15360 - Origin and Evolution of the First Known Ultra-Young Asteroid Family and its Doubly-Synchronous Binary Member

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) P2012F5	WFC3/UVIS	4	11-Jun-2018 18:04:27.0	yes
02	(1) P2012F5	WFC3/UVIS	4	11-Jun-2018 18:04:30.0	yes
A2	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:32.0	yes
A3	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:33.0	yes
04	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:35.0	yes
05	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:36.0	yes
54	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:37.0	yes
06	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:38.0	yes
55	(1) P2012F5	WFC3/UVIS	2	11-Jun-2018 18:04:39.0	yes

22 Total Orbits Used

ABSTRACT

Our GO-14192 and DD-14475 programs executed in late 2015 and early 2016, providing spectacular WFC3/UVIS images of the unusual disrupted asteroid P/2012 F5. We have detected at least nine star-like fragments of the main nucleus, still cocooned in their birth dust trail, suggesting that P/2012 F5 is a newborn asteroid family, only a few years old. Given that the main nucleus rotates at a critical rate, this ultra-young system is the best candidate for a family generated by rotational fission, as opposed to all the other asteroid families, which are of collisional origin. To our great surprise, the largest fragment of the main nucleus is most probably a small, doubly-synchronous binary, challenging the established theory of formation of binary asteroids. Capitalizing on these exciting early results, we propose a long-term monitoring program of P/2012 F5, with which we wish to secure new data from the next two oppositions. The requested additional HST orbits are critically needed to quantify the ejection parameters of the fragments and thereby verify the suspected cause of the fragmentation. They will also provide absolutely unique insight into the evolution of the first known ultra-young asteroid binary. Hubble is the only facility with sufficient sensitivity and wide-field angular resolution to carry out this investigation, which is more than likely to have a profound impact on asteroid science, including our solar system and systems around other stars.

OBSERVING DESCRIPTION

1. Target and Scheduling

Our target is the fragmented asteroid P/2012 F5, which has a bright nucleus and many fainter fragments embedded in a long dust trail. At the time of the planned HST observations the nucleus is of 22 mag and the brightest fragment of about 27 mag (R-band magnitudes). The TARGETS component contains the orbital elements of the main nucleus, automatically retrieved by APT from the JPL's HORIZONS, which ensure the ephemeris precision better than 1 arcsec. The nucleus and the fragments are dispersed along a straight line, which has a sky PA ranging from 274 to 275 deg at the time of the planned HST observations. The expected angular distance between the easternmost component and the westernmost component (one of the faint fragments) is 45 arcsec, however, the associated dust trail extends further out, and can be several arcminutes long.

These observations are *time-critical* and should be scheduled in two 5-orbit visits in the time slots defined by the BETWEEN Special Requirement (ideally close to the centers of these slots). These slots were optimized for maximum scientific return based on several parameters of the target. In particular, they ensure near-maximum brightness, negligible observing-geometry changes within a visit, and a sufficient time separation of the visits.

EDIT: Due to the new maximum duration of a visit equal to 4 orbits, the observations should be scheduled in two 4-orbit visits and one 2-orbit visit

in between.

2. Visit Design

In Visit 1 we place the target's nucleus in quadrant B, approximately (500,500) px from its outer corner, which is achieved by a combination of the selected UVIS1-FIX aperture and a large POS TARG offset of (61.50,24.25) arcsec. Thanks to the selected ORIENT Special Requirement all the known fragments will also be present in quadrant B and lined up along the HST's U3 axis, which minimizes geometric distortions. Moreover, full-frame readout makes it possible to detect new fragments at larger separations from the nucleus in quadrant C.

In Visit 2 we place the target's nucleus in the UVIS2-C1K1C-CTE aperture, approximately (500,500) px from the outer corner of quadrant C. Thanks to the selected ORIENT Special Requirement all the known fragments will also be present in quadrant C and lined up along the detector data rows. Moreover, full-frame readout makes it possible to detect new fragments at larger separations from the nucleus in quadrant D.

EDIT: The newly created Visits 4 and 5 have the same designs as Visit 2, except that the selected ORIENT Special Requirement is slightly different. Visit 4 is the new 2-orbit visit and Visit 5 is a repeat of the failed Visit 1.

3. Orbit Design

Each orbit has basically the same architecture. We consistently use WFC3/UVIS with the F350LP filter, which offers the best SNR on asteroid nuclei. We wish to take five full-frame images per orbit, which is small enough to ensure parallel buffer dumps and good overall observing efficiency, but large enough to adequately sample the light curves of the main nucleus and largest fragment. The orbital visibility at the time of the preferred observations allows us to take all five images with 438 sec integration time when a GS is re-acquired, or four images with 438 sec integration time and one image with 295 sec integration time when a new GS is acquired. We purposely leave 141 sec of unused orbital visibility, which is needed to allow for scheduling in the preferred time slots.

To maximize observing efficiency, dithering is applied between consecutive orbits (i.e. all five exposures taken during a single orbit will not be dithered) through changing the POS TARG offsets, which incurs no overheads but naturally mitigates the effect of bad pixels in a deep, visit-

averaged image. To minimize the influence of geometric distortions, the POS TARG offsets move the target along the HST's U3 axis.

EDIT: The designs of the newly created Visits 4 and 5 are different. The two-orbit Visit 4 uses in-orbit POS TARG change (one per orbit) ensuring 4 different dither positions for the entire visit. To accommodate this change, the first exposure from the first orbit has been shortened from 295 sec to 231 sec and the first exposure from the second orbit has been shortened from 438 sec to 374 sec. The four-orbit Visit 5 has longer orbits than the previous visits, allowing us to take all five images with 453 sec integration time when a GS is re-acquired, or four images with 453 sec integration time and one image with 327 sec integration time when a new GS is acquired. The new integration times take into account that GS re-acquisition now takes 15 sec longer than before.

