# 17302 - Mapping the Debris of Comet 96P/Machholz

Cycle: 30, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**

| *Name* | *Institution* |
|---|---|
| **Qicheng Zhang (PI) (Contact)** | **California Institute of Technology** |
| Dr. Matthew M Knight (CoI) | United States Naval Academy |
| Dr. Quanzhi Ye (CoI) | University of Maryland |
| Dr. Karl Battams (CoI) | Naval Research Laboratory |

**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) 96P-FIELD1 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:03.0 | yes |
| 02 | (2) 96P-FIELD2 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:05.0 | yes |
| 03 | (3) 96P-FIELD3 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:06.0 | yes |
| 04 | (4) 96P-FIELD4 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:07.0 | yes |
| 05 | (5) 96P-FIELD5 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:09.0 | yes |
| 06 | (6) 96P-FIELD6 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:10.0 | yes |

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 07 | (7) 96P-FIELD7 | ACS/WFC<br>WFC3/UVIS | 1 | 10-Apr-2023 11:01:11.0 | yes |

7 Total Orbits Used

**ABSTRACT**

Periodic sunskirting comet 96P/Machholz is the largest surviving member of a vast fragmentation complex spanning a few dozen near-Earth objects and meteoroid streams responsible for 3 major annual meteor showers on Earth. Observations by SOHO's LASCO coronagraphs show 96P's fragmentation to be ongoing, finding the comet to be accompanied by a dense trail of fragments/debris during its 2012 apparition, again one orbit later in 2017, and recently for the third time in 2023 January. However, SOHO can only see gas (largely sodium) and, to a lesser extent, dust released by the fragments, and not the actual solid bodies. This limitation hinders accurate size/mass estimates of these fragments, and indeed of any active "comet" SOHO observes, since a small but highly active fragment/comet can appear similar to a large but less active one. We propose to address this shortcoming by using HST's WFC3/UVIS to map the fragments along the debris trail while they are largely inactive away from the Sun, taking advantage of favorable geometry in late 2023 June that enables highly efficient observations. Parallel ACS/WFC observations will further enhance sensitivity to potential new fragments unseen by SOHO. The results will provide a translation between physical size and SOHO-observed activity to constrain the physical properties of these and the many similar cometary fragments seen by SOHO, and enable quantitative evaluation of the ongoing formation/evolution of 96P's fragmentation complex.

**OBSERVING DESCRIPTION**

We request 7 orbits to image the orbital track of 96P/Machholz with WFC3/UVIS around 2023 June 23.5 +/- 3.0. These 7 orbits target different points along the orbit, centered (1) 1 hour behind, (2) 3 hours ahead, (3) 7 hours ahead, (4) 11 hours ahead, (5) 15 hours ahead, (6) 30 hours ahead, and (7) 34 hours ahead of 96P. The precise targeted positions are set by the orbital elements of 96P for its 2023 apparition with the time of perihelion adjusted by the respective timing offsets. We use the following osculating orbital elements for 96P at epoch 2023 February 25.0 from MPEC 2023-G31:

q = 0.1164278 au
e = 0.9615855
i = 57.50263 deg

O = 93.95363 deg

w = 14.74900 deg

T = 2023-01-31 02:01:44

Aside from pointing, the 7 orbits are identical with 5 full frame exposures of ~350 s through the F350LP filter, dithered to cover the interchip gap and improve robustness to detector defects. Additionally, 5 parallel exposures will be taken alongside the primary exposures using ACS/WFC through the F606W filter, of which, the first 4 frames are limited to the WFC1A-2K subarray by buffer dump requirements. Parallel exposures are intended to sample portions of space arbitrarily offset from the 96P orbit by the WFC3-ACS sky separation and do not impose further constraints on spacecraft roll. Gyro bias updates are not needed during the requested orbits, as they do not need to be consecutive.

