15493 - Astrometry of 2014MU69 for New Horizons encounter

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?*
12	(3) 486958-E	WFC3/UVIS	1	25-Oct-2018 19:00:35.0	yes

1 Total Orbits Used

ABSTRACT

We propose 12 orbits of time to make high-precision astrometric measurements of the New Horizons extended mission target, 2014MU69. These observations are in direct support of the navigation of New Horizons leading up to its encounter in Jan 2019. These visits represent an optimized plan for improved orbit estimates that will complete as the target becomes directly observable by New Horizons. This astrometry is a key element leading up to a close investigation of a Cold-Classical Kuiper Belt Object, one of the most primitive members of our solar system.

OBSERVING DESCRIPTION

These observations will use the full field of WFC3/UVIS due to its improved broadband PSF and detector sensitivity compared to ACS. This was the HST instrument used to successfully to detect 2014MU69 and our other potential KBO targets in our 2014 search campaign. We are using the F350LP filter for its sensitivity and image quality as well as consistency with the prior observations. Our observing strategy is based on the successful strategy developed for our 2014-2016 HST KBO search and followup campaigns. For each HST orbit we will use WFC3 with the F350LP filter to obtain five 370 second exposures. We will track on the known motion of 2014MU69, which results in trailing of stars, but does not prevent their removal to provide robust detections in single orbits as shown. The formal uncertainty of the position is less than 1 pixel for the entire campaign. Thus, the target can easily be placed near the center of WFC3/UVIS2, and very bright stars can be avoided by adjusting the timing of the observations as necessary. Once preliminary observing windows are available we need to examine the background star field for contamination and final scheduling to avoid field stars. We require acquisition of the full WFC3 field for precise astrometric solutions. The visit timing is designed to get broad time coverage for the orbit estimation needed for New Horizons navigation support. The one week period is chosen to provide ample scheduling flexibility and could be shifted by another day or two if needed. The timing of these weeks is controlled by avoiding the time around quadrature when the sky-plane velocity is below 1 arcsec/hour and the need to get the visits spread out in time throughout the annual observing window.

Visit

Proposal 15493, Visit 12, implementation Thu Oct 25 23:00:35 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: SCHED 90%; BETWEEN 25-OCT-2018:00:00:00 AND 15-NOV-2018:00:00:00

Comments: The scheduling for this visit must be coordinated with visit 13 from (14450). These two visits are to be sheduled three days apart within the same one week window. We will need to verify the scheduling window for each visit to ensure there are no field star contamination problems.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=CELESTIAL		(1)
	Purpose=OTHER	Pattern Orientation=0		
	Number Of Points=5	Angle Between Sides=		
	Point Spacing=.030	Center Pattern=true		
	Line Spacing=			