Visit

Proposal 15360, Visit 01, failed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 274D TO 274 D; BETWEEN 04-MAY-2018:00:00:00 AND 07-MAY-2018:00:00:00

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Description=Disrupted asteroid
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS1-FIX	F350LP		POS TARG 61.50,24 .25		295 Secs (295 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS1-FIX	F350LP		POS TARG 61.50,24 .25		438 Secs X 4 (1752 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS1-FIX	F350LP		POS TARG 60.75,23 .50		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)]	***[2]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	
4		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS1-FIX	F350LP		POS TARG 60.00,22 .75		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)]	***[3]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	
5		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS1-FIX	F350LP		POS TARG 59.25,22 .00		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)]	***[4]***
								[==>(Copy 2)]	
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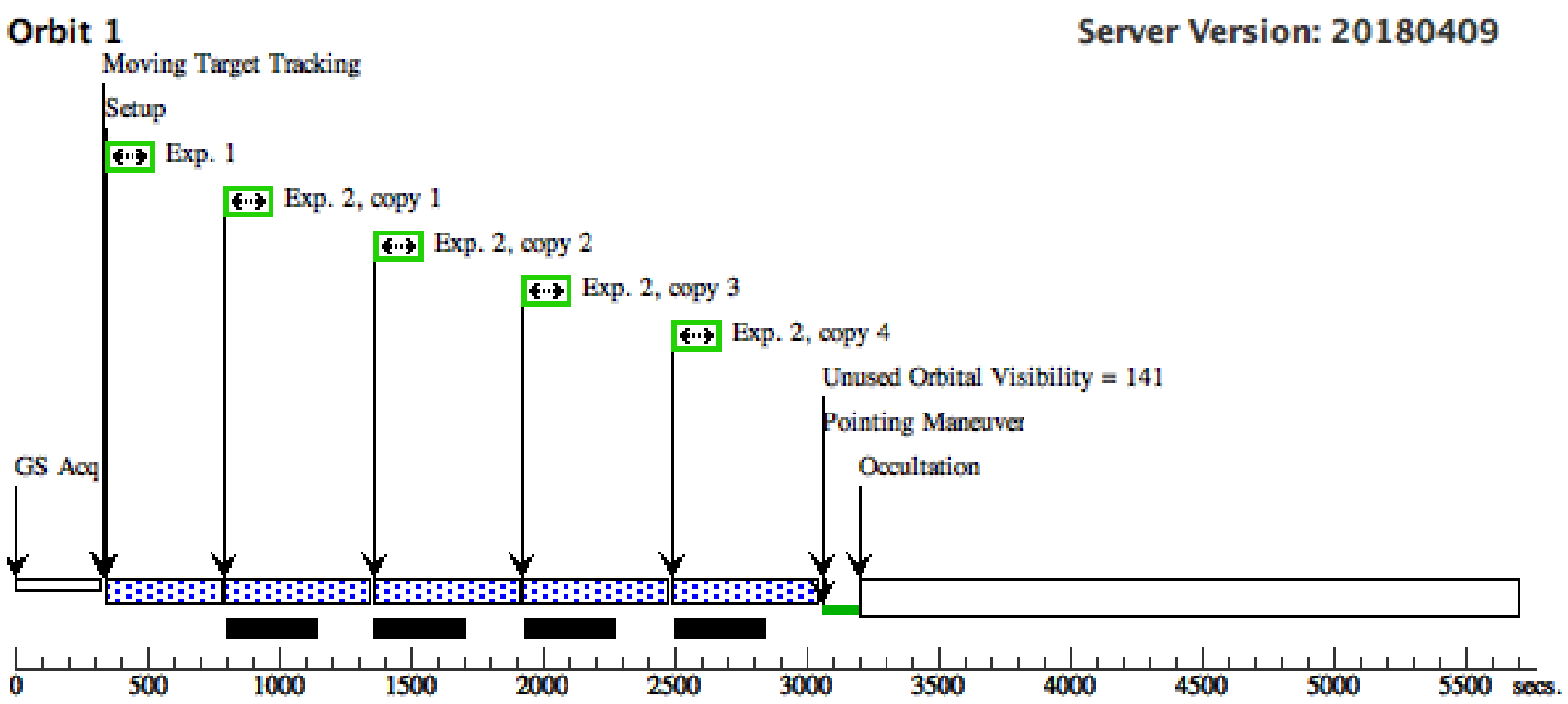
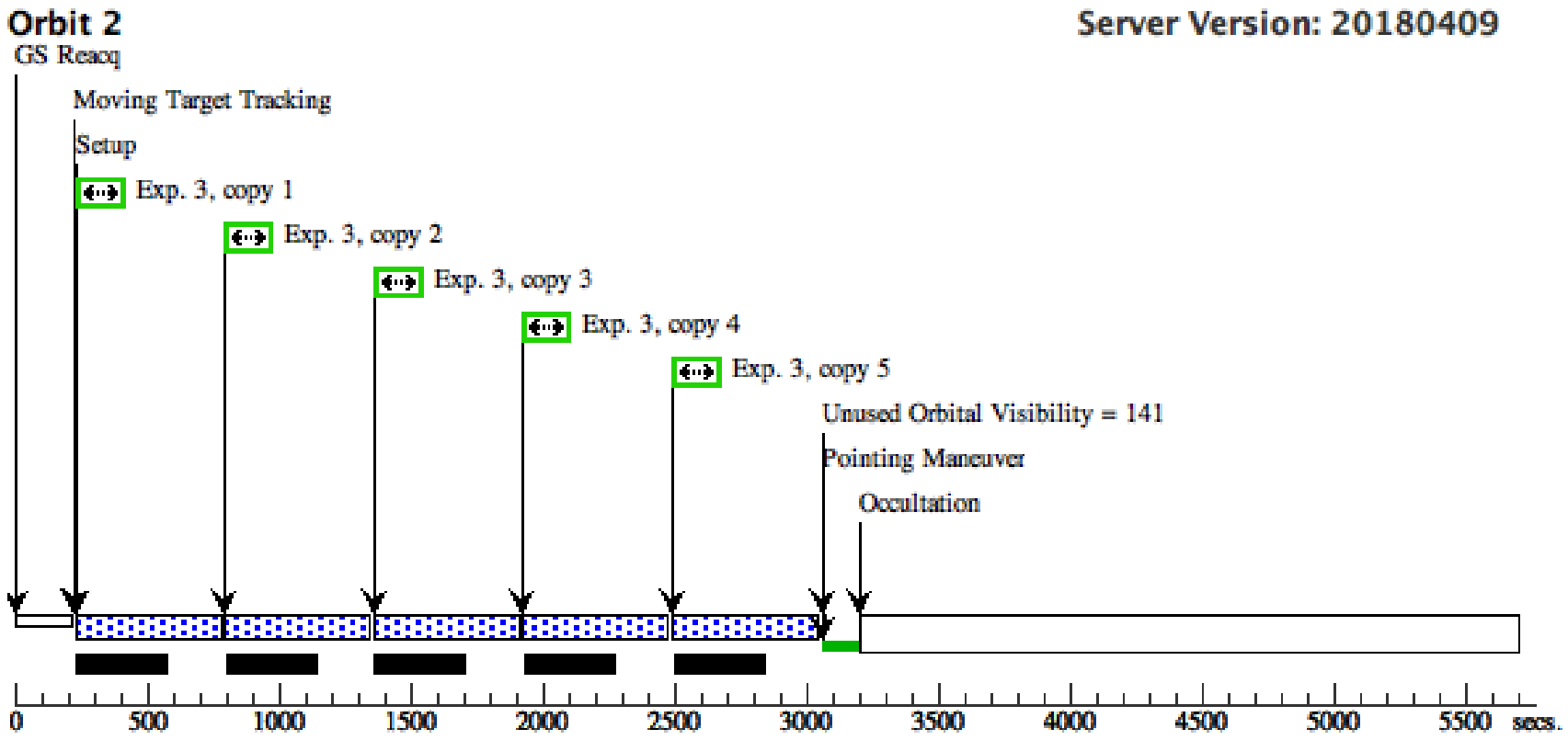
								[==>(Copy 4)]	
								[==>(Copy 5)]	

