# 17404 - Mass Measurement of a Candidate Balck Hole Microlens with Systematic Error Control

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**

| *Name* | *Institution* |
|---|---|
| **Dr. David P. Bennett (PI) (Contact)** | **University of Maryland** |
| Dr. Jean-Philippe Beaulieu (CoI) (ESA Member) | CNRS, Institut d'Astrophysique de Paris |
| Dr. Joshua Blackman (CoI) (ESA Member) | University of Bern |
| Dr. Aparna Bhattacharya (CoI) | University of Maryland |
| Dr. Ian Bond (CoI) | Massey University |
| Dr. Naoki Koshimoto (CoI) | Osaka University |
| Casey Lam (CoI) | Carnegie Institution of Washington |
| Dr. Jessica Ryan Lu (CoI) | University of California - Berkeley |
| Dr. Przemek Mroz (CoI) (ESA Member) | Warsaw University |
| Dr. Clement Ranc (CoI) (ESA Member) | CNRS, Institut d'Astrophysique de Paris |
| Jan Skowron (CoI) (ESA Member) | Warsaw University |
| Prof. Takahiro Sumi (CoI) | Osaka University |
| Dr. Sean Terry (CoI) (CoPI) | University of Maryland College Park |
| Dr. Andrzej Udalski (CoI) (ESA Member) | Warsaw University |
| Dr. Aikaterini Vandorou (CoI) | University of Maryland |

**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 2 | 12-Jun-2024 14:00:21.0 | yes |

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 51 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 1 | 12-Jun-2024 14:00:23.0 | yes |
| 52 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 1 | 12-Jun-2024 14:00:25.0 | yes |
| 53 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 1 | 12-Jun-2024 14:00:26.0 | yes |
| 02 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 2 | 12-Jun-2024 14:00:28.0 | yes |
| 54 | (1) MOA-2019-BLG-284 | WFC3/UVIS | 1 | 12-Jun-2024 14:00:30.0 | yes |

8 Total Orbits Used

**ABSTRACT**

We propose Hubble imaging of the black hole candidate microlens system MOA-2019-BLG-284 in order to measure the astrometric microlensing signal and determine the lens system mass. Microlensing is the only method that can detect black holes that are isolated or in stable, non-accreting binary systems, so routine detection of black hole astrometric microlensing will provide a significant advance in our understanding of the formation of stellar mass black holes. Our proposed observations will determine if the MOA-2019-BLG-284 lens system is a rare stable binary system with a black hole primary or an isolated stellar mass black hole. This observing program is designed to address possible systematic errors in the astrometric measurements. We will also use the Hubble data to correct systematic errors in the ground-based photometry that determines the microlensing parallax. Since both astrometric microlensing and microlensing parallx measurements are needed to determine black hole masses, an understanding of systematic errors in both quantaties is needed for reliable mass measurements. The novel systematic error correction methods that we propose may be used to increase the sensitivity of future black hole mass measurements from astrometric and photometric microlensing.

**OBSERVING DESCRIPTION**

We request two visits per year of two orbits each, with one orbit to observe in each of the F814W and F606W passbands. This is 4 orbits per year for a total of 12 orbits over 3 years. We require a time series of data in both the F814W and F606W passbands for two reasons. First, we can get redundant astrometry measurements with two passband, and this will help to understand possible systematic astrometry errors. The two passbands will also provide a critical test of the possibility of models with binary source stars, since astrometric microlensing of binary source stars is generally color dependent. The spring and fall data are necessary in order to obtain a time series of observations with roll angles changing by 180 degrees every ~ 6 months. This will provide yearly imaging with PSF distortions due to CTE losses in nearly opposite directions in alternate visits. The roll angles used will be the same as two previous observing programs for this target (Bennett et al. 2020, Terry et al. 2021) in order to provide two long duration,