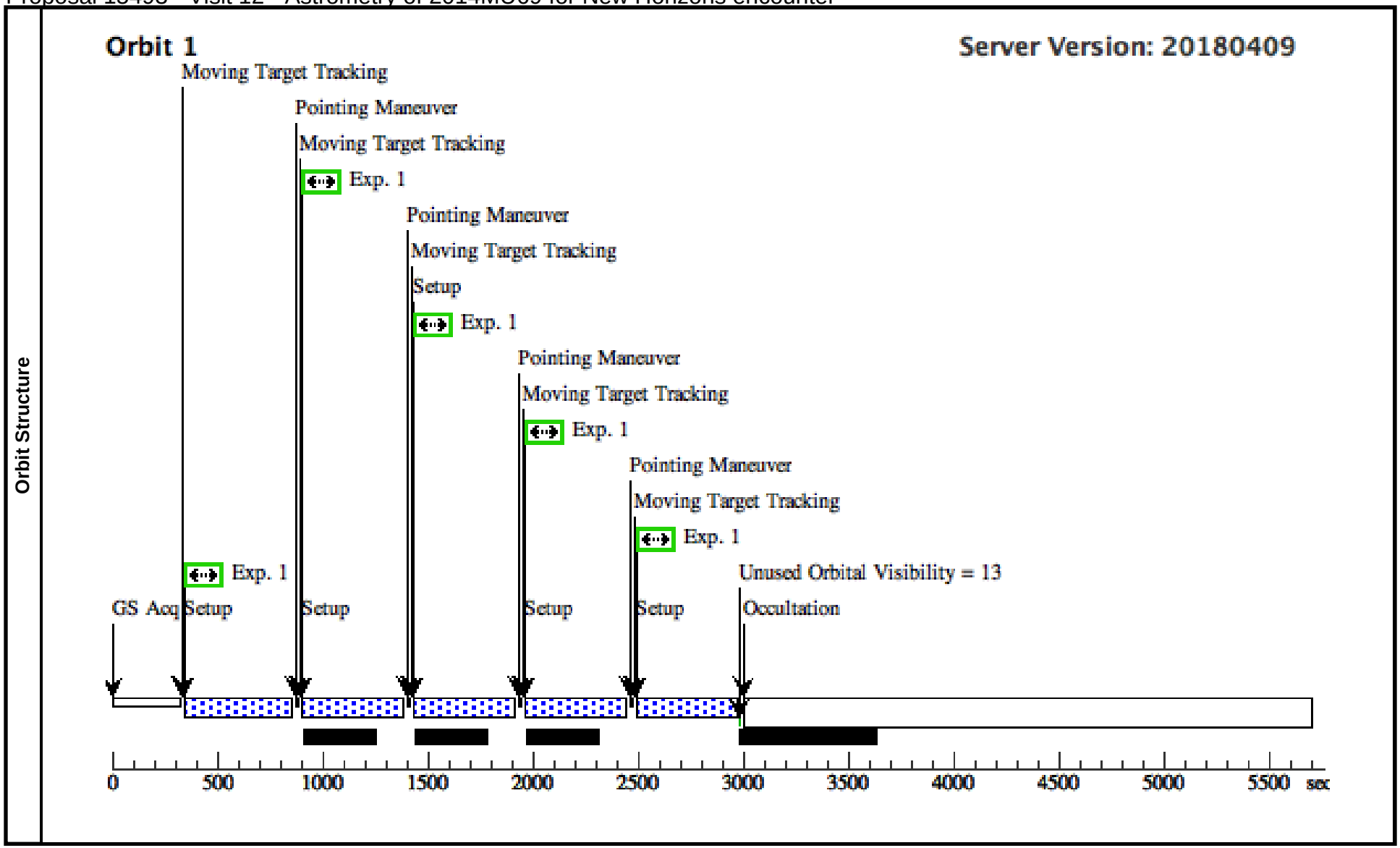
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(3)	486958-E	TYPE=ASTEROID,A=44.522607562638,E=0.040269637522,I=2.452265958242,O=158.963182412558,W=174.926199040395,M=315.140003030700,EQUINOX=J2000,EPOCH=15-AUG-2018:00:00:00,EpochTimeScale=UTC				EARTH

Comments: Description=Kuiper-Belt Object

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) 486958-E	WFC3/UVIS, ACCUM, UVIS2	F350LP		GS ACQ SCENARIO BASE1B3	Sequence 1-1 Non-Int in Visit 12	367.0 Secs (1835 Secs)	
							Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in Visit 12 (1)	*[==>(Pattern 1)]*	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
								[==>(Pattern 5)]	


Orbit 1
Server Version: 20180409
Orbit Structure
Moving Target Tracking
Pointing Maneuver
Moving Target Tracking
Exp. 1
Pointing Maneuver
Moving Target Tracking
Setup
Exp. 1
Pointing Maneuver
Moving Target Tracking
Exp. 1
Pointing Maneuver
Moving Target Tracking
Exp. 1
Exp. 1
Unused Orbital Visibility = 13
GS Acq
Setup
Setup
Setup
Setup
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec