15505 - The Pluto System in the Post-New Horizons Era: Opposition Effects, Rotations, and Orbital Stability

Cycle: 26, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
24	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:20.0	yes
25	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:22.0	yes
26	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:24.0	yes
31	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:25.0	yes
32	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:27.0	yes
33	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:29.0	yes
34	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:30.0	yes
35	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:31.0	yes
36	(1) PLUTO	WFC3/UVIS	1	28-Jun-2019 14:00:33.0	yes
41	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:36.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
42	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:38.0	yes
43	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:39.0	yes
44	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:40.0	yes
45	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:41.0	yes
51	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:43.0	yes
52	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:44.0	yes
53	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS	1	28-Jun-2019 14:00:45.0	yes

17 Total Orbits Used

ABSTRACT

Following the New Horizons flyby in 2015, we propose a two-cycle program to observe Pluto and its five moons in the post-encounter era, building on the rich legacy of observations obtained during and prior to the historic flyby. At opposition in Cycles 25-26, the Pluto system is visible at the smallest solar phase angle in 87 years. The system will be at true opposition when it crosses the line of nodes in July 2018, and as seen from Pluto, Earth will transit the solar disk. Such rare planetary alignments enable the characterization of small-scale surface texture and porosity as well as the direct measurement of the geometric albedo, rather than an estimation of its value from photometric models. Any variation among the regolith properties of Pluto's moons will test the long-standing hypothesis that ejecta exchange between the moons has altered their surfaces. We will also follow up on the surprising result from New Horizons and HST that the small moons are spinning rapidly and with high obliquities. Styx, Nix, and Hydra show hints of being in strong spin-orbit couplings with Charon, but confirmation requires the additional precision in measurements of their spin rates and polar precession rates proposed here. In addition, we will obtain new astrometry of the small moons, making it possible to determine their masses and bulk densities with much higher precision. Results from this program will enhance the scientific return from the New Horizons mission, providing images complementary to those obtained by the spacecraft on approach and achieving science objectives that cannot be met by either HST or New Horizons alone.

OBSERVING DESCRIPTION

This program consists of two types of visit types. Five visits (31-36) are primarily for photometry within specific phase angle ranges near opposition, to study the opposition surge on all the bodies in the Pluto system. Eight visits are for astrometry and photometry, primarily to determine the orbits and rotation states of the four small moons. Rotation states are also needed to interpret the data near opposition. Five of these visits (41-45) are

scheduled before opposition 2019 and two (51, 52) after to ensure a long time baseline for orbit and rotation determinations in 2019. One visit is scheduled in late 2018 to extend the time baseline of our most recent observations. The filters used here match those in Programs 13667 and 15261, so that the combined data sets sample a much longer time baseline and extend the phase angle coverage down to the very small phase angles not available to Program 13667 in 2015.

Visits 24-26 are a set of three options for scheduling the Visit in late 2018. The times have been derived from the constraint that our last 2018 observation, when combined with the earlier data, will provide the best constraint on the rotations of Styx, Nix and Kerberos. Visits 25 and 26 are on hold in case Visit 24 cannot be scheduled.

Note also that Visits 32 and 33 are scientifically equivalent, with 33 on hold. Either one of them should be scheduled.

Visits 41-45 and 51-52 have been specified to optimize our sampling of the rotational phases of Nix. This is necessary to meet our scientific goal of measuring its unusually rapid spin rate with high precision. We have defined the times of these visits using period and phase constraints to support this goal.

In order to obtain reliable measurements of the small moons, particularly Styx and Kerberos, we require that they not overlap with the diagonal diffraction stripes from Pluto and Charon. The optimal orientation cannot be determined until the time frame of a visit has been narrowed down to a few hours. In this Phase II proposal, we have filled in all the ORIENT values that we could. However, for those visits where the ORIENT is currently unspecified, we request the opportunity to select a value once the visit has been scheduled. This is the procedure we followed in Program 15261 and it worked well for us.

Visit

Proposal 15505, LATE 2018 (24), withdrawn Fri Jun 28 18:00:46 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; ORIENT 78D TO 80 D; BETWEEN 28-OCT-2018:22:00:00 AND 29-OCT-2018:02:00:00

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. The time was selected to optimize the precision on the rotation rates of Stys, Nix and Kerberos in data from 2018.

ORIENT = 79 has been confirmed to position all four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Diagnostics

(LATE 2018 (24)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Solar System Targets

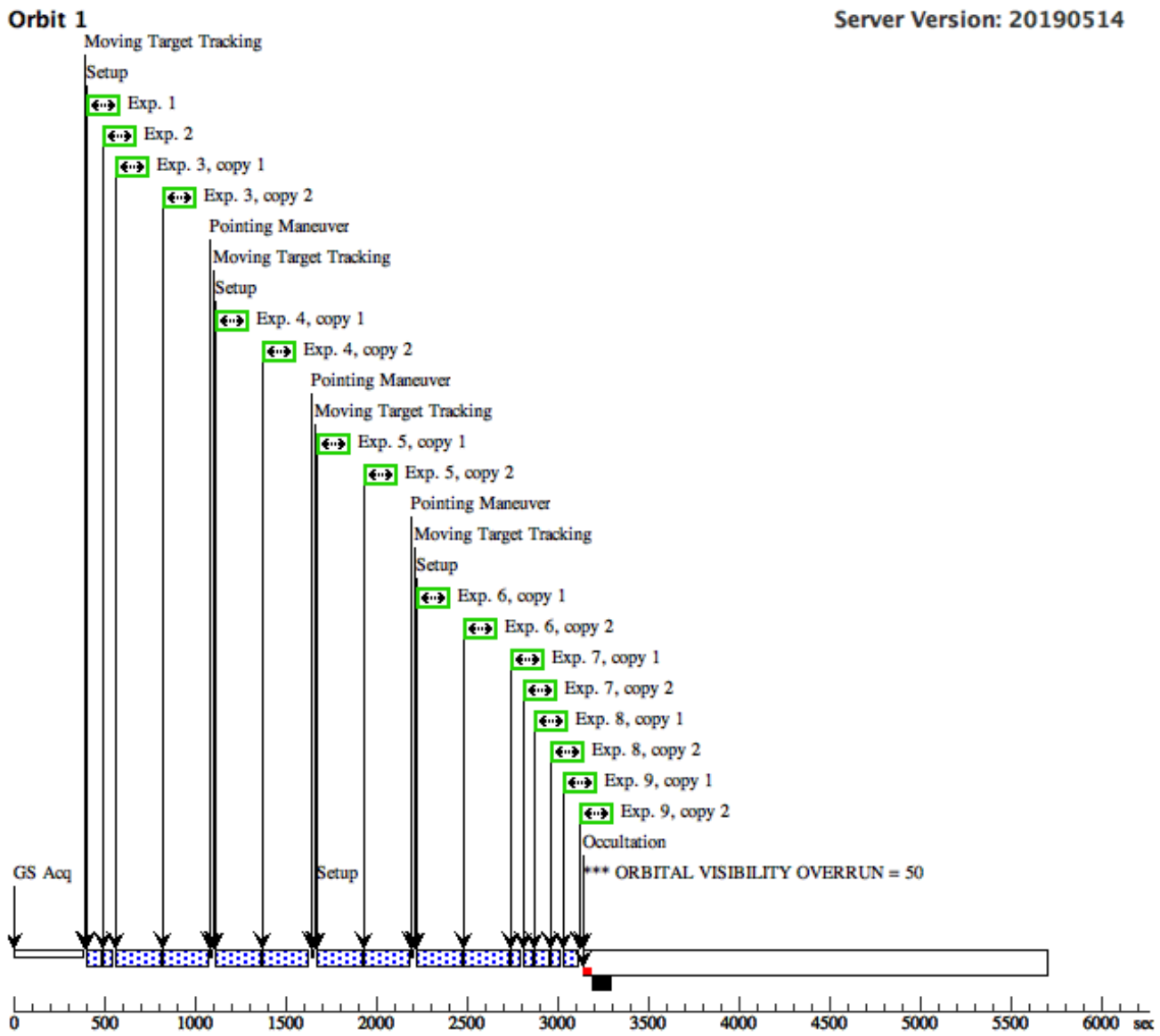
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-9 Non-Int in LATE 2018 (24)	3 Secs (3 Secs) *[==>]*	 ***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018 (24)	3 Secs (3 Secs) *[==>]*	 ***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018 (24)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in LATE 2018 (24)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in LATE 2018 (24)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in LATE 2018 (24)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018 (24)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
8	F555W, 2 x 6s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018 (24)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***
9	F625W, 2 x 6, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018 (24)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[1]***

Orbit Structure



Visit

Proposal 15505, LATE 2018-OPTION B (25), withdrawn Fri Jun 28 18:00:46 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; ORIENT 76D TO 78 D; BETWEEN 13-NOV-2018:19:00:00 AND 13-NOV-2018:23:00:00; ON HOLD

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. The time was selected to optimize the precision on the rotation rates of Stys, Nix and Kerberos in data from 2018.

This is an alternative to Visit 24. It is ON HOLD and should only be used if Visit 24 is unschedulable.

ORIENT = 77 has been confirmed to position all four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

On Hold Comments: Use in place of Visit 24 if that visit cannot be scheduled.