independent data sets with nearly opposite directions of CCD charge transfer. The strongest astrometric microlensing signals are expected at twice the Einstein radius crossing time ( ~ 570 days) after the event peak, which will be in mid-2023 for MB19284. However, as Dominik & Sahu (2002) point out, it is necessary to make astrometric microlensing observations for a longer duration (at least 3 Einstein radius crossing times) to separate the astrometric microlensing signal from the linear proper motion of the source star. We propose observations over 3 cycles to obtain the last observation at 3.6 Einstein radius crossing times after the light curve peak. We request 18 exposures per orbit in the WFC3/UVIS F814W and F606W passbands to get good spatial sampling of the effective PSFs (Anderson and King 2000) and to avoid saturation. So, we select the UVIS2-C1K1C-SUB subarray to minimize PSF distortions due to the effects of CTE degradation.

We require observations within two weeks of one of our May and September 2020 and 2021 observations in order to minimize the effect of parallax motion of our astrometric reference stars between visits in different years.

## Visit

**Proposal 17404, Visit 01, failed**

Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 89D TO 89 D; BETWEEN 15-SEP-2023:00:00:00 AND 30-OCT-2023:00:00:00

## Diagnostics

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

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

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

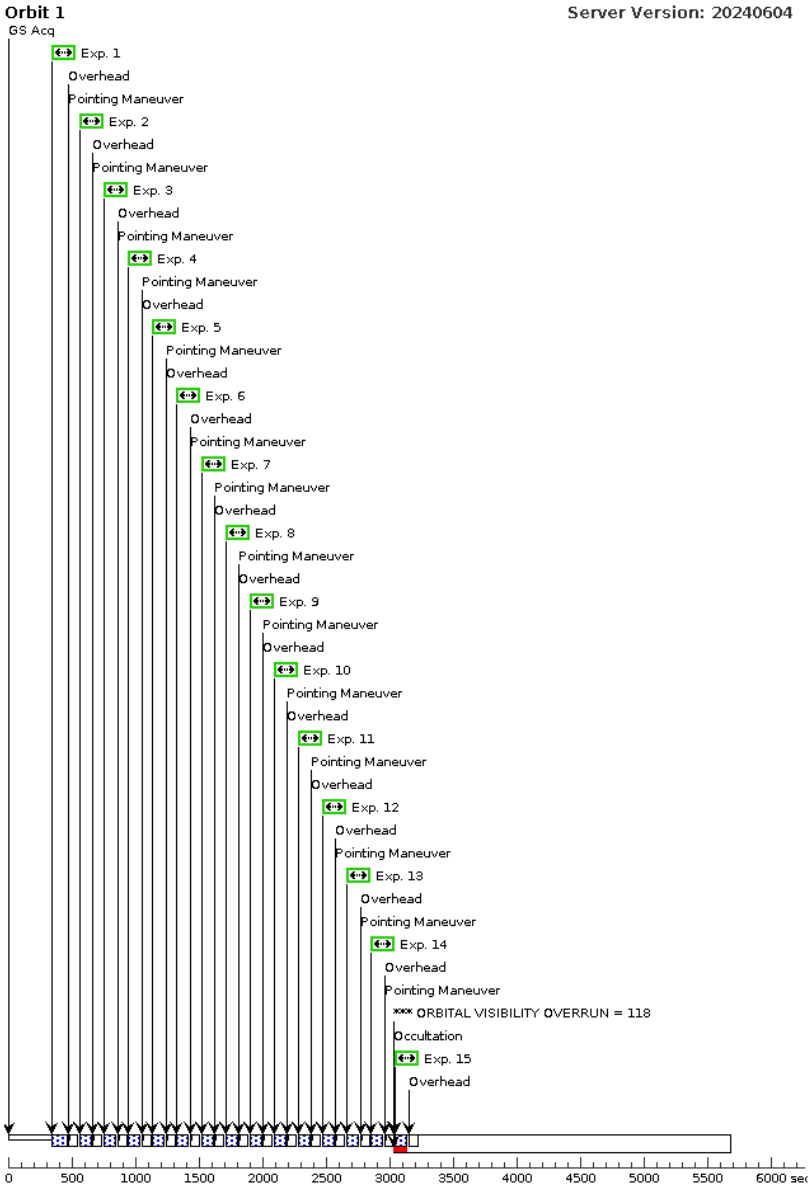
*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