## Visit

**Proposal 17302, Visit 01** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

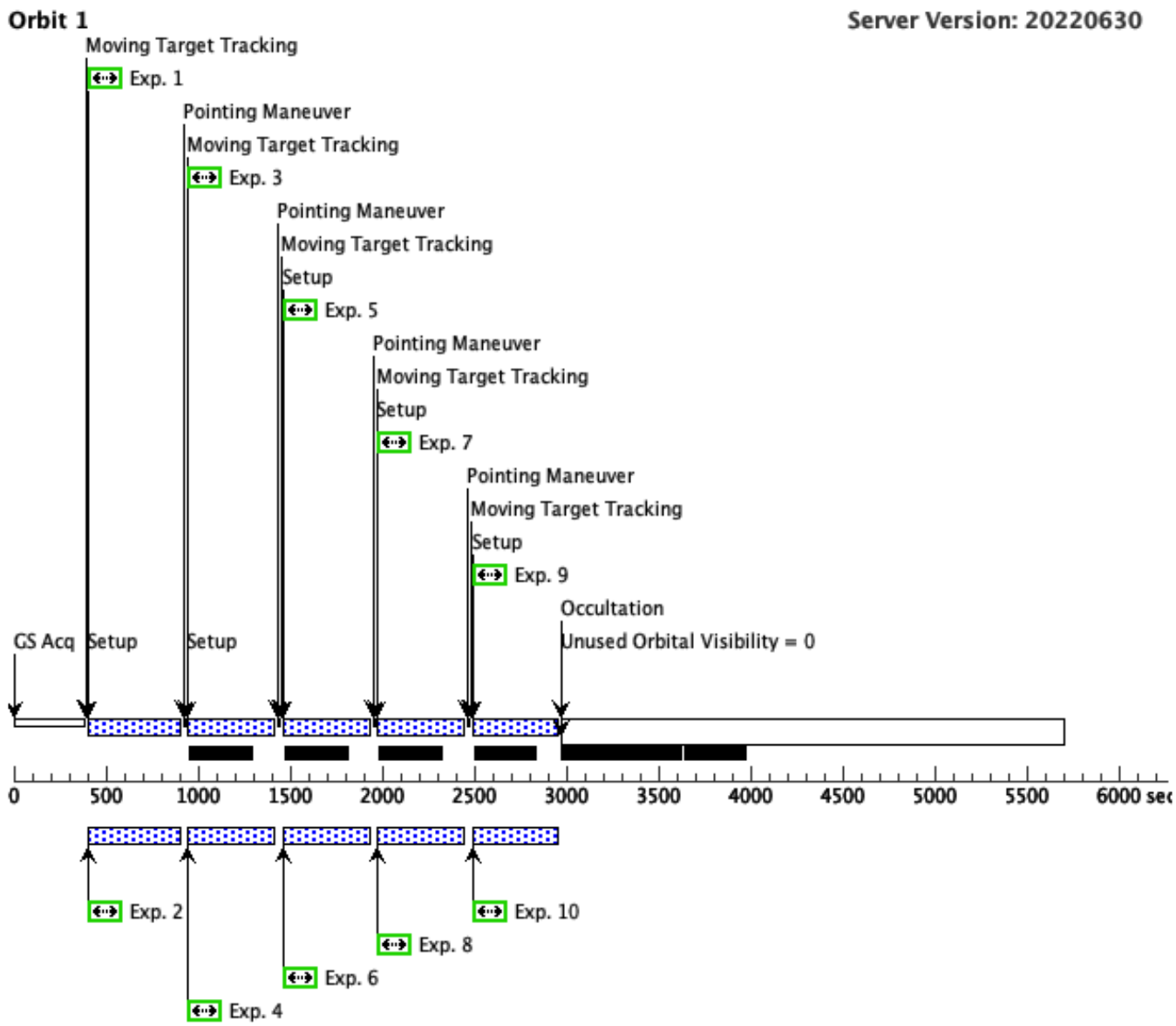
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (1) | 96P-FIELD1 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=31-JAN-2023:03:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 1 hour later*
*Description=1 hour behind 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) 96P-FIELD1 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group 1-2 in Visit 01 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (1) 96P-FIELD1 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 1-2 in Visit 01 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (1) 96P-FIELD1 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group 3-4 in Visit 01 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (1) 96P-FIELD1 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 3-4 in Visit 01 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (1) 96P-FIELD1 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group 5-6 in Visit 01 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (1) 96P-FIELD1 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 5-6 in Visit 01 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (1) 96P-FIELD1 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group 7-8 in Visit 01 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (1) 96P-FIELD1 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 7-8 in Visit 01 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (1) 96P-FIELD1 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group 9-10 in Visit 01 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (1) 96P-FIELD1 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group 9-10 in Visit 01 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 02** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

