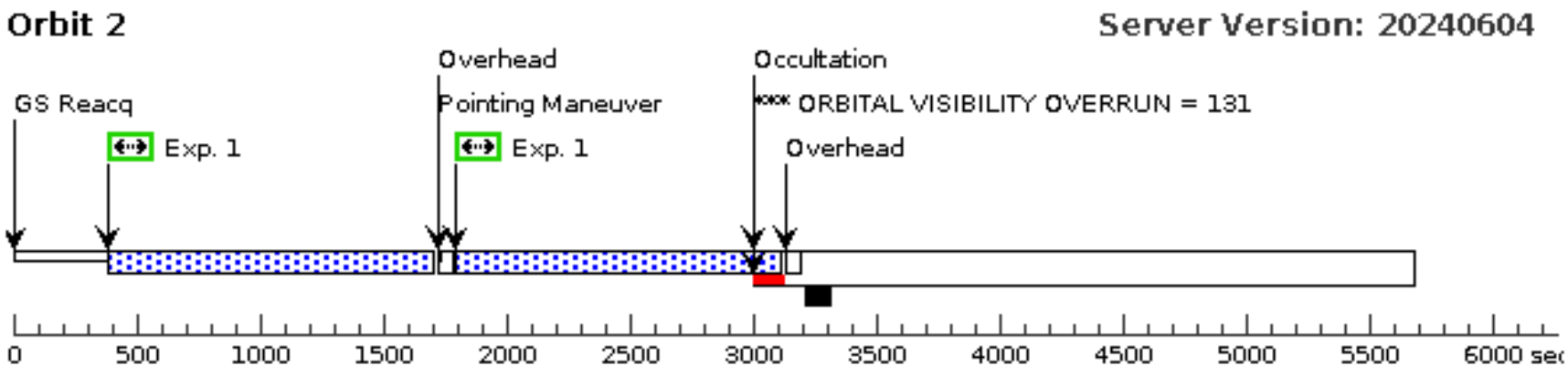
*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F763M | | GS ACQ SCENARIO BASE1B3 | Pattern 1, Exps 1-1 in Visit 04 (1) | 1250 Secs (5308 Secs) | |
| | | | | | | | | *[==>1329.0 Secs (Pattern 1)]*<br>*[==>1329.0 Secs (Pattern 2)]* | ***[1]*** |
| | | | | | | | | *[==>1325.0 Secs (Pattern 3)]*<br>*[==>1325.0 Secs (Pattern 4)]* | ***[2]*** |

Orbit Structure



## Visit

**Proposal 17599, Visit 54, implementation** Wed Jul 03 18:00:19 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

*Comments: HOPR repeat of visit 04.*

*Only first obit is being repeated. POS-TARGs have been used to define the first to dither positions.*
*Exp 1 x= 0.00, y= 0.00*
*Exp 2 x= 4.00, y= 1.50*

## Diagnostics

(Exposure 1 (Visit 54)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Exposure 2 (Visit 54)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

## Fixed Targets

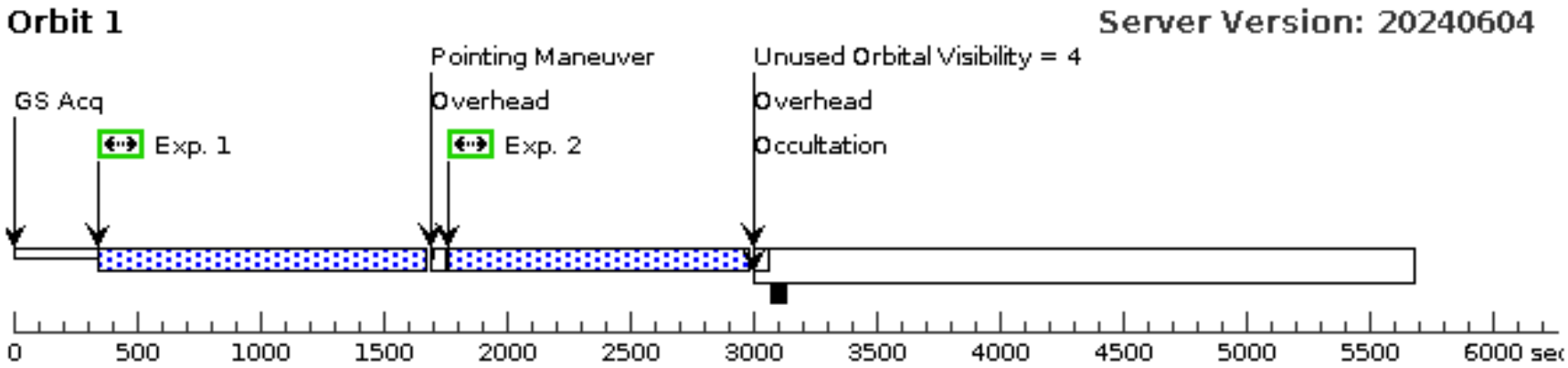
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F763M | | POS TARG 0.00,0.00;<br>GS ACQ SCENARIO BASE1O3 | | 1250 Secs (1303 Secs)<br>*[==>1303.0 Secs ]* | ***[1]*** |
| 2 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F763M | | POS TARG 4.00,1.50 | | 1250 Secs (1224 Secs)<br>*[==>1224.0 Secs ]* | ***[1]*** |

## Orbit Structure



## Visit

**Proposal 17599, Visit 05, completed** Wed Jul 03 18:00:19 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Diagnostics

(Visit 05) Warning (Orbit Planner): GS ACQ SCENARIO REQUESTED INCONSISTENT WITH VISIT GYRO MODE

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 05)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 05) special requirements) Warning (Form): The specified GS Acq Scenario is not in the current list of valid scenarios.

## Patterns

| # | Primary Pattern | | Secondary Pattern | Exposures |
|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-DITHER-BOX<br>Purpose=DITHER<br>Number Of Points=4<br>Point Spacing=0.173<br>Line Spacing=0.112 | Coordinate Frame=POS-TARG<br>Pattern Orientation=23.884<br>Angle Between Sides=81.785<br>Center Pattern=false | | (1) |

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | JWST-ER1 | RA: 10 00 24.1736 (150.1007233d)<br>Dec: +01 53 34.17 (1.89282d)<br>Equinox: J2000 | | V=25 | Reference Frame: ICRS |

*Comments:*
*Category=GALAXY*
*Description=[EINSTEIN RING, GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY]*
*Extended=YES*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) JWST-ER1 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F845M | FLASH=5 | GS ACQ SCENARIO BASE1B3 | Pattern 1, Exps 1-1 in Visit 05 (1) | 1250 Secs (5298 Secs) | |
| | | | | | | | | *[==>1327.0 Secs (Pattern 1)]*<br>*[==>1327.0 Secs (Pattern 2)]* | ***[1]*** |
| | | | | | | | | *[==>1322.0 Secs (Pattern 3)]*<br>*[==>1322.0 Secs (Pattern 4)]* | ***[2]*** |

Orbit Structure