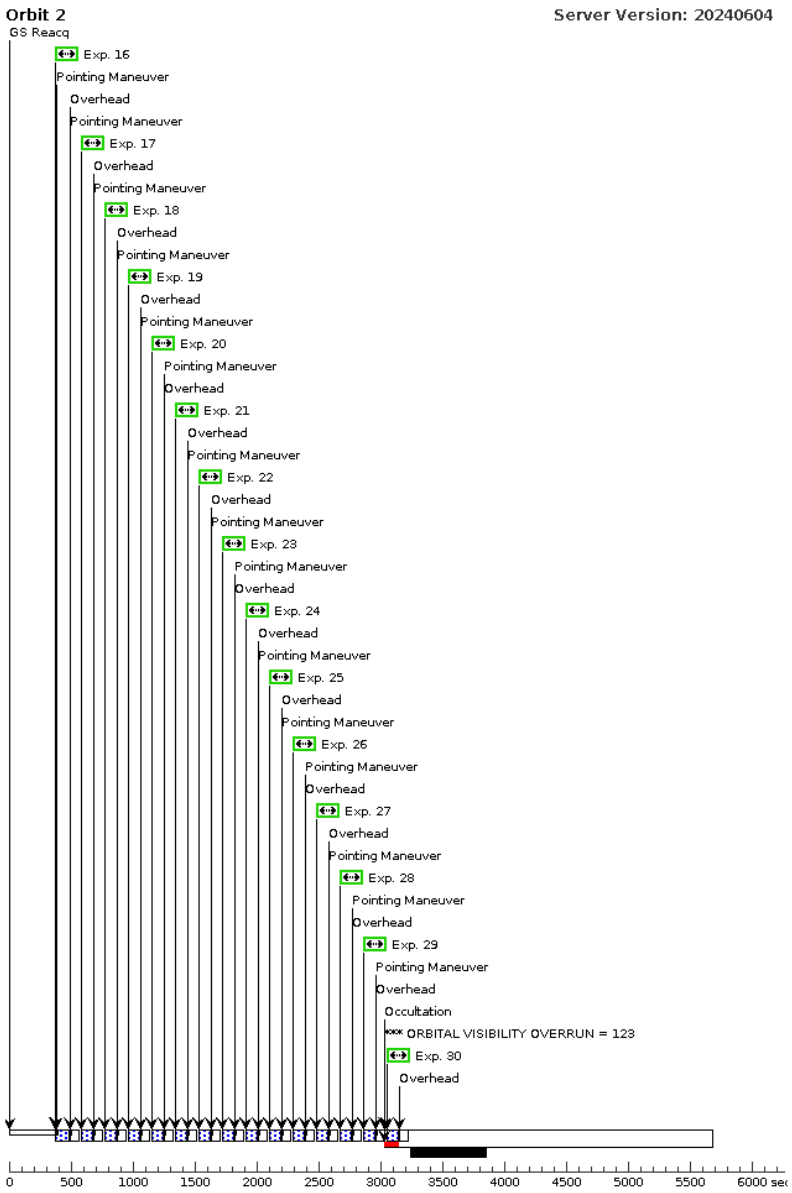
**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.0,0.0 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 11 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 12 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 13 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 14 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 15 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 16 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 17 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 18 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 19 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 20 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 21 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 22 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 23 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 24 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 25 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 26 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 27 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 28 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 29 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 30 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |

**Orbit Structure**

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Exp. 28
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Exp. 29
Pointing Maneuver
Overhead
Occultation
*** ORBITAL VISIBILITY OVERRUN = 123
Exp. 30
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

## Visit

**Proposal 17404, repeat of 2nd orbit of visit 01 (51), failed** Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 85D TO 95 D; BETWEEN 15-SEP-2023:00:00:00 AND 30-OCT-2023:00:00:00