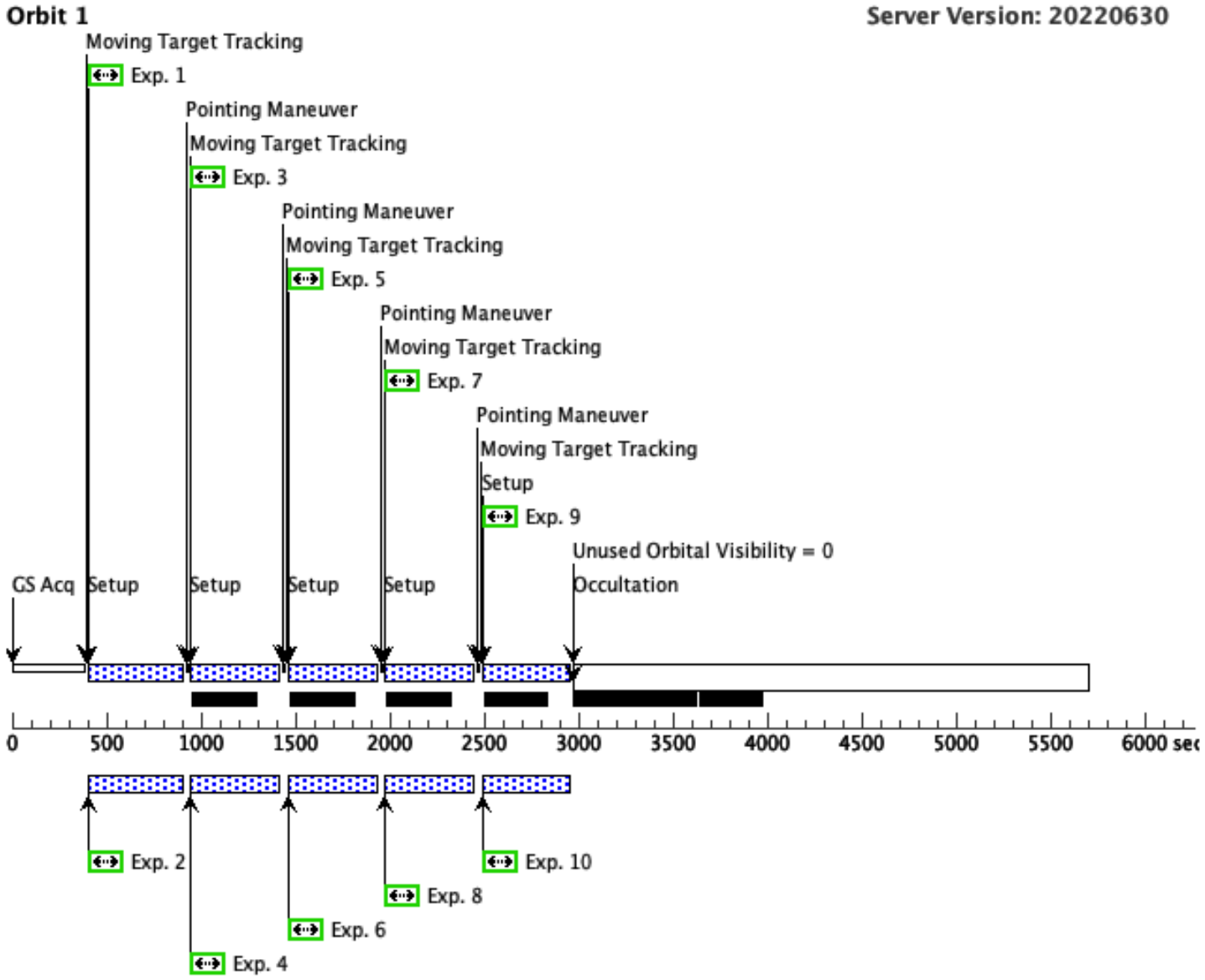
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (2) | 96P-FIELD2 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=30-JAN-2023:23:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 3 hours earlier*
*Description=3 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (2) 96P-FIELD2 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group up 1-2 in Visit 02 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (2) 96P-FIELD2 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 1-2 in Visit 02 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (2) 96P-FIELD2 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group up 3-4 in Visit 02 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (2) 96P-FIELD2 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 3-4 in Visit 02 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (2) 96P-FIELD2 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group up 5-6 in Visit 02 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (2) 96P-FIELD2 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 5-6 in Visit 02 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (2) 96P-FIELD2 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group up 7-8 in Visit 02 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (2) 96P-FIELD2 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 7-8 in Visit 02 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (2) 96P-FIELD2 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group up 9-10 in Visit 02 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (2) 96P-FIELD2 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group up 9-10 in Visit 02 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 03** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