Orbit Structure

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GS Reacq
Moving Target Tracking
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Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 141
Pointing Maneuver
Occultation
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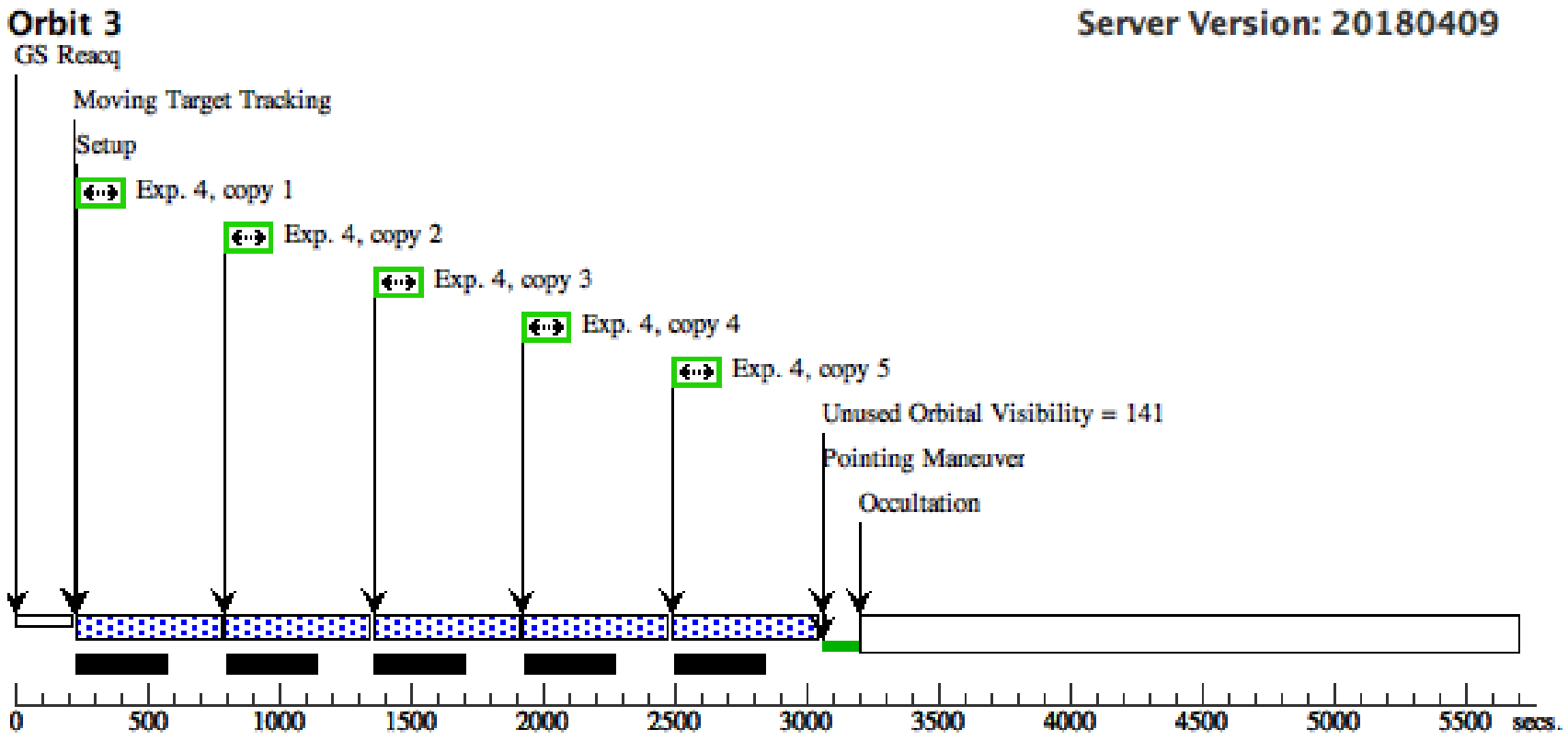
secs.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Server Version: 20180409
GS Reacq
Moving Target Tracking
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Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Unused Orbital Visibility = 141
Pointing Maneuver
Occultation
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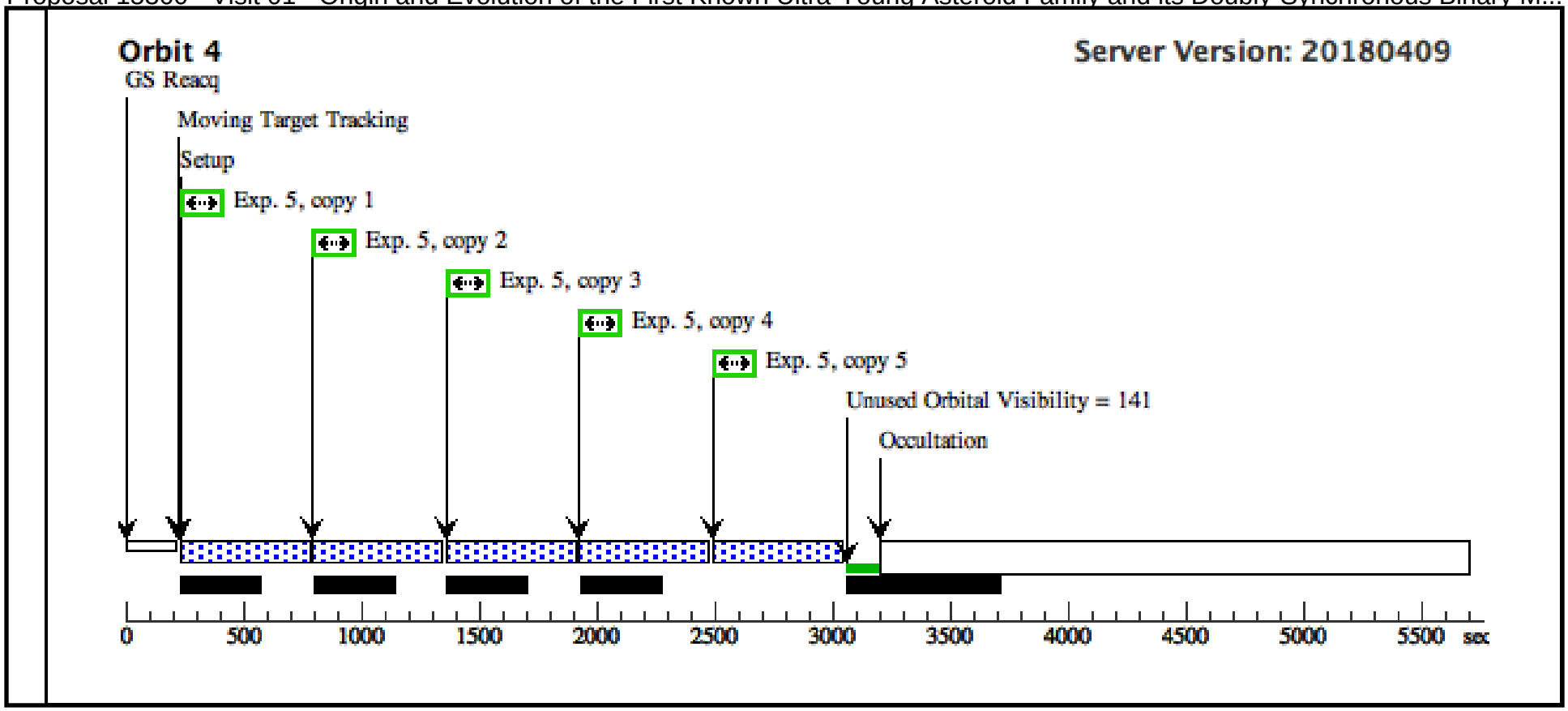
secs.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Server Version: 20180409
GS Reacq
Moving Target Tracking
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Exp. 5, copy 5
Unused Orbital Visibility = 141
Occultation
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Visit