## Diagnostics

(repeat of 2nd orbit of visit 01 (51)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

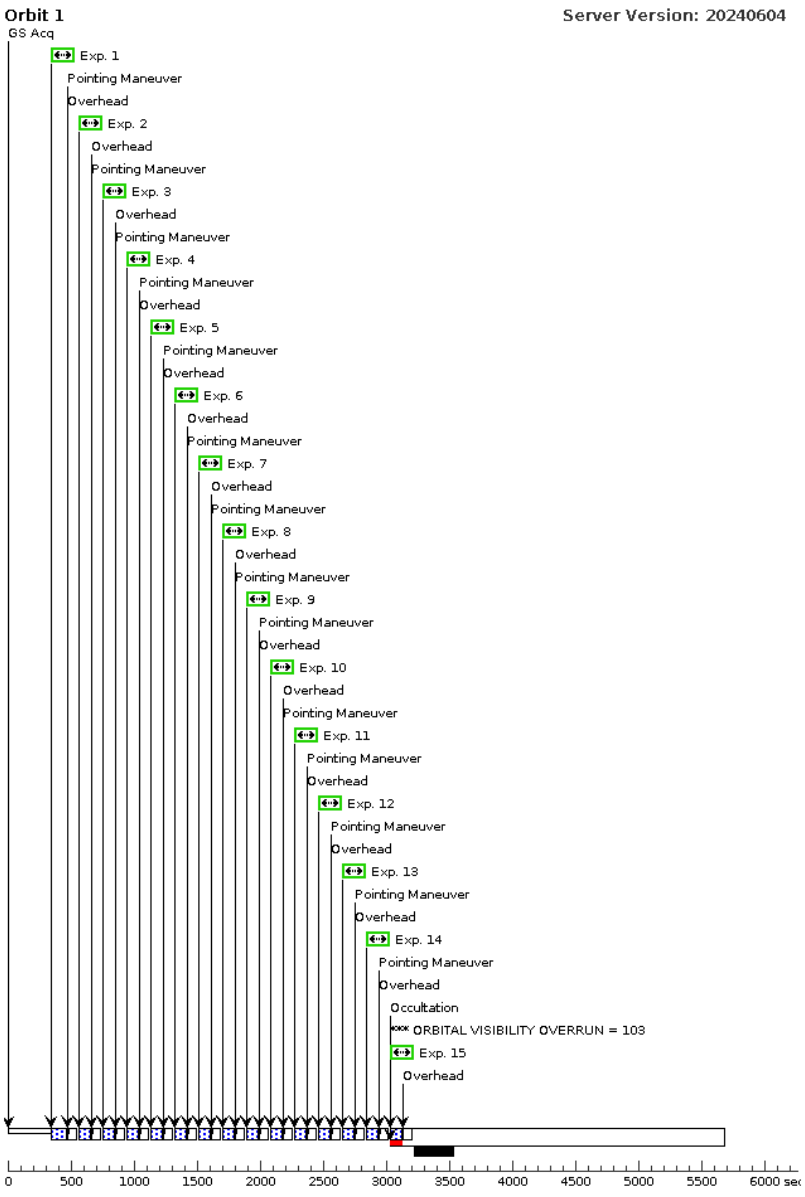
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 11 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 12 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 13 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 14 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 15 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

**Orbit Structure**



## Visit

**Proposal 17404, repeat of visit 51 (52), failed**

Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: BEFORE 05-MAR-2024:00:00:00