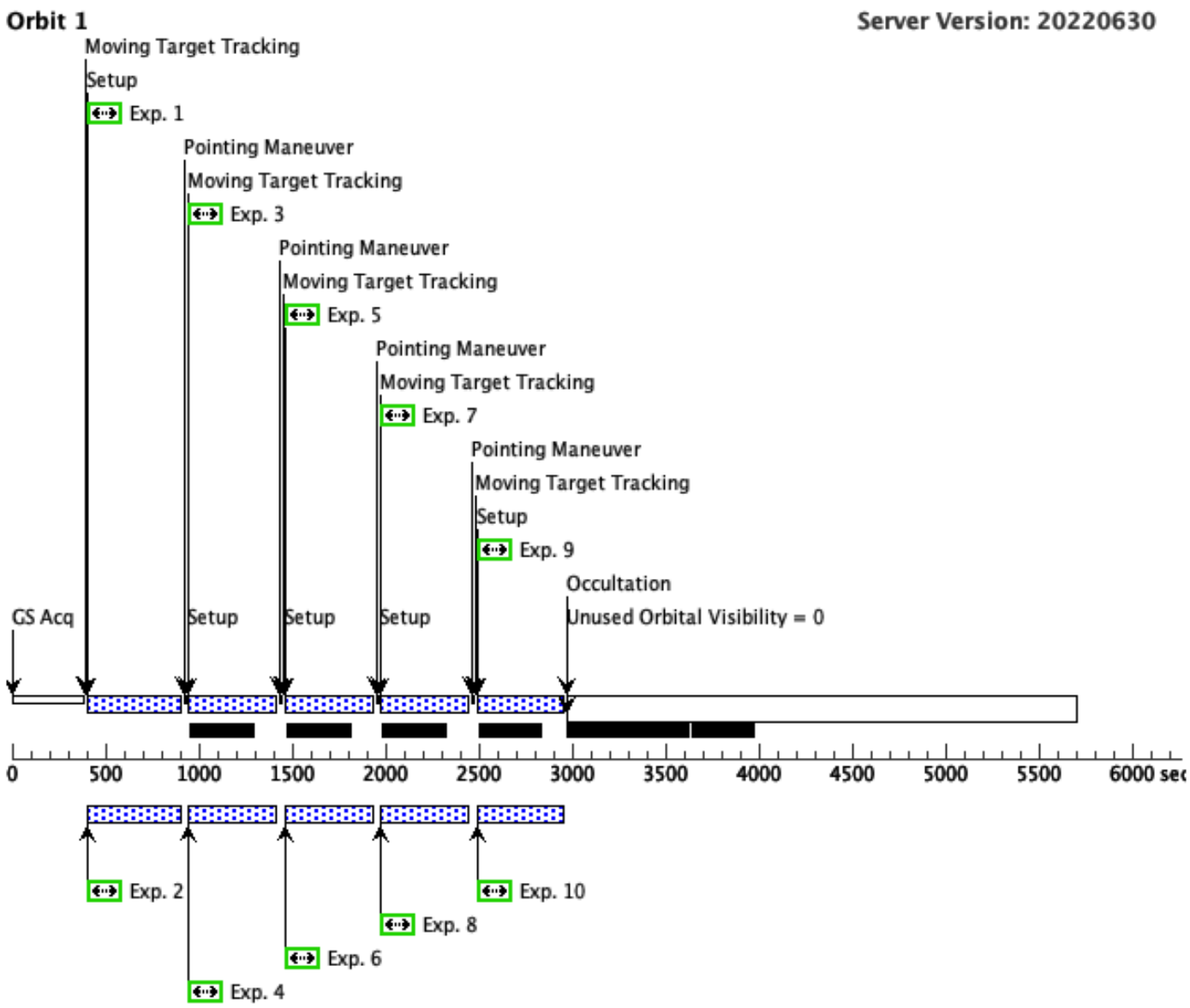
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (3) | 96P-FIELD3 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=30-JAN-2023:19:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 7 hours earlier*
*Description=7 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (3) 96P-FIELD3 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group up 1-2 in Visit 03 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (3) 96P-FIELD3 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 1-2 in Visit 03 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (3) 96P-FIELD3 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group up 3-4 in Visit 03 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (3) 96P-FIELD3 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 3-4 in Visit 03 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (3) 96P-FIELD3 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group up 5-6 in Visit 03 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (3) 96P-FIELD3 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 5-6 in Visit 03 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (3) 96P-FIELD3 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group up 7-8 in Visit 03 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (3) 96P-FIELD3 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 7-8 in Visit 03 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (3) 96P-FIELD3 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group up 9-10 in Visit 03 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (3) 96P-FIELD3 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group up 9-10 in Visit 03 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 04** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