Diagnostics

(LATE 2018-OPTION B (25)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Solar System Targets

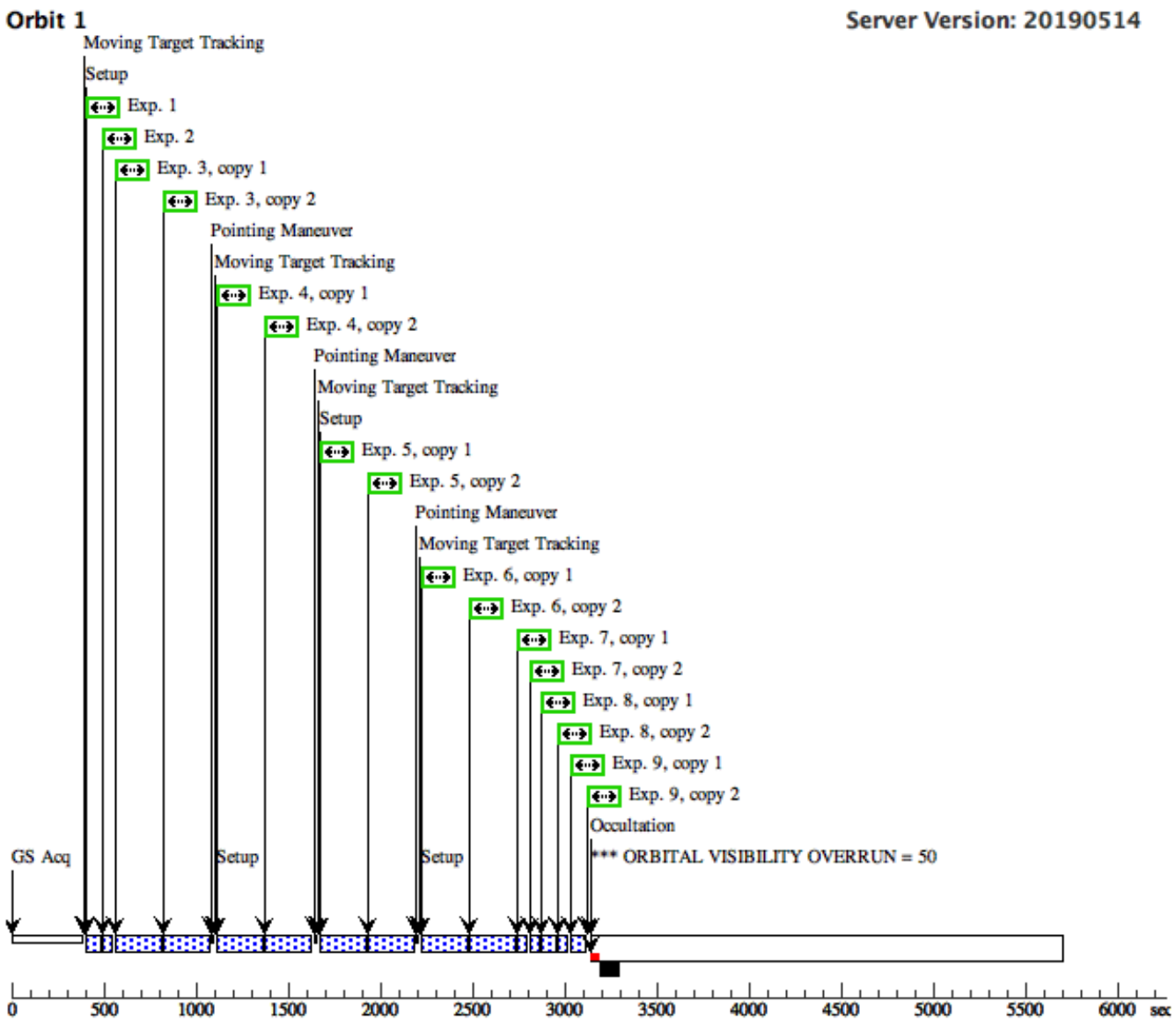
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F555W, 2 x 6s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F625W, 2 x 6, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION B (25)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, LATE 2018-OPTION C (26), withdrawn Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; BETWEEN 01-NOV-2018:00:00:00 AND 30-NOV-2018:00:00:00; ON HOLD

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis.

This is an alternative to Visits 24 and Visit 25. It is ON HOLD and should only be used if both visits are unschedulable.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

On Hold Comments: Use in place of Visits 24 and Visit 26 if neither visit is schedulable.

Diagnostics

(LATE 2018-OPTION C (26)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Solar System Targets

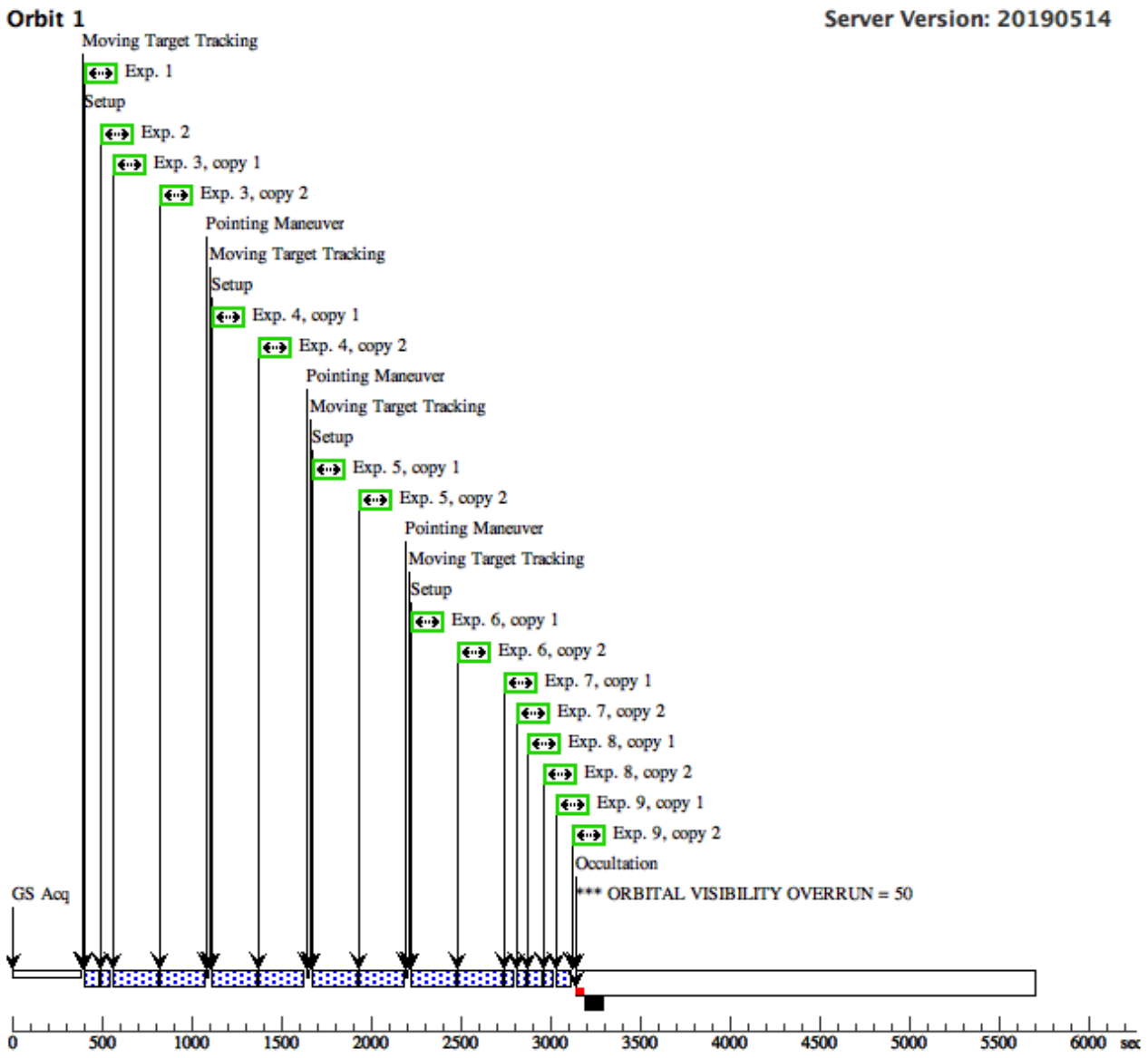
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F555W, 2 x 6s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F625W, 2 x 6, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in LATE 2018-OPTION C (26)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, OPPOSITION 2019 (31), scheduling Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 65D TO 78 D; ORIENT 245D TO 258 D; BETWEEN 14-JUL-2019:14:00:00 AND 14-JUL-2019:17:00:00; VISIBILITY INTERVAL 50 M

Comments: Color photometry of Pluto and Charon at exact opposition. Additional long exposures to capture the small moons. Two POS TARGs designed to shift the system by 5.5 pixels along each axis midway through the visit.

ORIENT has been specified to keep the four small moons out of the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

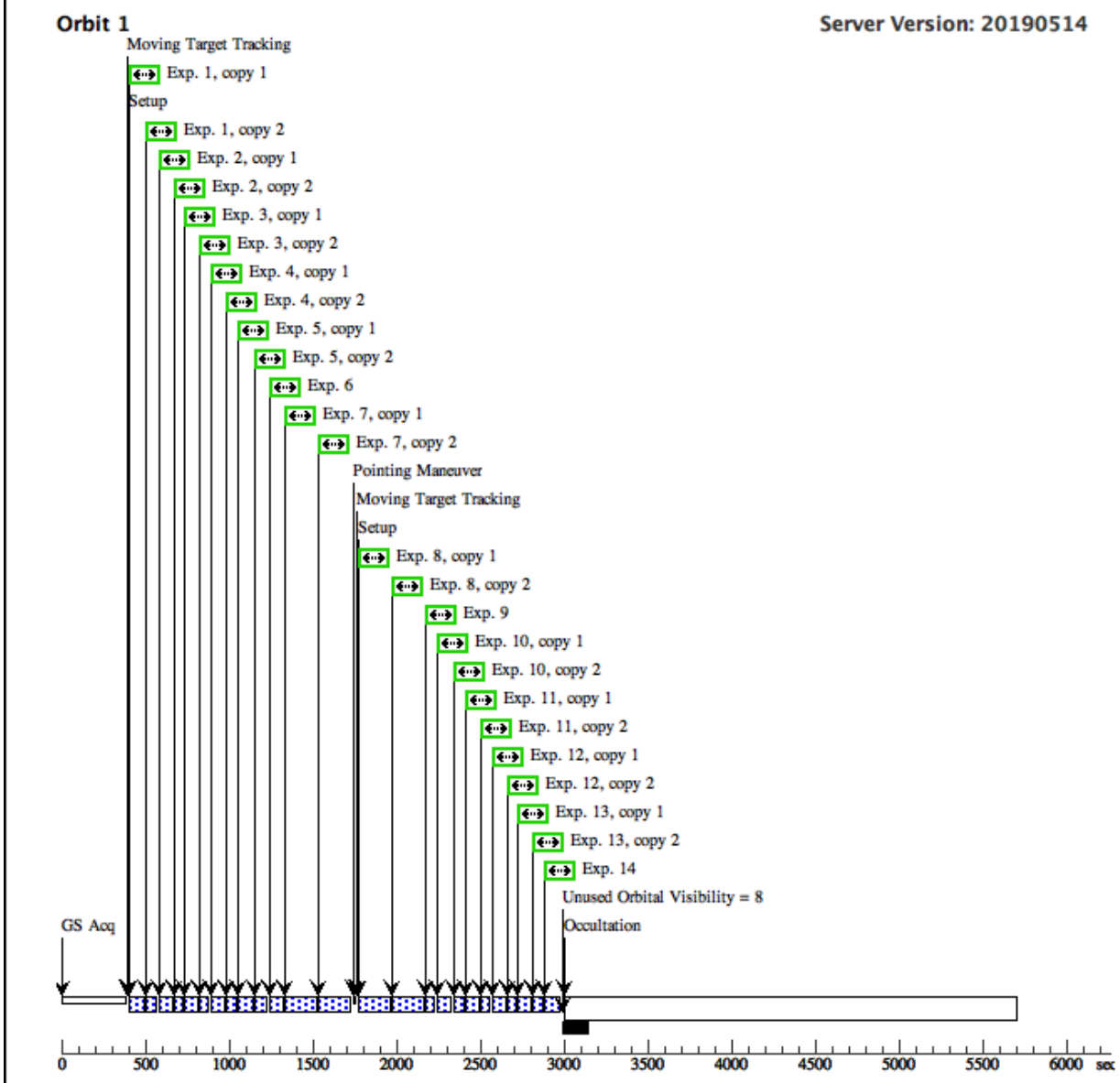
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F438W 2 x 12s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12	POS TARG 0.000,0.000	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	12 Secs X 2 (24 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2	F555W 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	F625W 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F775W 2 x 9s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F845M 2 x 2 5s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12	SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	25 Secs X 2 (50 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 1 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	3 Secs (3 Secs) *[==>]*	***[1]***
7	F350LP, 2 x 148s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	148 Secs X 2 (296 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F350LP, 2 x 148s, Pos2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	148 Secs X 2 (296 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F350LP, 1 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	3 Secs (3 Secs) *[==>]*	***[1]***
10	F438W 2 x 12s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	12 Secs X 2 (24 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
11	F555W 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
12	F625W 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
13	F775W 2 x 9s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
14	F845M 1 x 2 5s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12	SAME POS AS 8	Sequence 1-14 Non-Int in OPPOSITION 2019 (31)	25 Secs (25 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 15505, PHASE 0.02 DEG BEFORE OPP (32), implementation Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 61D TO 79 D; BETWEEN 14-JUL-2019:02:00:00 AND 14-JUL-2019:12:00:00; VISIBILITY INTERVAL 50 M