## Diagnostics

(repeat of visit 51 (52)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

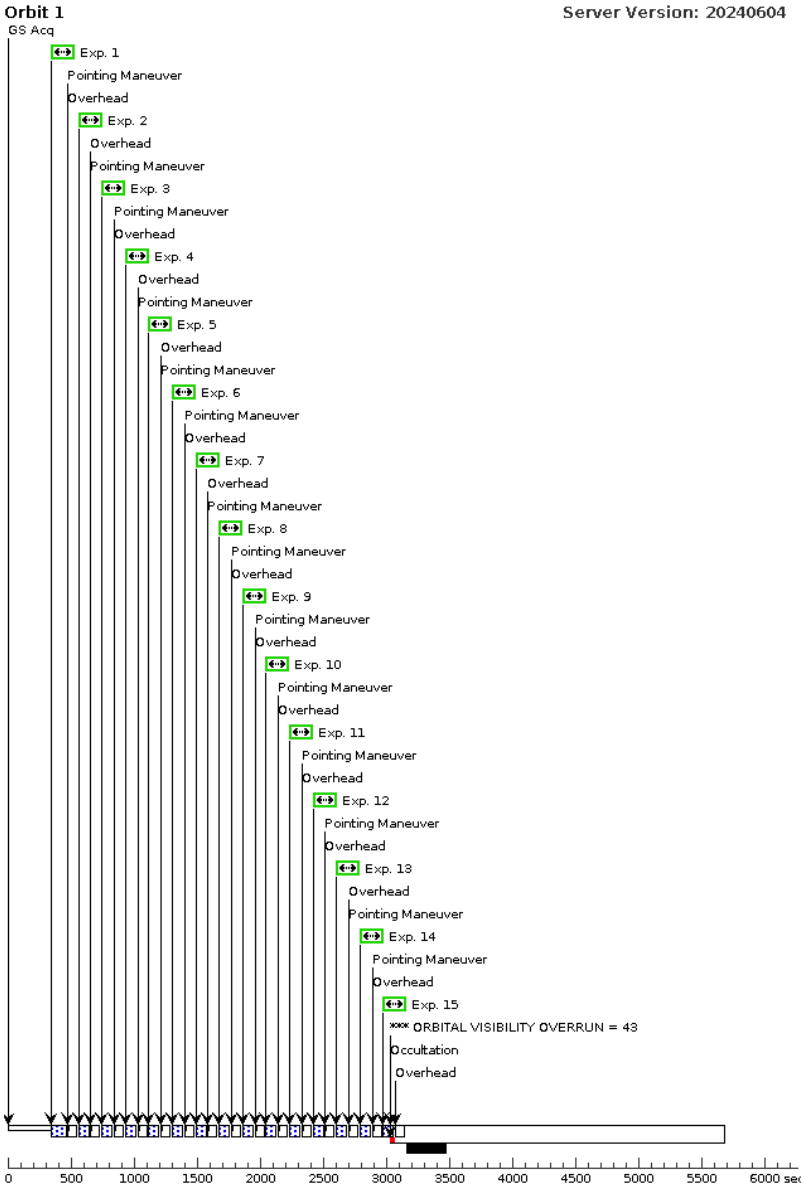
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 11 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 12 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 13 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 14 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 15 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



# Proposal 17404 - repeat of visit 52 (53) - Mass Measurement of a Candidate Balck Hole Microlens with Systematic Error Control

## Visit

**Proposal 17404, repeat of visit 52 (53), completed** Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: BEFORE 03-MAY-2024:00:00:00