Proposal 15360, Visit 02, withdrawn Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 140D TO 140 D; BETWEEN 26-MAY-2018:00:00:00 AND 30-MAY-2018:00:00:00

Solar System Targets

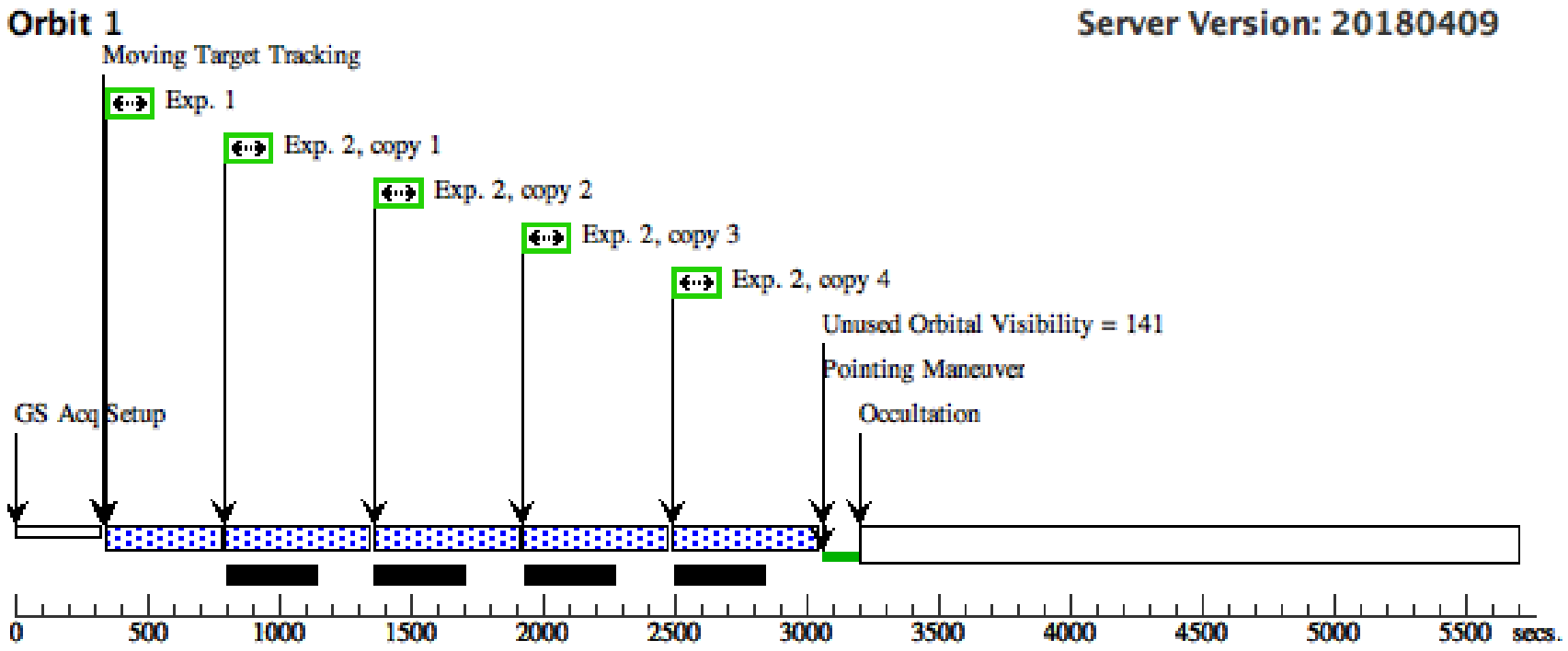
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