Comments: Broadband photometry of the small moons at 0.018 to 0.021 degrees phase. Additional short exposures to study year-by-year changes in Pluto's rotation curve.

Two scientifically equivalent opportunities are available, designated as Visits 32 and 33. Visit 33 is designated ON HOLD. Schedule either Visit 32 or 33. They are listed separately because they must satisfy different ORIENT constraints in order to keep the small moons out of the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

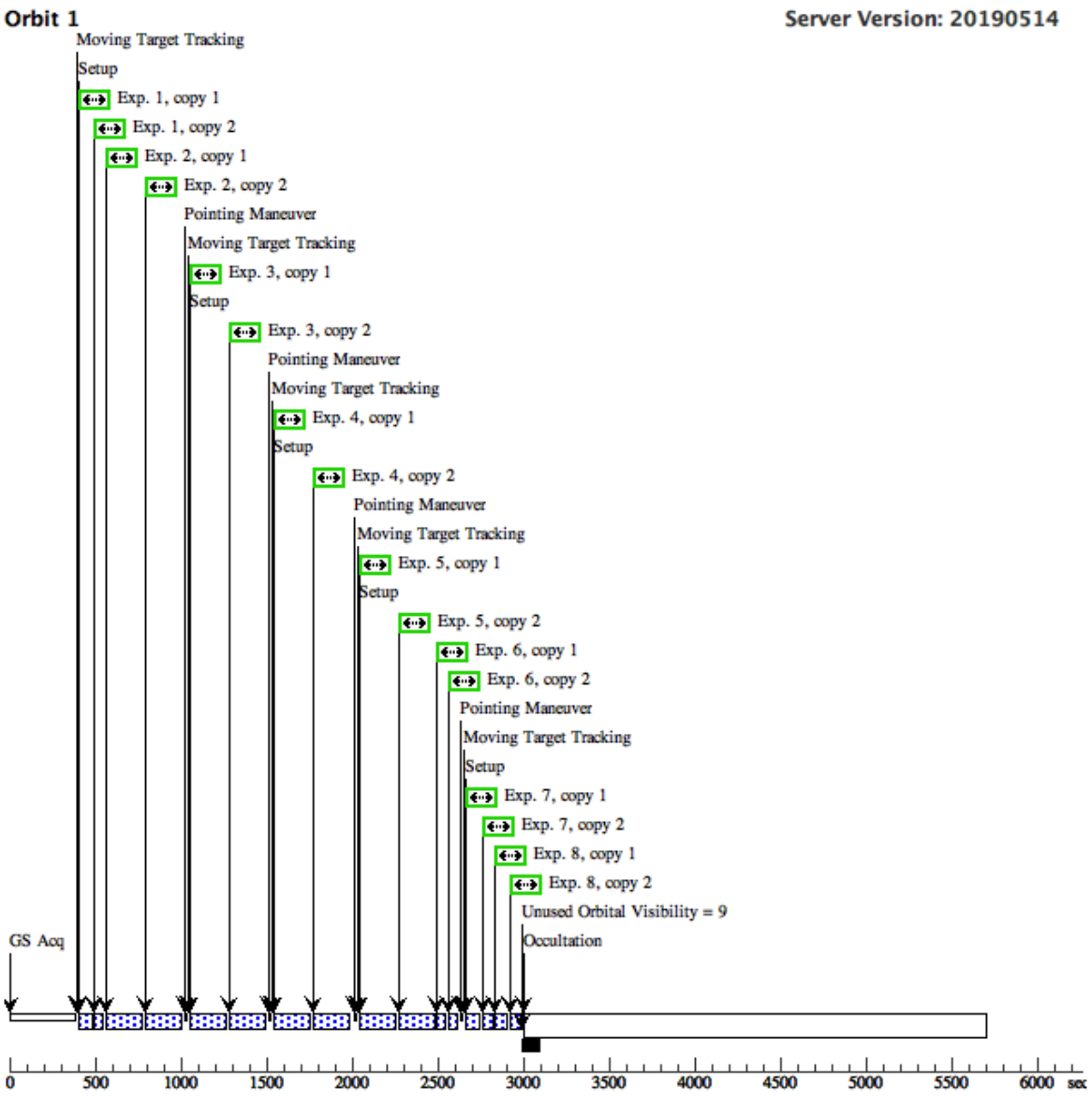
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 2 x 3 sec	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2	F350LP, 2 x 175s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	175 Secs X 2 (350 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	F350LP, 2 x 175s, Pos 2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	175 Secs X 2 (350 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 175s, Pos 3	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	175 Secs X 2 (350 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 175s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	175 Secs X 2 (350 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 3s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F438W, 2 x 12s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	12 Secs X 2 (24 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F775M, 2 x 9s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.02 DEG BEFORE OPP (32)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, PHASE 0.02 DEG AFTER OPP (33), withdrawn Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 70D TO 89 D; ORIENT 250D TO 269 D; BETWEEN 14-JUL-2019:19:00:00 AND 15-JUL-2019:03:00:00; ON HOLD ; VISIBILITY INTERVAL 51 M

Comments: Broadband photometry of the small moons at 0.017 to 0.019 degrees phase. Additional short exposures to study year-by-year changes in Pluto's rotation curve.

Two scientifically equivalent opportunities are available, designated as Visits 32 and 33. Visit 33 is designated ON HOLD. Schedule either Visit 32 or 33. They are listed separately because they must satisfy different ORIENT constraints in order to keep the small moons out of the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

On Hold Comments: This is an alternative to Visit 32. Schedule either 32 or 33; they are scientifically equivalent.

Solar System Targets

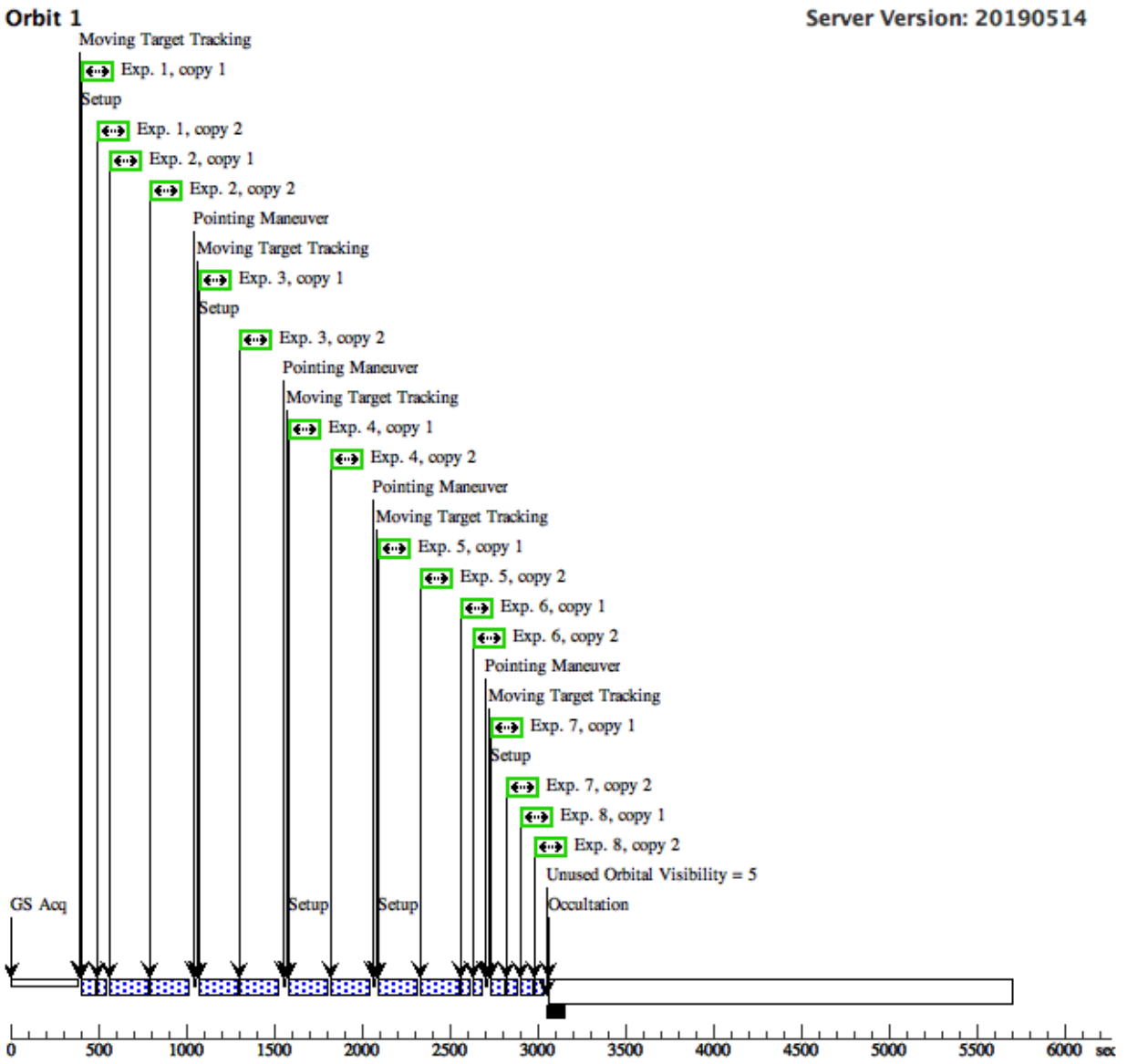
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 2 x 3 sec	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	3 Secs X 2 (4 Secs) *[==>2.0 Secs (Copy 1)]* *[==>2.0 Secs (Copy 2)]*	***[1]***
2	F350LP, 2 x 185s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	185 Secs X 2 (368 Secs) *[==>184.0 Secs (Copy 1)]* *[==>184.0 Secs (Copy 2)]*	***[1]***
3	F350LP, 2 x 185s, Pos 2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	185 Secs X 2 (368 Secs) *[==>184.0 Secs (Copy 1)]* *[==>184.0 Secs (Copy 2)]*	***[1]***
4	F350LP, 2 x 185s, Pos 3	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	185 Secs X 2 (368 Secs) *[==>184.0 Secs (Copy 1)]* *[==>184.0 Secs (Copy 2)]*	***[1]***
5	F350LP, 2 x 185s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	185 Secs X 2 (368 Secs) *[==>184.0 Secs (Copy 1)]* *[==>184.0 Secs (Copy 2)]*	***[1]***
6	F350LP, 2 x 3s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	3 Secs X 2 (4 Secs) *[==>2.0 Secs (Copy 1)]* *[==>2.0 Secs (Copy 2)]*	***[1]***
7	F438W, 2 x 12s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	12 Secs X 2 (22 Secs) *[==>11.0 Secs (Copy 1)]* *[==>11.0 Secs (Copy 2)]*	***[1]***
8	F775M, 2 x 9s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.02 DEG AFTER OPP (33)	9 Secs X 2 (16 Secs) *[==>8.0 Secs (Copy 1)]* *[==>8.0 Secs (Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, PHASE 0.04-0.06 DEG (34), scheduling Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 12-JUL-2019:15:00:00 AND 13-JUL-2019:07:00:00; BETWEEN 15-JUL-2019:22:00:00 AND 16-JUL-2019:14:00:00; VISIBILITY INTERVAL 50 M

Comments: Broadband photometry of the small moons at 0.04 to 0.06 degrees phase. Additional short exposures to study year-by-year changes in Pluto's rotation curve.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

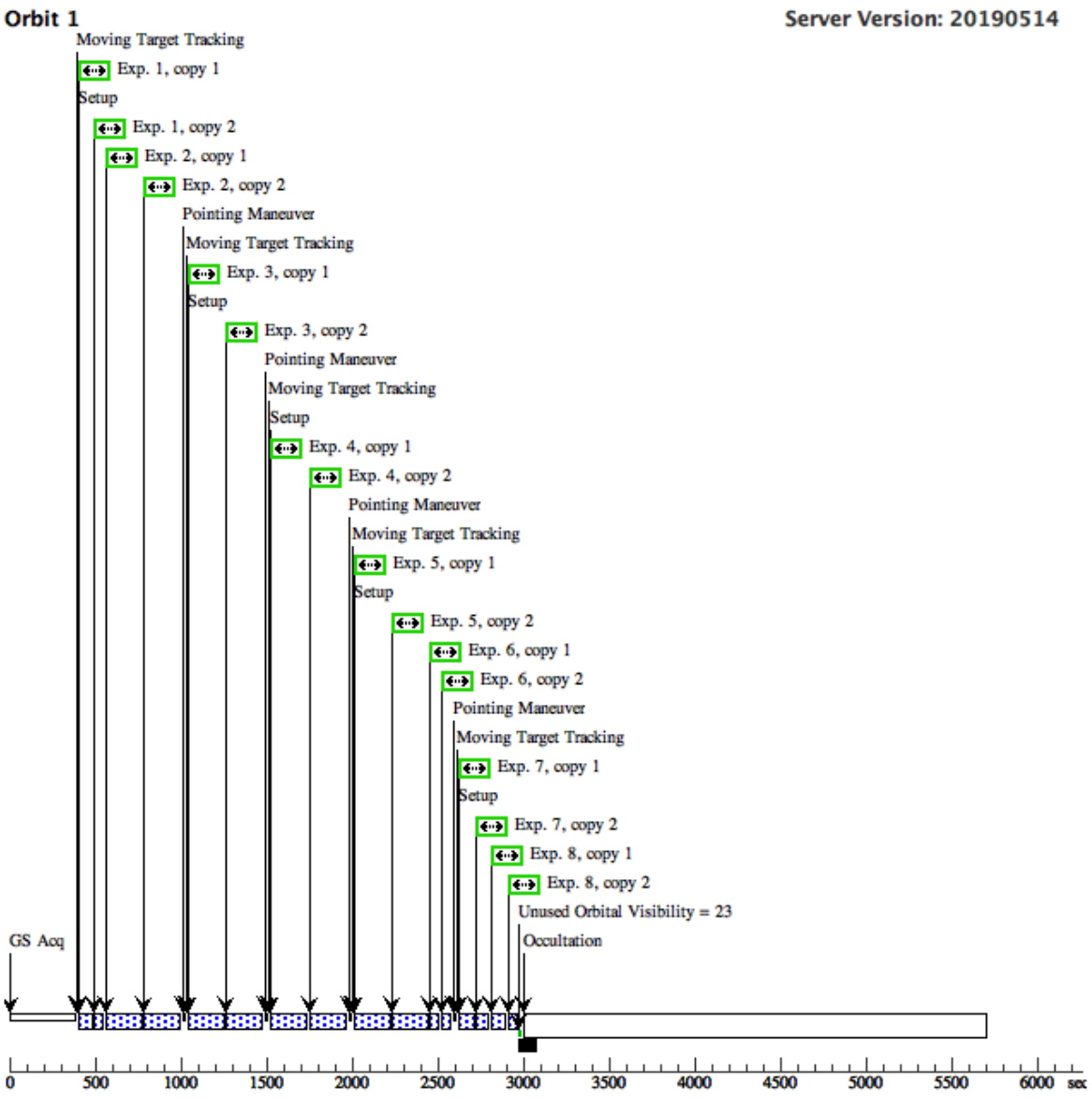
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 2 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2	F350LP, 2 x 170s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	170 Secs X 2 (340 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	F350LP, 2 x 170s, Pos 2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	170 Secs X 2 (340 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 170s, Pos 3	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	170 Secs X 2 (340 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 170s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	170 Secs X 2 (340 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 3s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F845M, 2 x 25s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	25 Secs X 2 (50 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F625W, 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.04-0.06 DEG (34)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, PHASE 0.09-0.12 DEG (35), scheduling Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 10-JUL-2019:13:00:00 AND 11-JUL-2019:14:00:00; BETWEEN 17-JUL-2019:16:00:00 AND 18-JUL-2019:16:00:00; VISIBILITY INTERVAL 51 M

Comments: Broadband photometry of the small moons at 0.09 to 0.12 degrees phase. Additional short exposures to study year-by-year changes in Pluto's rotation curve.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

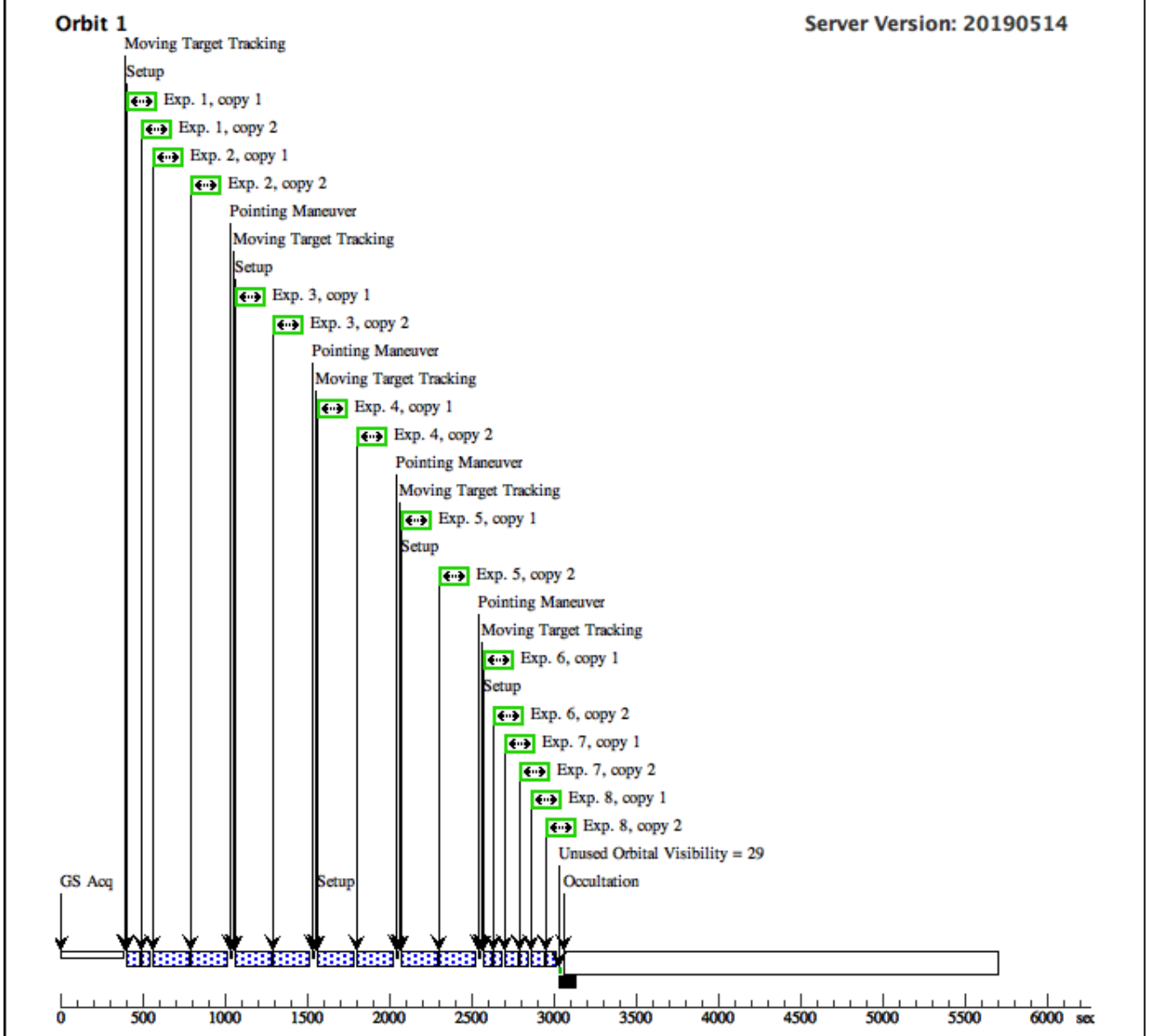
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 2 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2	F350LP, 2 x 180s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	F350LP, 2 x 180s, Pos 2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 180s, Pos 3	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 180s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F555W, 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F438W, 2 x 12s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.09-0.12 DEG (35)	12 Secs X 2 (24 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, PHASE 0.18-0.22 DEG (36), scheduling Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 07-JUL-2019:03:00:00 AND 08-JUL-2019:12:00:00; BETWEEN 20-JUL-2019:18:00:00 AND 22-JUL-2019:03:00:00; VISIBILITY INTERVAL 51 M

Comments: Broadband photometry of the small moons at 0.18 to 0.22 degrees phase. Additional short exposures to study year-by-year changes in Pluto's rotation curve.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

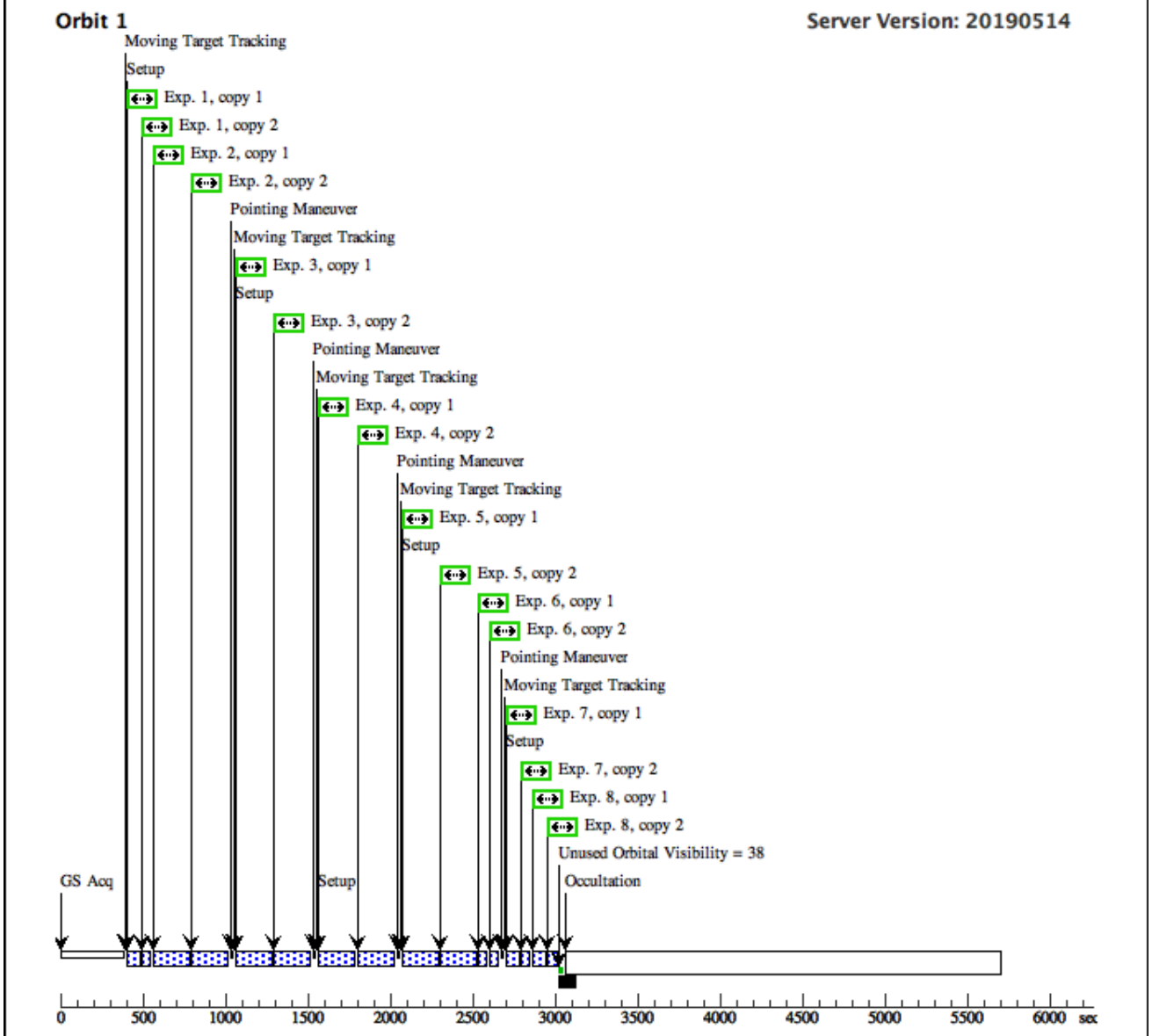
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	PLUTO	STD=PLUTO				EARTH

Comments: Description=Pluto

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 2 x 3s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
2	F350LP, 2 x 180s, Pos 1	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
3	F350LP, 2 x 180s, Pos 2	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 180s, Pos 3	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 180s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	180 Secs X 2 (360 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 3s, Pos 4	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F625W, 2 x 6s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F775W, 2 x 9s	(1) PLUTO	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12		Sequence 1-8 Non-Int in PHASE 0.18-0.22 DEG (36)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0-0.2, PRE-OPP (41), completed Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 01-MAR-2019:00:00:00 AND 01-APR-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5; VISIBILITY INTERVAL 53 M

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. Scheduled before opposition, with phase > 0.4 degrees.

Nix rotational phase between 0 and 0.2; during March 2019 to ensure a long time baseline.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

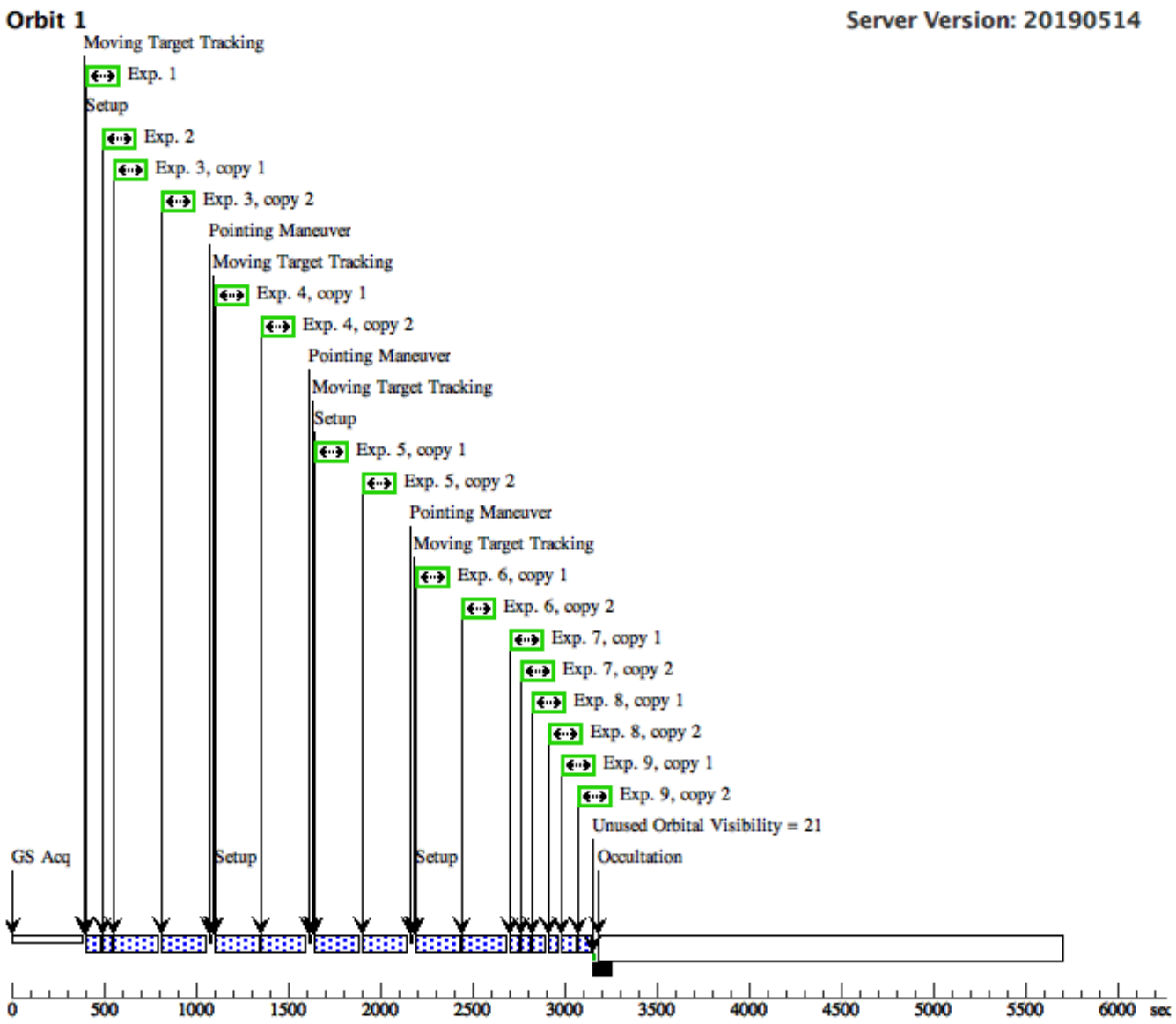
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0 TO 0.2	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	3 Secs (0.5 Secs) *[==>0.5 Secs]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	3 Secs (0.5 Secs) *[==>0.5 Secs]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	210 Secs X 2 (410 Secs) *[==>205.0 Secs (Copy 1)]* *[==>205.0 Secs (Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	210 Secs X 2 (410 Secs) *[==>205.0 Secs (Copy 1)]* *[==>205.0 Secs (Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	210 Secs X 2 (410 Secs) *[==>205.0 Secs (Copy 1)]* *[==>205.0 Secs (Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	210 Secs X 2 (410 Secs) *[==>205.0 Secs (Copy 1)]* *[==>205.0 Secs (Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	3 Secs X 2 (1 Secs) *[==>0.5 Secs (Copy 1)]* *[==>0.5 Secs (Copy 2)]*	***[1]***
8	F775W, 2 x 9s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	9 Secs X 2 (8 Secs) *[==>4.0 Secs (Copy 1)]* *[==>4.0 Secs (Copy 2)]*	***[1]***
9	F845M, 2 x 25s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.2, PRE-OPP (41)	25 Secs X 2 (40 Secs) *[==>20.0 Secs (Copy 1)]* *[==>20.0 Secs (Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.2-0.4, PRE-OPP (42), completed Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 15-MAR-2019:00:00:00 AND 15-APR-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5; VISIBILITY INTERVAL 52 M

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. Scheduled before opposition, with phase > 0.4 degrees.