## Diagnostics

(repeat of visit 52 (53)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

## Fixed Targets

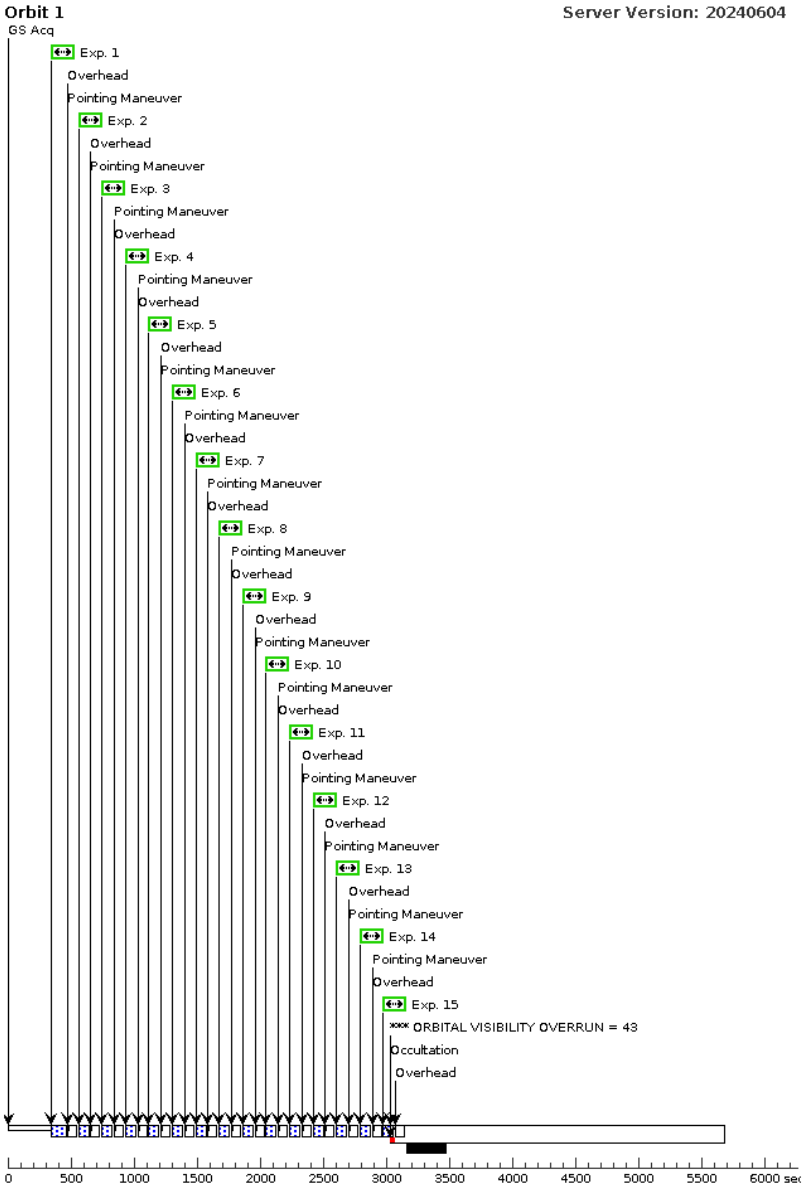
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 11 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 12 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 13 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 14 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 15 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 85 Secs (85 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

**Orbit Structure**



# Proposal 17404 - Visit 02 - Mass Measurement of a Candidate Balck Hole Microlens with Systematic Error Control

## Visit

**Proposal 17404, Visit 02, failed**

Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: Warning**

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 269D TO 269 D; BETWEEN 24-MAY-2024:00:00:00 AND 09-JUN-2024:00:00:00

## Diagnostics

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

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

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

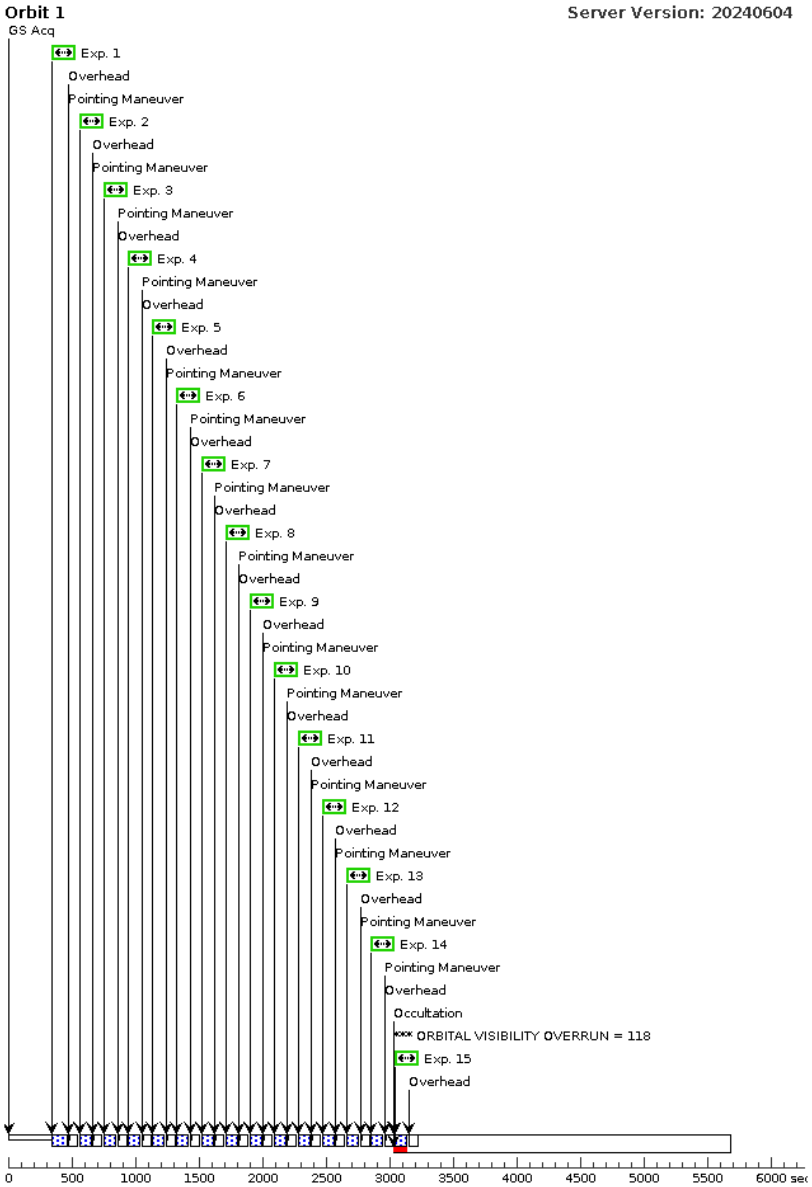
*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