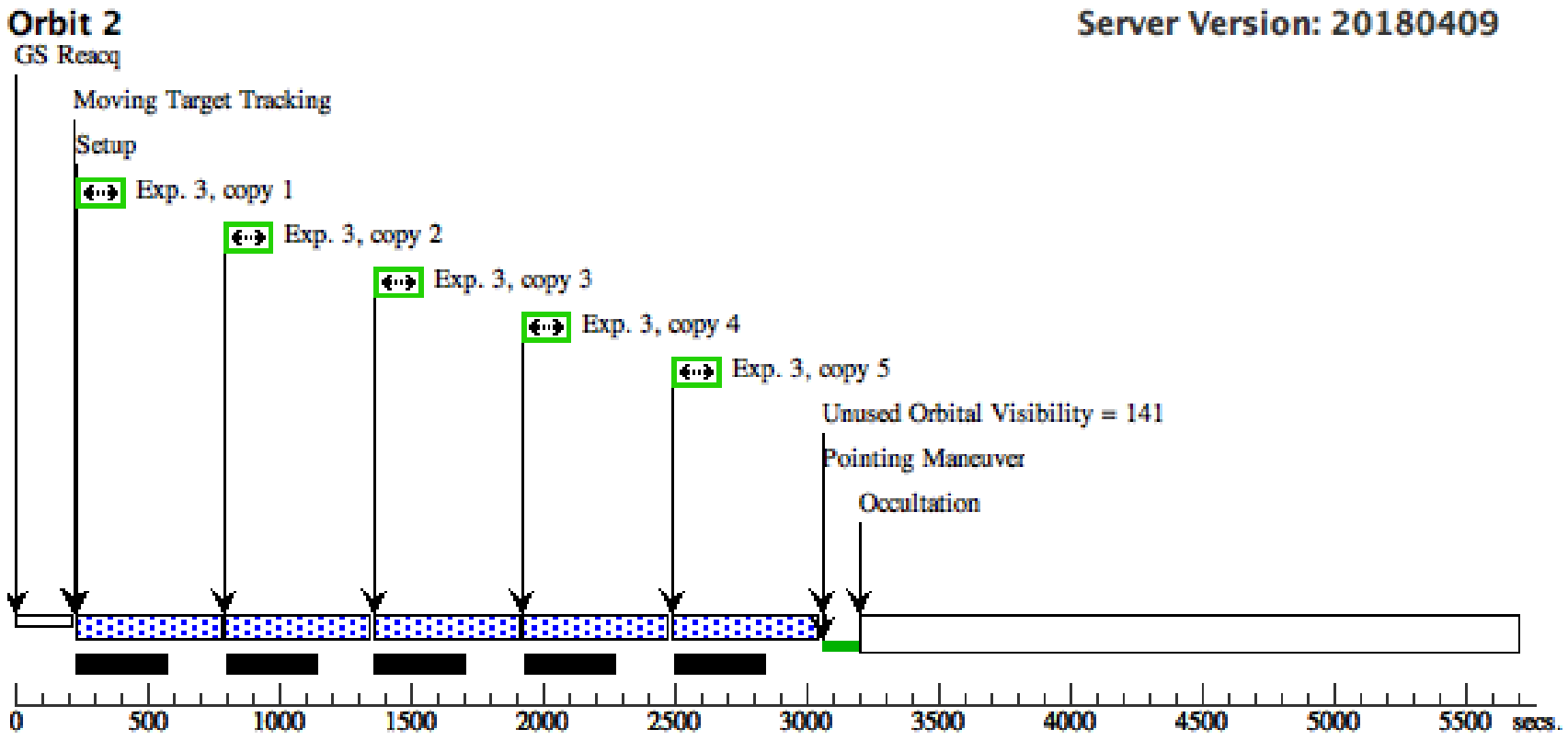
Comments: Description=Disrupted asteroid
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		295 Secs (295 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		438 Secs X 4 (1752 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]*	***[1]***
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.75,0.7 5		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[2]***
4		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[3]***
5		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 2.25,2.2 5		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[4]***