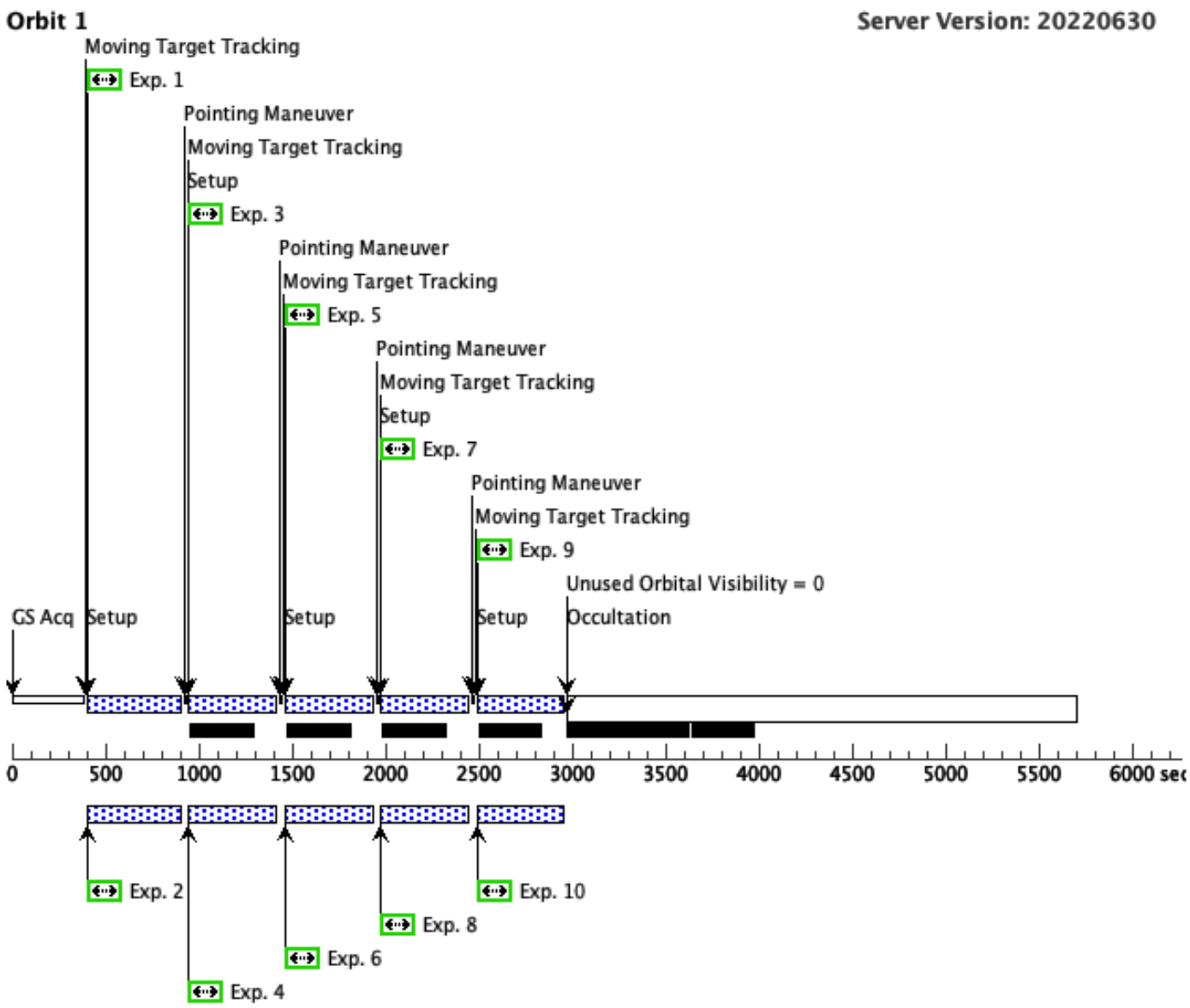
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (4) | 96P-FIELD4 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=30-JAN-2023:15:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 11 hours earlier*
*Description=11 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (4) 96P-FIELD4 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group 1-2 in Visit 04 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (4) 96P-FIELD4 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 1-2 in Visit 04 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (4) 96P-FIELD4 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group 3-4 in Visit 04 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (4) 96P-FIELD4 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 3-4 in Visit 04 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (4) 96P-FIELD4 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group 5-6 in Visit 04 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (4) 96P-FIELD4 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 5-6 in Visit 04 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (4) 96P-FIELD4 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group 7-8 in Visit 04 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (4) 96P-FIELD4 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 7-8 in Visit 04 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (4) 96P-FIELD4 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group 9-10 in Visit 04 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (4) 96P-FIELD4 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group 9-10 in Visit 04 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 05** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