Nix rotational phase between 0.2 and 0.4; second of five visits well-spaced between March 1 and July 1.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

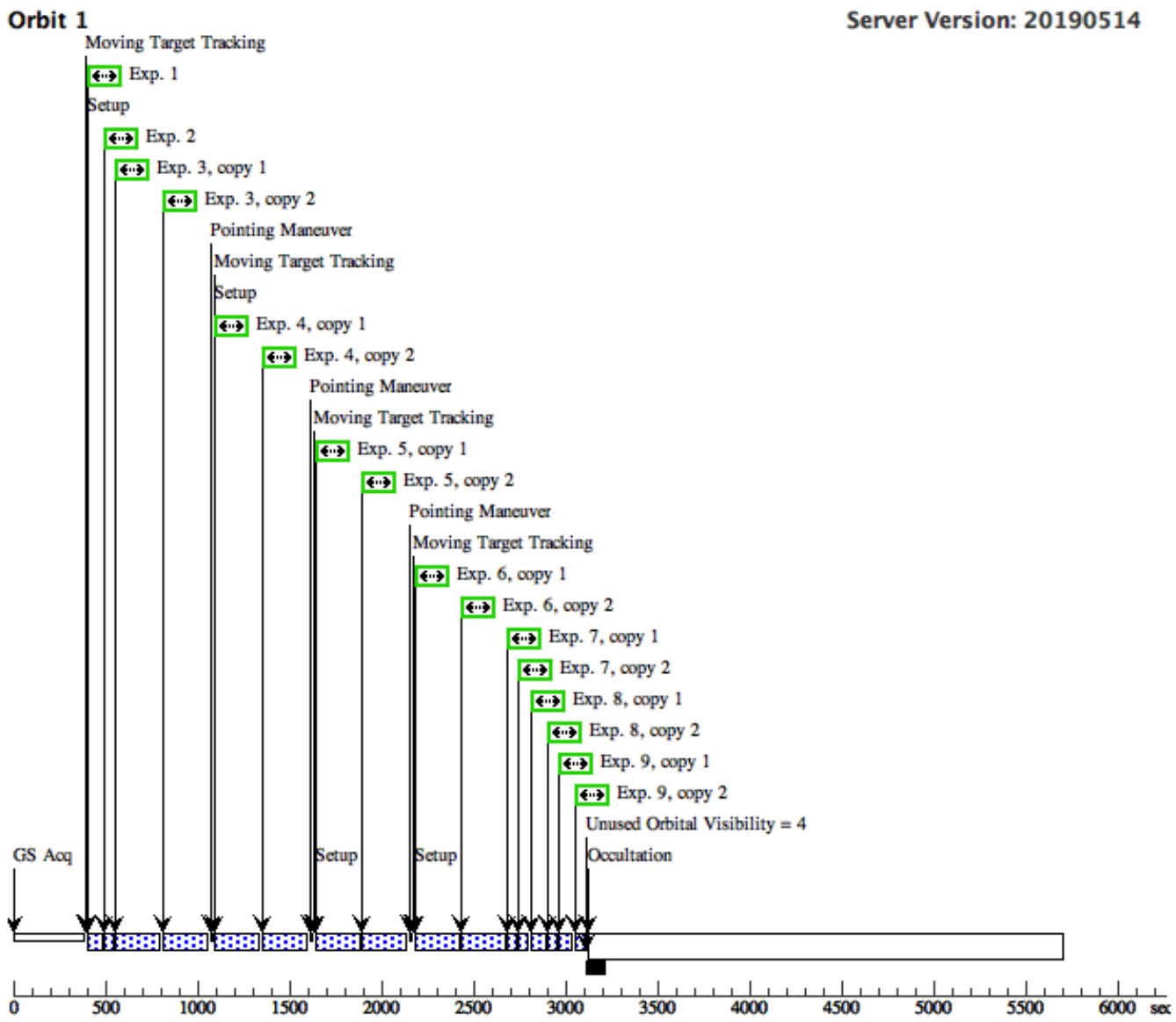
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.2 TO 0.4	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	3 Secs (0.5 Secs) *[==>0.5 Secs]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	3 Secs (0.5 Secs) *[==>0.5 Secs]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	210 Secs X 2 (406 Secs) *[==>203.0 Secs (Copy 1)]* *[==>203.0 Secs (Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	210 Secs X 2 (406 Secs) *[==>203.0 Secs (Copy 1)]* *[==>203.0 Secs (Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	210 Secs X 2 (406 Secs) *[==>203.0 Secs (Copy 1)]* *[==>203.0 Secs (Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	210 Secs X 2 (406 Secs) *[==>203.0 Secs (Copy 1)]* *[==>203.0 Secs (Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	3 Secs X 2 (1 Secs) *[==>0.5 Secs (Copy 1)]* *[==>0.5 Secs (Copy 2)]*	***[1]***
8	F438W, 2 x 12s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	12 Secs X 2 (10 Secs) *[==>5.0 Secs (Copy 1)]* *[==>5.0 Secs (Copy 2)]*	***[1]***
9	F555W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.2-0.4, PRE-OPP (42)	6 Secs X 2 (1 Secs) *[==>0.5 Secs (Copy 1)]* *[==>0.5 Secs (Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.4-0.6, PRE-OPP (43), completed Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; ORIENT 234D TO 244 D; BETWEEN 15-APR-2019:00:00:00 AND 15-MAY-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. Scheduled before opposition, with phase > 0.4 degrees.

Nix rotational phase between 0.4 and 0.6; third of five visits well-spaced between March 1 and July 1.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Diagnostics

(NIX ROTATION 0.4-0.6, PRE-OPP (43)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Solar System Targets

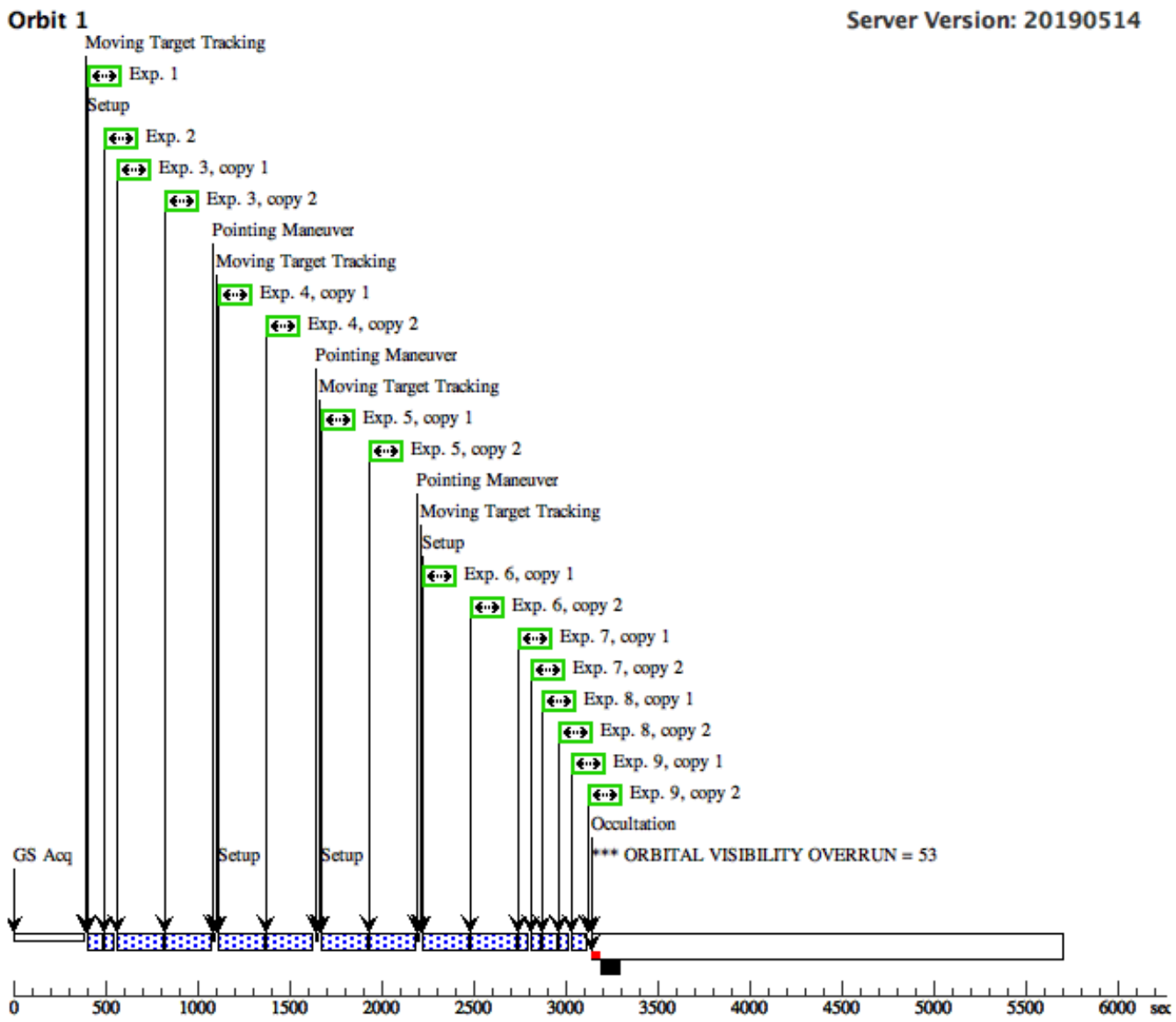
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.4 TO 0.6	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F625W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F775W, 2 x 9s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.4-0.6, PRE-OPP (43)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.6-0.8, PRE-OPP (44), completed Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; ORIENT 251D TO 253 D; BETWEEN 15-MAY-2019:00:00:00 AND 15-JUN-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. Scheduled before opposition, with phase > 0.4 degrees.

Nix rotational phase between 0.6 and 0.8; fourth of five visits well-spaced between March 1 and July 1.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

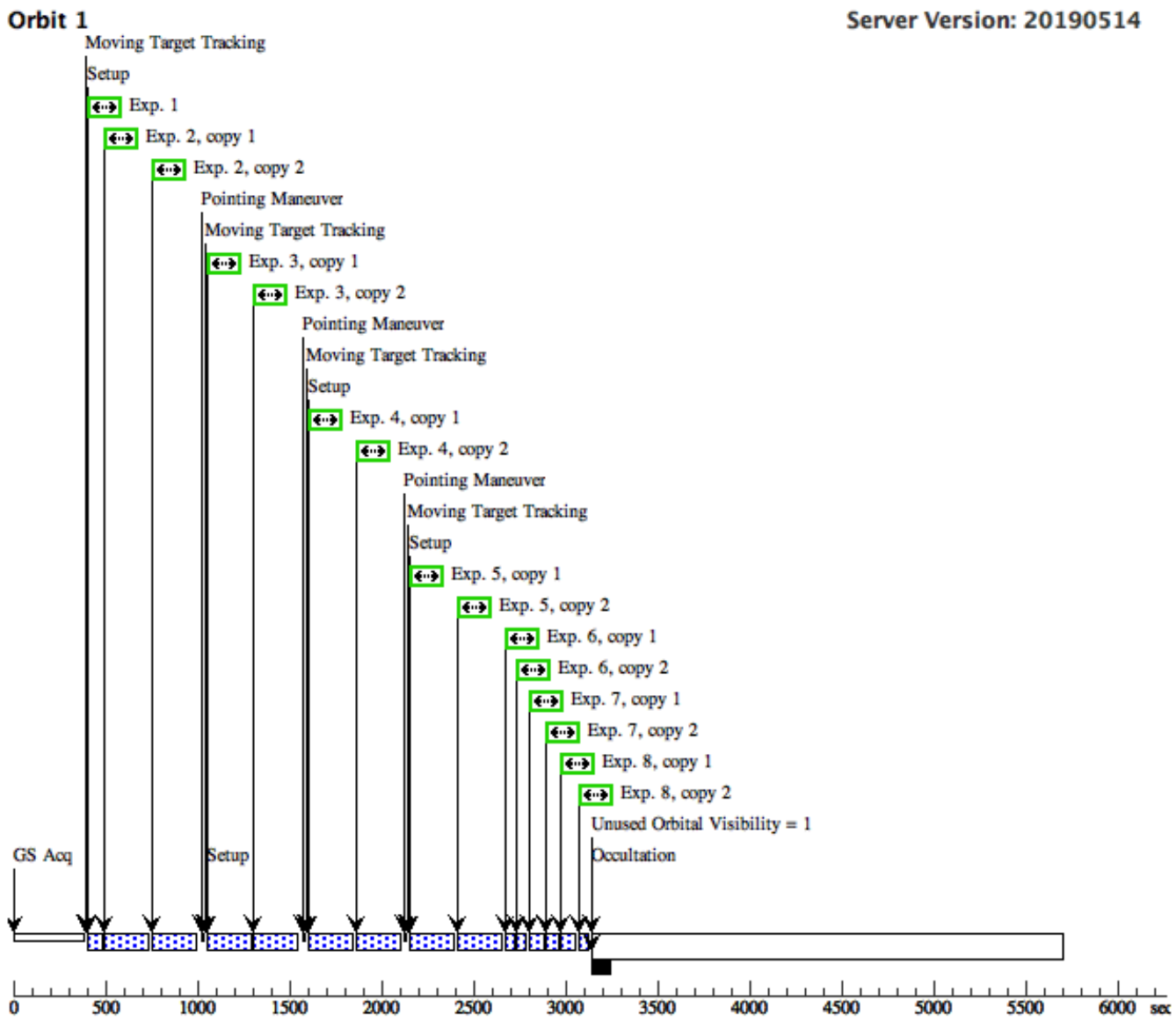
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.6 TO 0.8	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	3 Secs (2 Secs) *[==>2.0 Secs]*	***[1]***
2	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	210 Secs X 2 (418 Secs) *[==>209.0 Secs (Copy 1)]* *[==>209.0 Secs (Copy 2)]*	***[1]***
3	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	210 Secs X 2 (418 Secs) *[==>209.0 Secs (Copy 1)]* *[==>209.0 Secs (Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	210 Secs X 2 (418 Secs) *[==>209.0 Secs (Copy 1)]* *[==>209.0 Secs (Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	210 Secs X 2 (418 Secs) *[==>209.0 Secs (Copy 1)]* *[==>209.0 Secs (Copy 2)]*	***[1]***
6	F350LP, 2 x 3, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	3 Secs X 2 (4 Secs) *[==>2.0 Secs (Copy 1)]* *[==>2.0 Secs (Copy 2)]*	***[1]***
7	F845M, 2 x 20s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	20 Secs X 2 (38 Secs) *[==>19.0 Secs (Copy 1)]* *[==>19.0 Secs (Copy 2)]*	***[1]***
8	F438W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12	SAME POS AS 5	Sequence 1-8 Non-Int in NIX ROTATION 0.6-0.8, PRE-OPP (44)	6 Secs X 2 (10 Secs) *[==>5.0 Secs (Copy 1)]* *[==>5.0 Secs (Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.8-1, PRE-OPP (45), completed Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; BETWEEN 01-JUN-2019:00:00:00 AND 01-JUL-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis. Scheduled before opposition, with phase > 0.4 degrees.

Nix rotational phase between 0.8 and 1.0; during June 2018 to ensure a well-sampled time baseline.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Diagnostics

(NIX ROTATION 0.8-1, PRE-OPP (45)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Solar System Targets

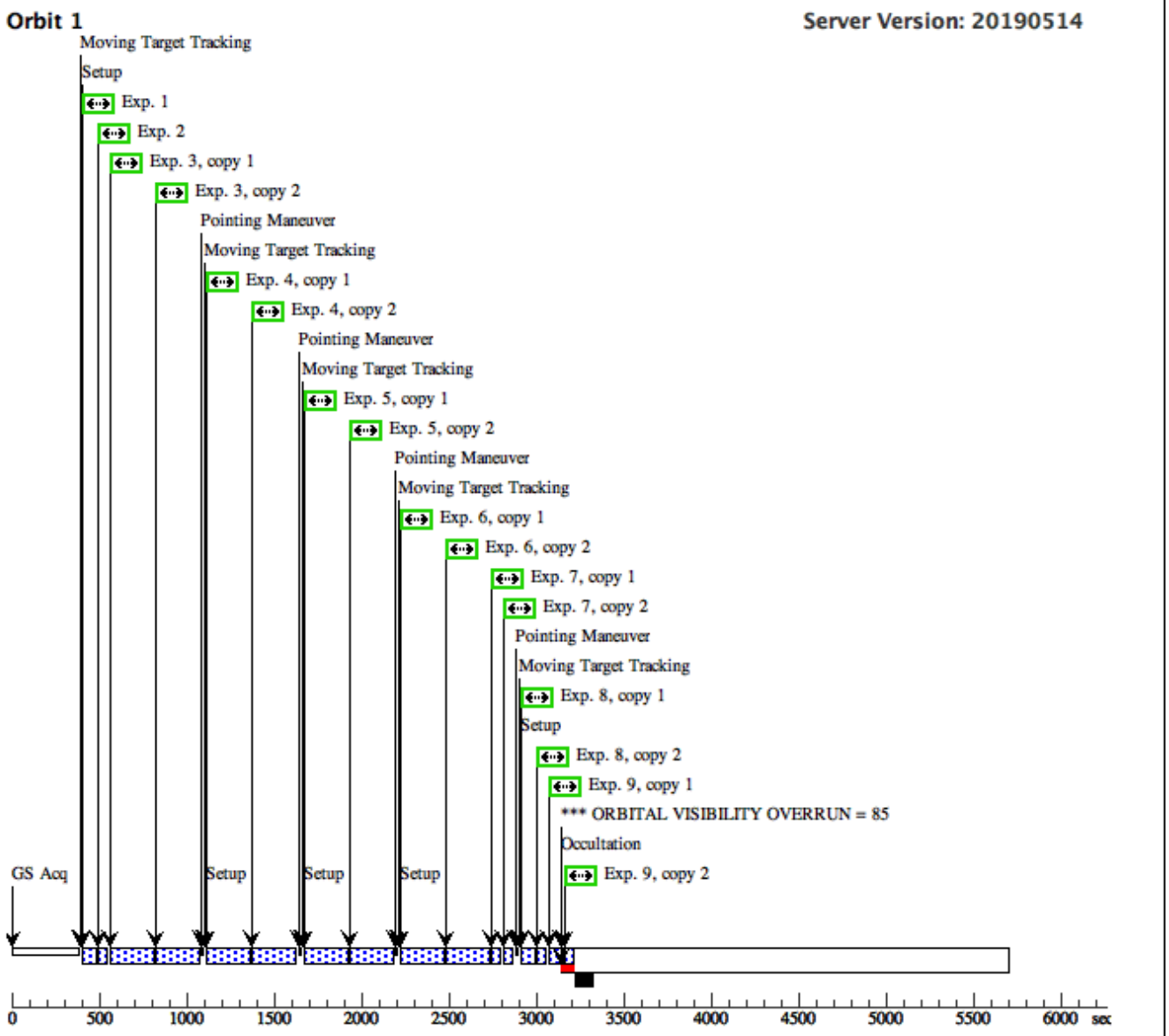
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.8 TO 1.0	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 210s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 210s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 210s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 210s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	210 Secs X 2 (420 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F555W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12		Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F625W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12		Sequence 1-9 Non-Int in NIX ROTATION 0.8-1, PRE-OPP (45)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0-0.25, POST-OPP (51), scheduling Fri Jun 28 18:00:47 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; BETWEEN 24-JUL-2019:00:00:00 AND 01-SEP-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis.

Nix rotational phase between 0. and 0.25. During August 2019 to ensure a well-sampled time baseline.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

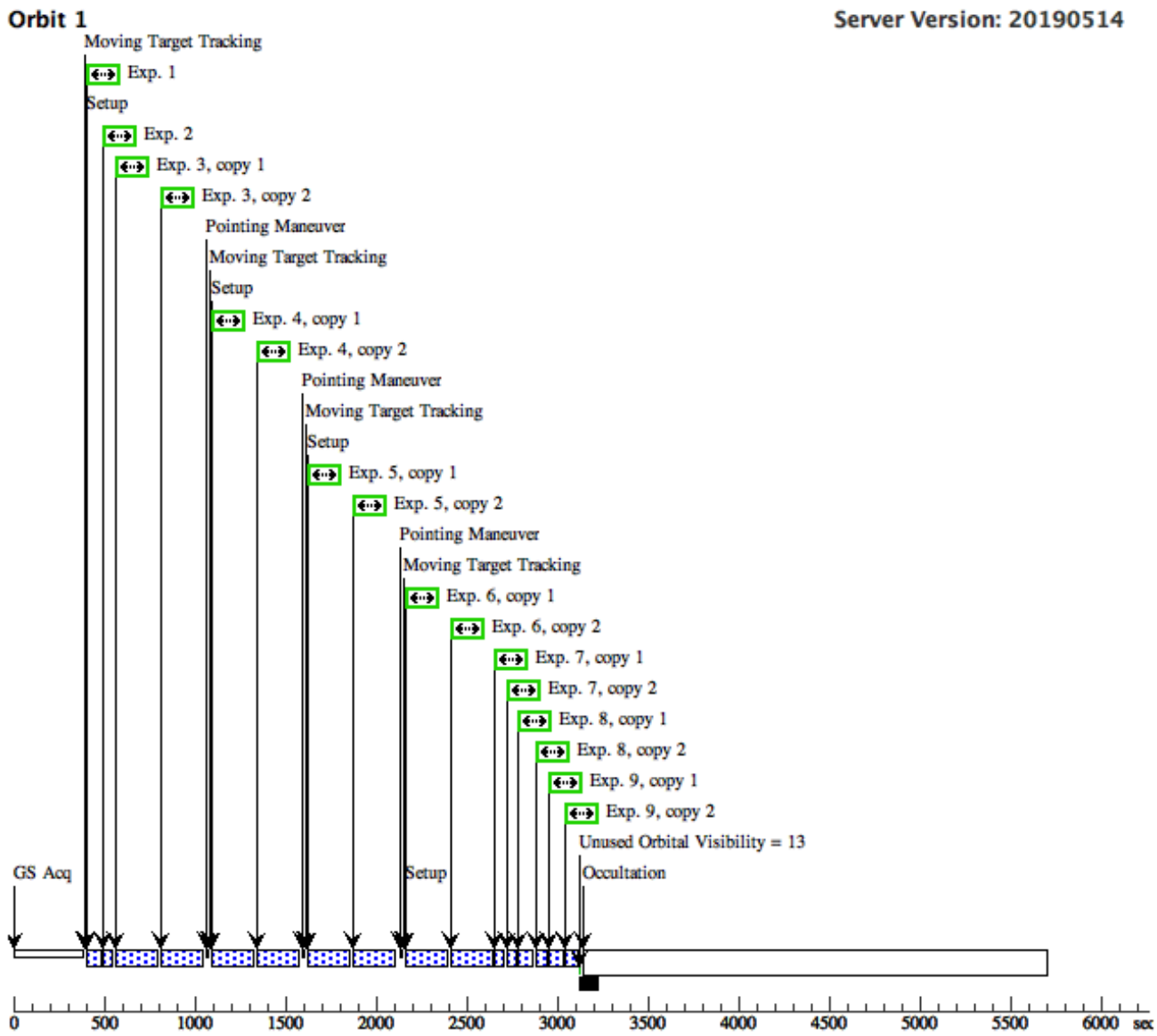
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0 TO 0.25	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 195s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	195 Secs X 2 (390 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 195s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	195 Secs X 2 (390 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 195s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	195 Secs X 2 (390 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 195s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	195 Secs X 2 (390 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F775W, 2 x 9s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F845M, 2 x 20s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F845M	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0-0.25, POST-OPP (51)	20 Secs X 2 (40 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.25-0.5, POST-OPP (52), scheduling Fri Jun 28 18:00:48 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; BETWEEN 13-SEP-2019:00:00:00 AND 01-OCT-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis.

Nix rotational phase between 0.25 and 0.5. In late September 2019 to ensure a long time baseline.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

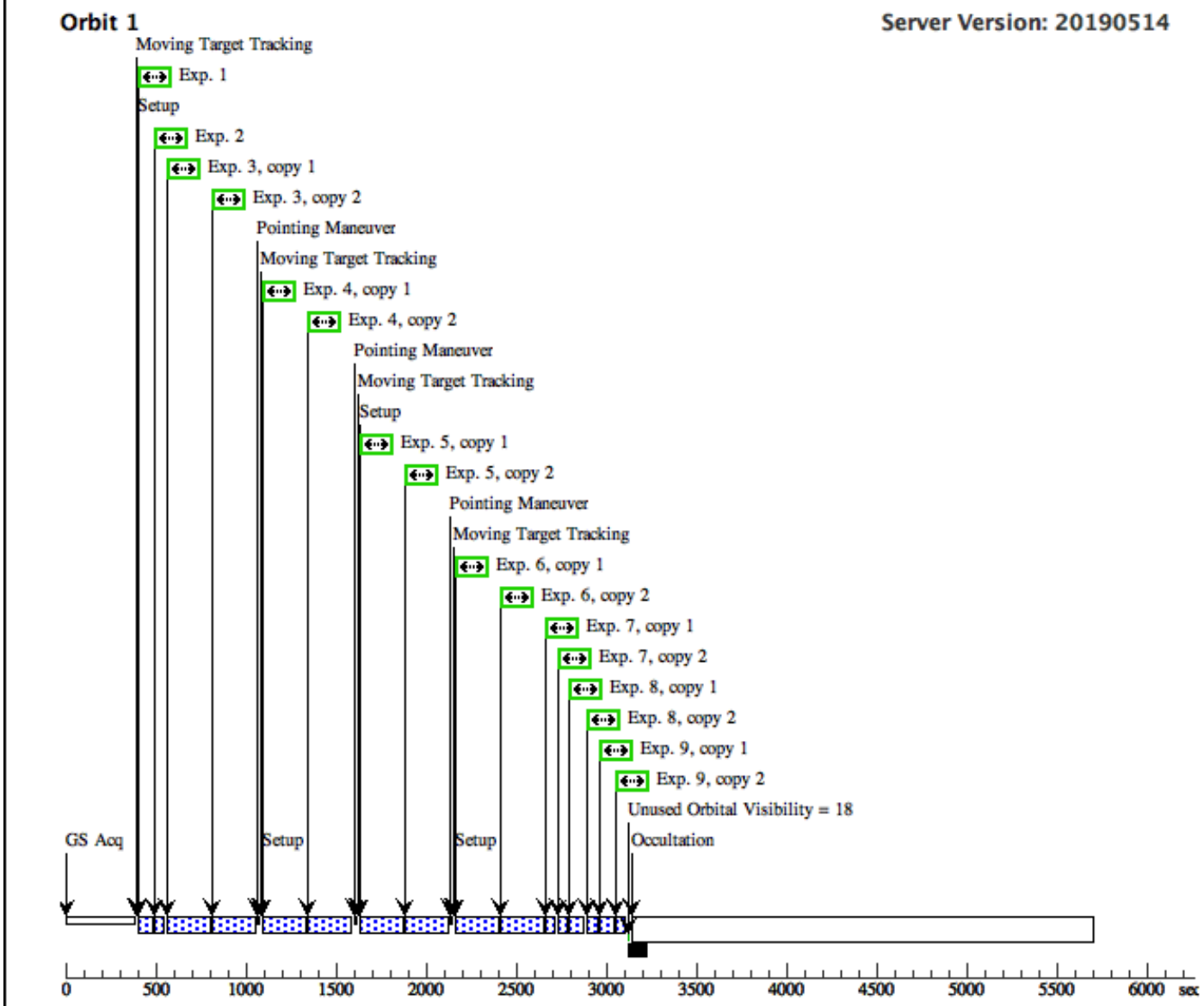
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.25 TO 0.5	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 200s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 200s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 200s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 200s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F438W, 2 x 12s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F438W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	12 Secs X 2 (24 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F555W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F555W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.25-0.5, POST-OPP (52)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 15505, NIX ROTATION 0.5-1.0, POST-OPP (53), scheduling Fri Jun 28 18:00:48 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 30%; BETWEEN 01-SEP-2019:00:00:00 AND 13-SEP-2019:00:00:00; Period 1.826 D AND ZERO-PHASE HJD2458618.5

Comments: Long exposures for the small moons through filter F350LP, plus additional short exposures for photometry of Pluto and Charon. POS TARG values re-position Pluto in steps of exactly 5.5 pixels along each axis.

Nix rotational phase between 0.5 and 1.0. In early September 2019 to ensure time baseline coverage.

We request the opportunity to define the ORIENT parameter once this visit is scheduled. It is important to keep the four small moons outside the diffraction spikes of Pluto and Charon.

Note: Changing the schedulability setting from 100 to 30 did not affect the valid observing windows at all, but it gave us several extra minutes of integration time on our targets.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	PLUTO-STYX-KERBEROS	STD=PLUTO			SEP OF CHARON STYX FROM EARTH GT 1.8", SEP OF CHARON KERBEROS FROM EARTH GT 1.6"	EARTH

Comments: Description=Pluto with Styx and Kerberos well separated from Charon

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	POS TARG 0.000,0.000; PHASE 0.5 TO 1.0	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	3 Secs (3 Secs) *[==>]*	***[1]***
2	F350LP, 1 x 3s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	3 Secs (3 Secs) *[==>]*	***[1]***
3	F350LP, 2 x 200s, Pos 1	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		SAME POS AS 1	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
4	F350LP, 2 x 200s, Pos 2	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.217,-0.012	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
5	F350LP, 2 x 200s, Pos 3	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG -0.002,0.219	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
6	F350LP, 2 x 200s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP		POS TARG 0.215,0.207	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	200 Secs X 2 (400 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
7	F350LP, 2 x 3s, Pos 4	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F350LP	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	3 Secs X 2 (6 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
8	F625W, 2 x 6s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F625W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	6 Secs X 2 (12 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***
9	F775W, 2 x 9s	(2) PLUTO-STYX-KERBEROS	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=12	SAME POS AS 6	Sequence 1-9 Non-Int in NIX ROTATION 0.5-1.0, POST-OPP (53)	9 Secs X 2 (18 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]*	***[1]***

Orbit Structure