Orbit Structure

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Server Version: 20180409
GS Reacq
Moving Target Tracking
Setup
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Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 141
Pointing Maneuver
Occultation
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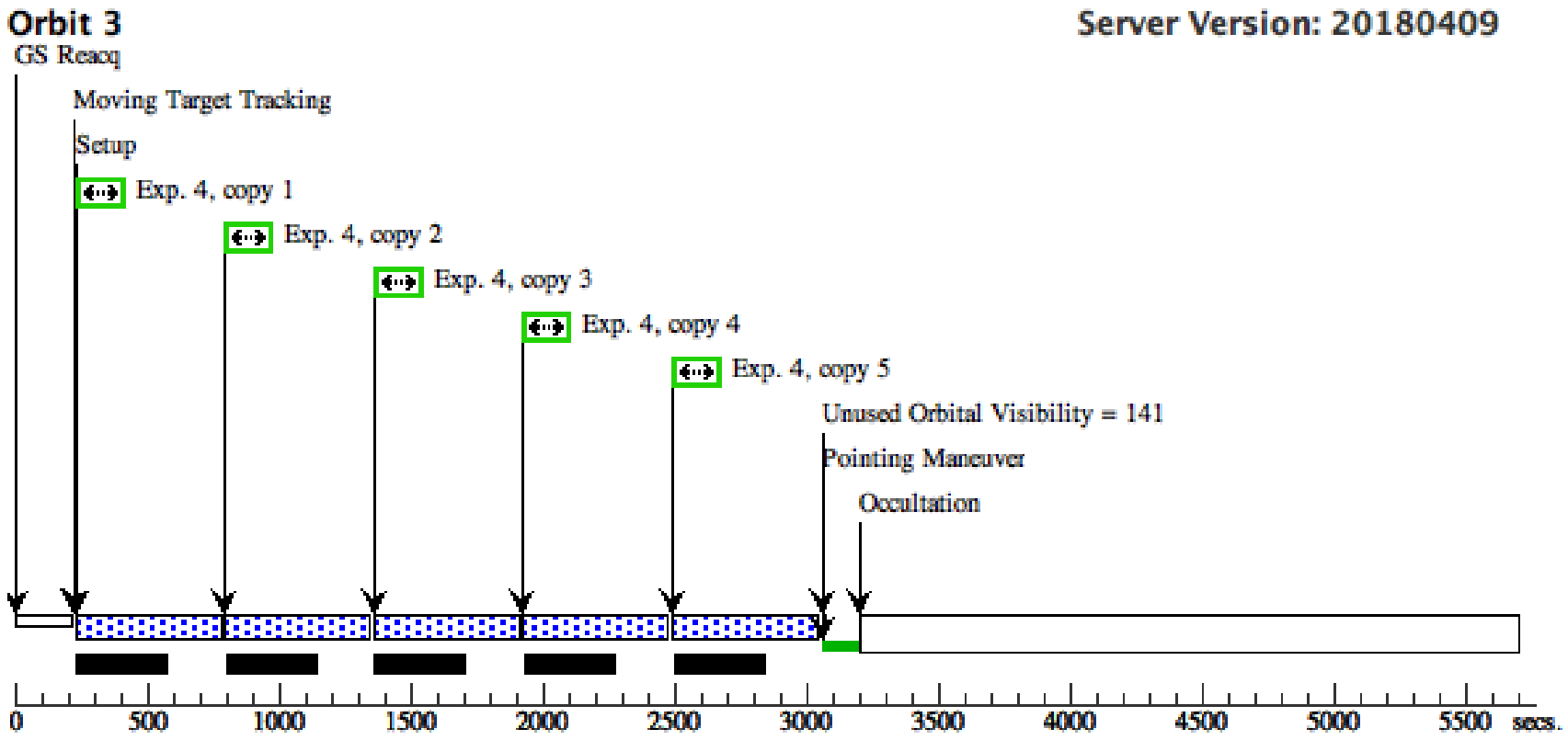
secs.


Orbit 3
Server Version: 20180409
GS Reacq
Moving Target Tracking
Setup
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Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
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Unused Orbital Visibility = 141
Pointing Maneuver
Occultation
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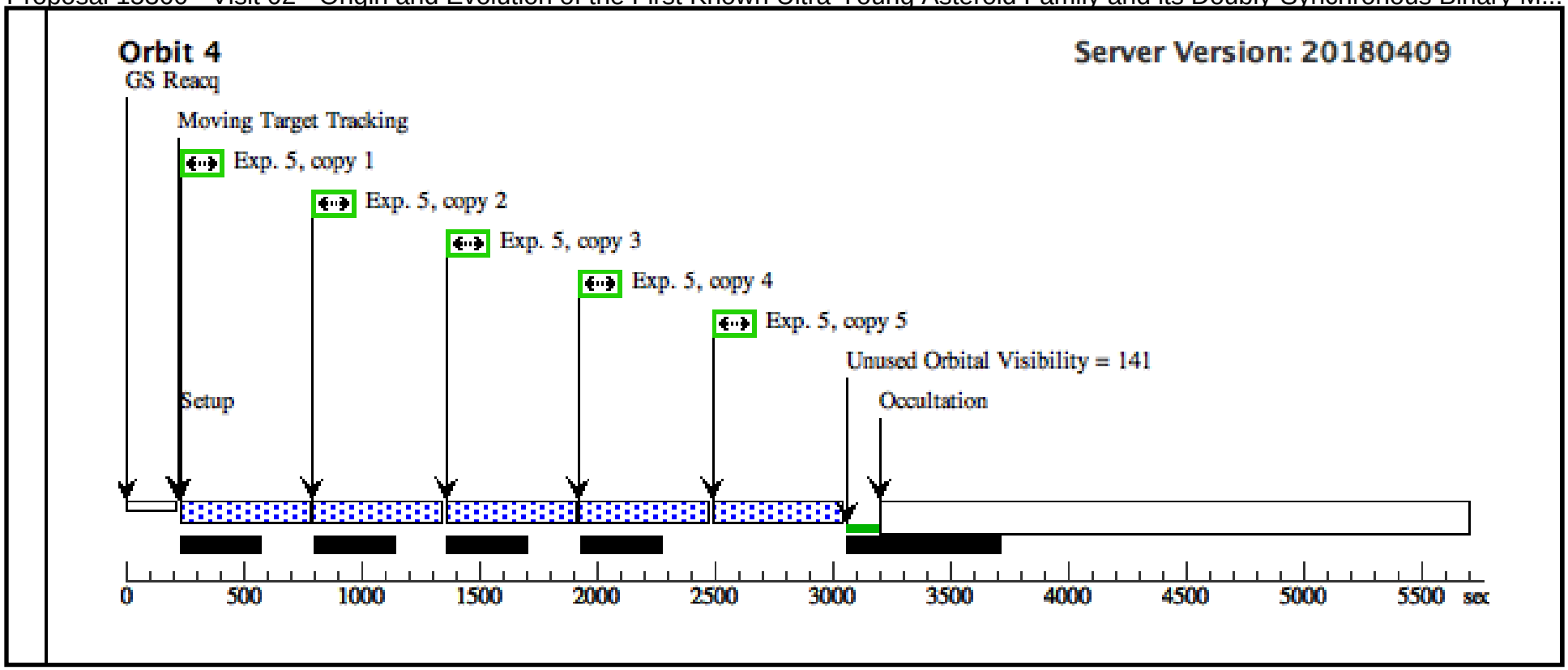
secs.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GS Reacq
Moving Target Tracking
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Unused Orbital Visibility = 141
Setup
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Visit