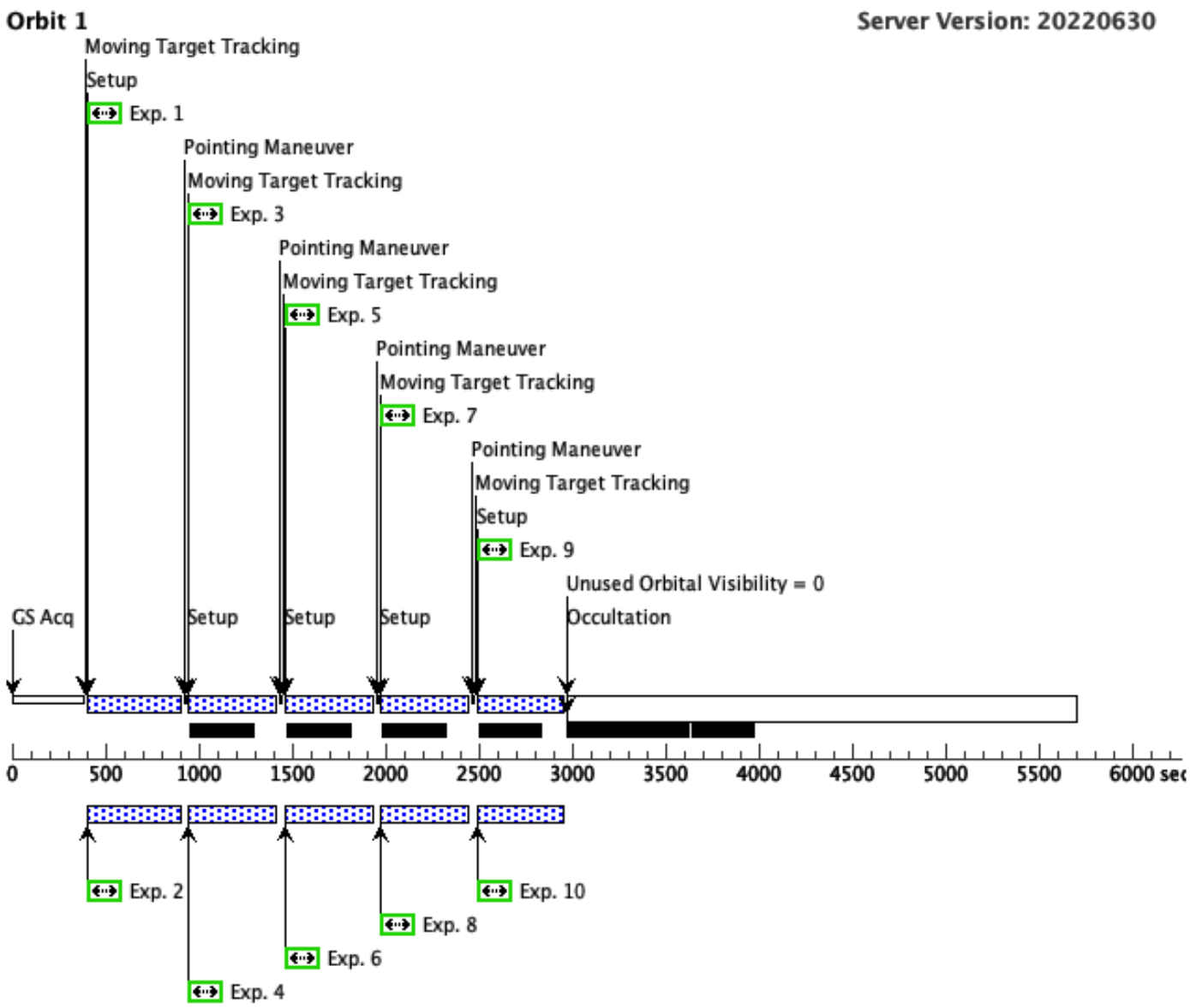
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (5) | 96P-FIELD5 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=30-JAN-2023:11:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 15 hours earlier*
*Description=15 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (5) 96P-FIELD5 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group 1-2 in Visit 05 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (5) 96P-FIELD5 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 1-2 in Visit 05 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (5) 96P-FIELD5 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group 3-4 in Visit 05 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (5) 96P-FIELD5 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 3-4 in Visit 05 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (5) 96P-FIELD5 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group 5-6 in Visit 05 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (5) 96P-FIELD5 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 5-6 in Visit 05 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (5) 96P-FIELD5 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group 7-8 in Visit 05 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (5) 96P-FIELD5 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 7-8 in Visit 05 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (5) 96P-FIELD5 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group 9-10 in Visit 05 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (5) 96P-FIELD5 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group 9-10 in Visit 05 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 06** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 25-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