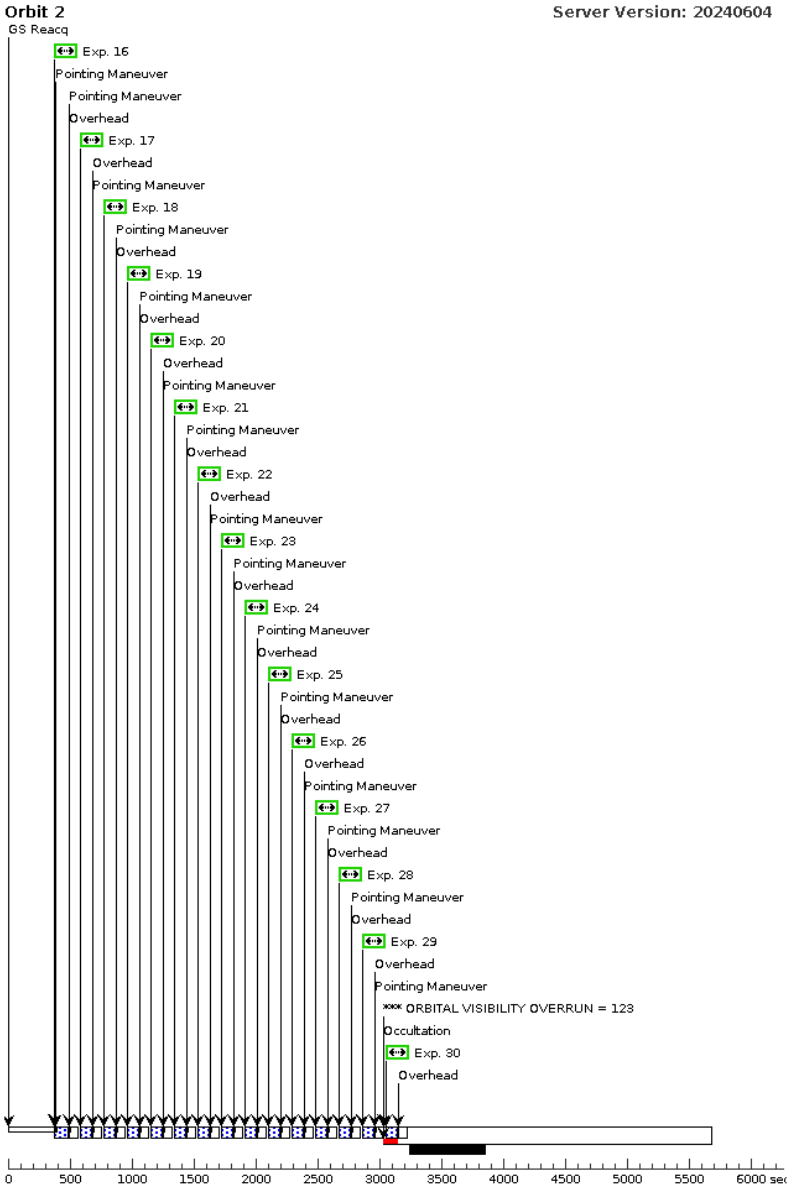
**Exposures**

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.0,0.0 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 11 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 12 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 13 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 14 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 15 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F606W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 90 Secs (90 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 16 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 17 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 18 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 19 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 20 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 21 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |
| 22 | | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 89 Secs (89 Secs) | |
| | | | | | | | | *[==>]* | ***[2]*** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 23 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 24 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 25 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 26 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 27 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 28 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 29 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |
| | 30 | (1) MOA-2019-BLG -284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | 89 Secs (89 Secs)<br>*[==>]* | <br>***[2]*** |

**Orbit Structure**




Orbit 2
Server Version: 20240604
GS Reacq
Exp. 16
Pointing Maneuver
Pointing Maneuver
Overhead
Exp. 17
Overhead
Pointing Maneuver
Exp. 18
Pointing Maneuver
Overhead
Exp. 19
Pointing Maneuver
Overhead
Exp. 20
Overhead
Pointing Maneuver
Exp. 21
Pointing Maneuver
Overhead
Exp. 22
Overhead
Pointing Maneuver
Exp. 23
Pointing Maneuver
Overhead
Exp. 24
Pointing Maneuver
Overhead
Exp. 25
Pointing Maneuver
Overhead
Exp. 26
Overhead
Pointing Maneuver
Exp. 27
Pointing Maneuver
Overhead
Exp. 28
Pointing Maneuver
Overhead
Exp. 29
Overhead
Pointing Maneuver
*** ORBITAL VISIBILITY OVERRUN = 123
Occultation
Exp. 30
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

## Visit

**Proposal 17404, repeat of 2nd orbit of visit 02 (54), implementation** Wed Jun 12 18:00:31 GMT 2024

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | MOA-2019-BLG-284 | RA: 18 05 55.0600 (271.4794167d)<br>Dec: -30 20 12.94 (-30.33693d)<br>Equinox: J2000 | | V=17.65+/-0.05<br>I = 15.97 +- 0.05 | Reference Frame: ICRS |

*Comments:*
*Category=STAR*
*Description=[BULGE, GRAVITATIONAL LENS, K V-IV]*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.0,0.0 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 2 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.21981, 0.01893 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 3 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08573, 0.22678 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 4 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30554, 0.24572 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 5 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.56707, 0.11780 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 6 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.78688, 0.13673 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 7 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65279, 0.34459 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 8 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.91230, 0.36598 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 9 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.08446, 0.53624 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 10 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.30427, 0.55517 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 11 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.20990, 0.76546 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 12 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.38999, 0.78195 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 13 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.65150, 0.65404 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 14 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.87130, 0.67303 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |
| 15 | | (1) MOA-2019-BLG-284 | WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB | F814W | FLASH=20 | POS TARG 0.73722 ,0.88083 | | 89 Secs (82 Secs)<br>*[==>82.0 Secs ]* | <br>***[1]*** |

Orbit Structure