Proposal 15360, Visit A2, completed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 140D TO 140 D; BETWEEN 26-MAY-2018:00:00:00 AND 30-MAY-2018:00:00:00

Comments: A2 and A3 copies of visit 02 to do as two orbit visits

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Description=Disrupted asteroid Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		295 Secs (295 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		438 Secs X 4 (1752 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.75,0.7 5		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)]	***[2]***
								[==>(Copy 2)]	
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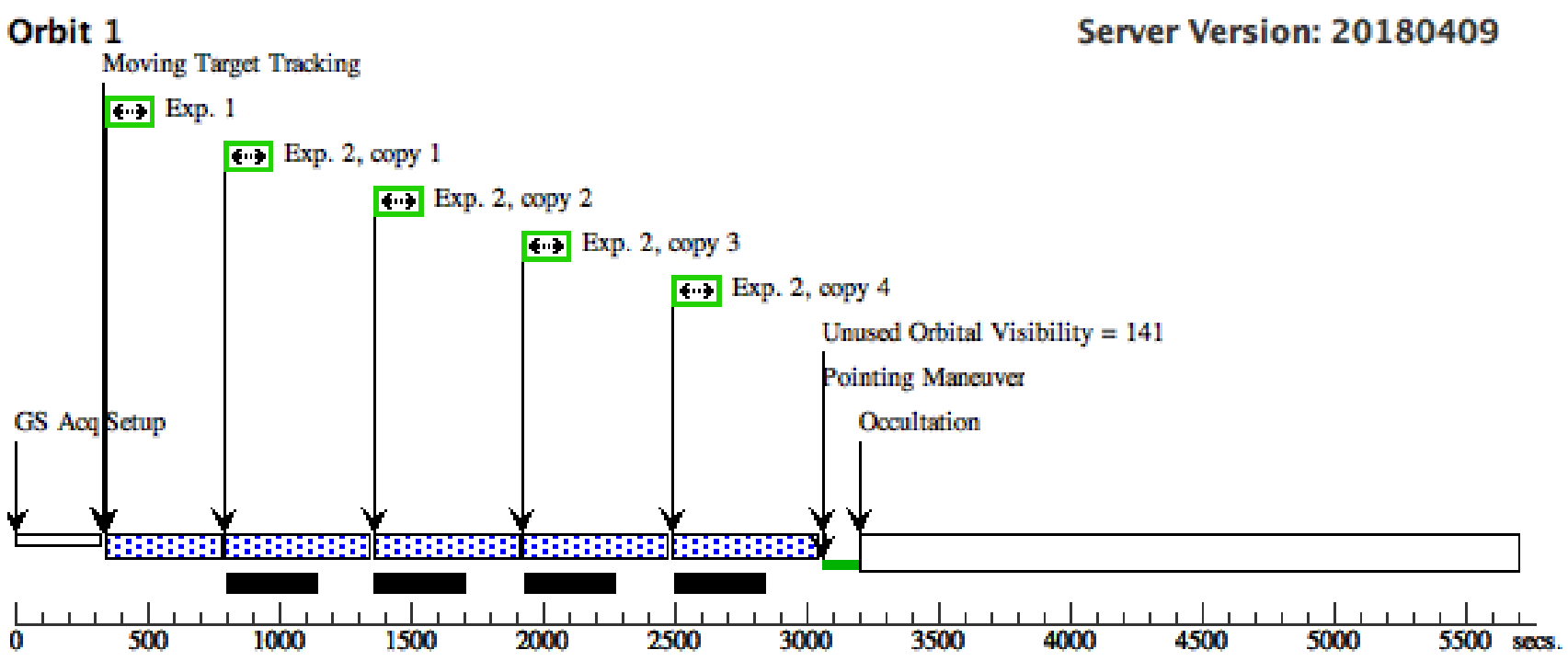
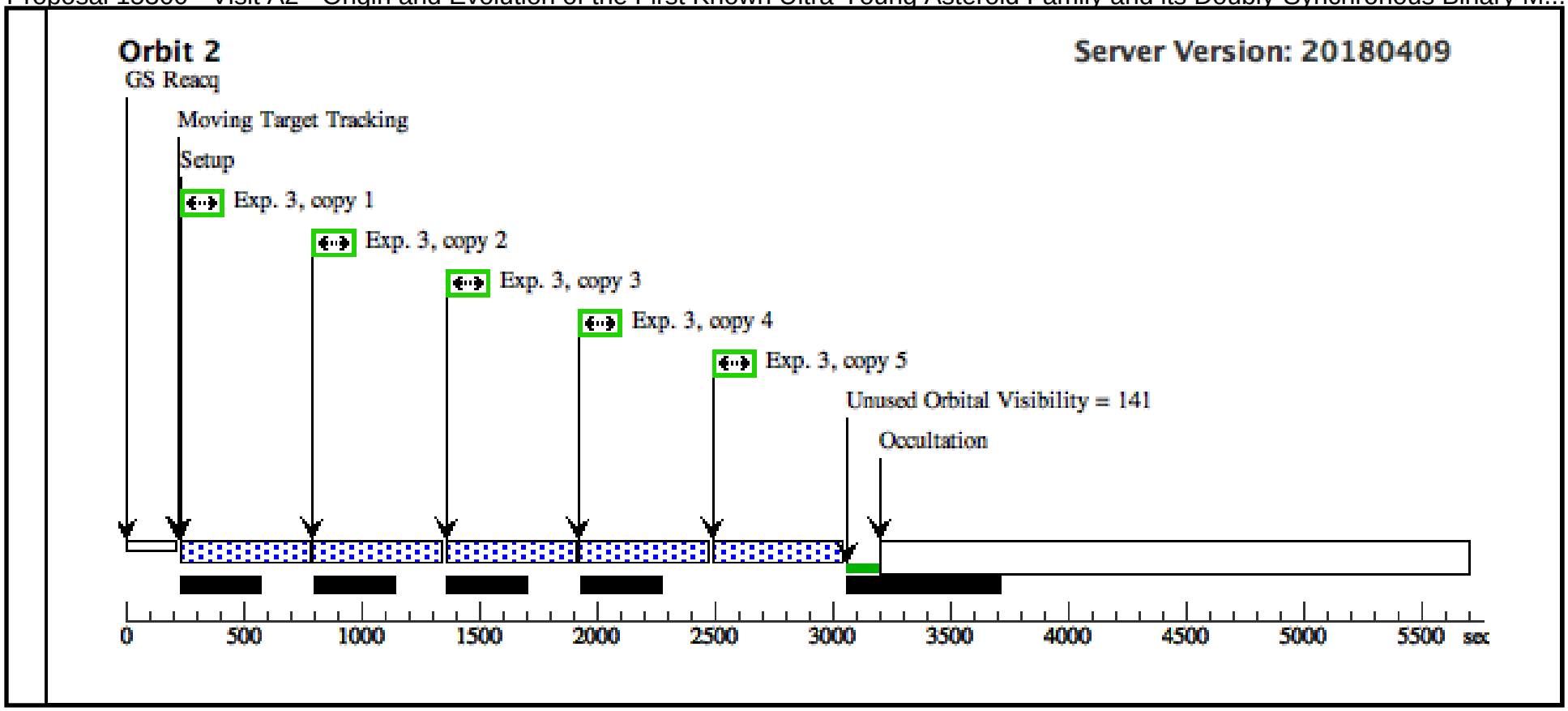
								[==>(Copy 5)]	