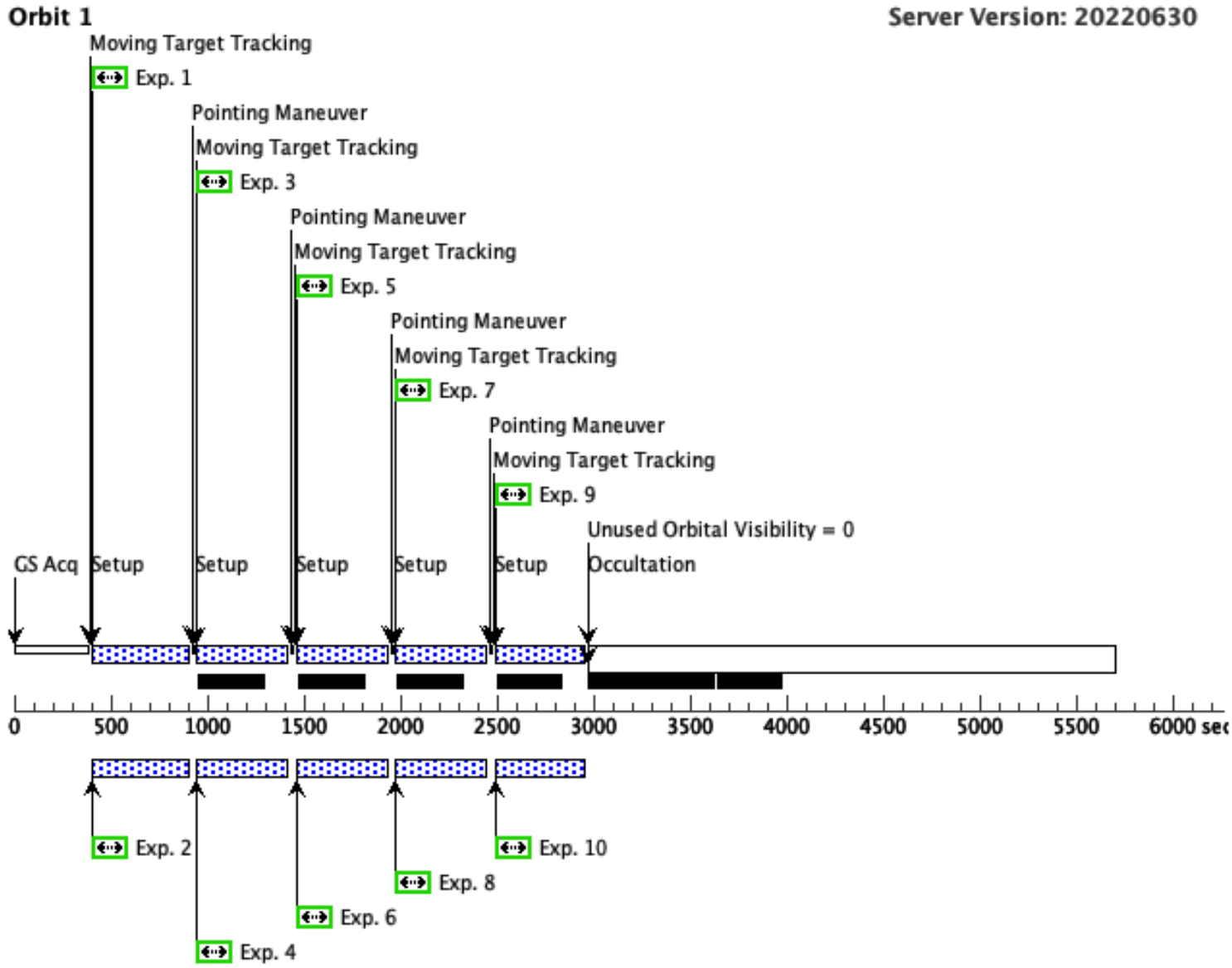
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (6) | 96P-FIELD6 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=29-JAN-2023:20:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 30 hours earlier*
*Description=30 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (6) 96P-FIELD6 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group 1-2 in Visit 06 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (6) 96P-FIELD6 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 1-2 in Visit 06 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (6) 96P-FIELD6 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group 3-4 in Visit 06 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (6) 96P-FIELD6 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 3-4 in Visit 06 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (6) 96P-FIELD6 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group 5-6 in Visit 06 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (6) 96P-FIELD6 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 5-6 in Visit 06 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (6) 96P-FIELD6 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group 7-8 in Visit 06 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (6) 96P-FIELD6 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group 7-8 in Visit 06 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (6) 96P-FIELD6 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group 9-10 in Visit 06 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (6) 96P-FIELD6 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group 9-10 in Visit 06 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure



## Visit

**Proposal 17302, Visit 07** Mon Apr 10 15:01:12 GMT 2023

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: SCHED 80%; BETWEEN 20-JUN-2023:12:00:00 AND 26-JUN-2023:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (7) | 96P-FIELD7 | TYPE=COMET,Q=0.1164278,E=0.9615855,I=57.50263,O=93.95363,W=14.74900,T=29-JAN-2023:16:01:44,TTimeScale=TDB,EQUINOX=J2000,EPOCH=25-FEB-2023:00:00:00,EpochTimeScale=TDB | | | | EARTH |

*Comments: Using 96P orbit with time of perihelion adjusted 34 hours earlier*
*Description=34 hours ahead of 96P*

## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (7) 96P-FIELD7 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | | Prime + Parallel Group up 1-2 in Visit 07 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 2 | | (7) 96P-FIELD7 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 1-2 in Visit 07 | 291 Secs (291 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 3 | | (7) 96P-FIELD7 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.1,1.4 | Prime + Parallel Group up 3-4 in Visit 07 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 4 | | (7) 96P-FIELD7 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 3-4 in Visit 07 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 5 | | (7) 96P-FIELD7 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.1,-1.4 | Prime + Parallel Group up 5-6 in Visit 07 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 6 | | (7) 96P-FIELD7 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 5-6 in Visit 07 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 7 | | (7) 96P-FIELD7 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG 0.2,-2.8 | Prime + Parallel Group up 7-8 in Visit 07 | 352 Secs (352 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 8 | | (7) 96P-FIELD7 | ACS/WFC, ACCUM, WFC1A-2K | F606W | | | Prime + Parallel Group up 7-8 in Visit 07 | 341 Secs (341 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 9 | | (7) 96P-FIELD7 | WFC3/UVIS, ACCUM, UVIS-CENTER | F350LP | | POS TARG -0.2,2.8 | Prime + Parallel Group up 9-10 in Visit 07 | 351 Secs (351 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |
| 10 | | (7) 96P-FIELD7 | ACS/WFC, ACCUM, WFC | F606W | | | Prime + Parallel Group up 9-10 in Visit 07 | 340 Secs (340 Secs) | |
| | | | | | | | | *[==>]* | ***[1]*** |

Orbit Structure