Orbit Structure

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Server Version: 20180409
GS Reacq
Moving Target Tracking
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Unused Orbital Visibility = 141
Occultation
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Visit

Proposal 15360, Visit A3, completed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 140D TO 140 D; BETWEEN 26-MAY-2018:00:00:00 AND 30-MAY-2018:00:00:00

Solar System Targets

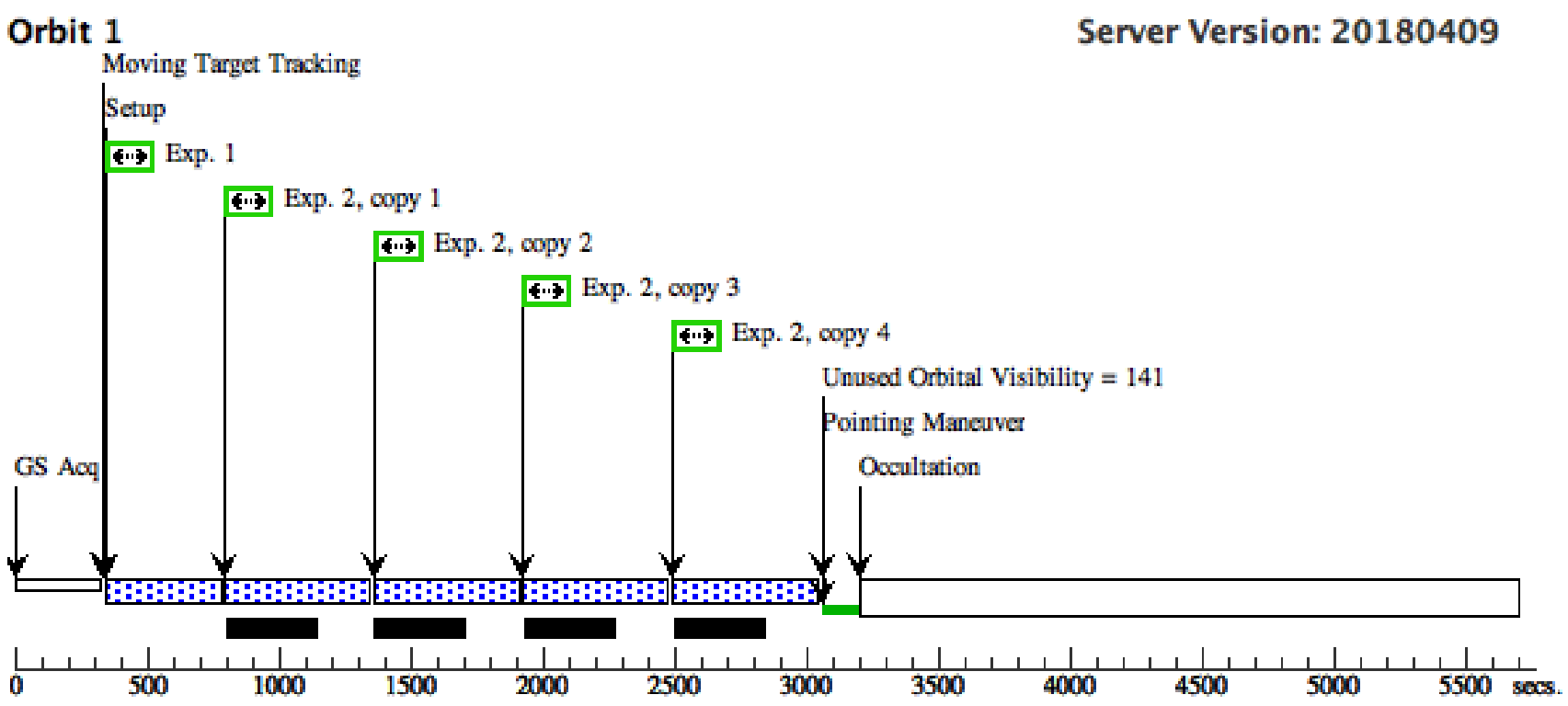
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

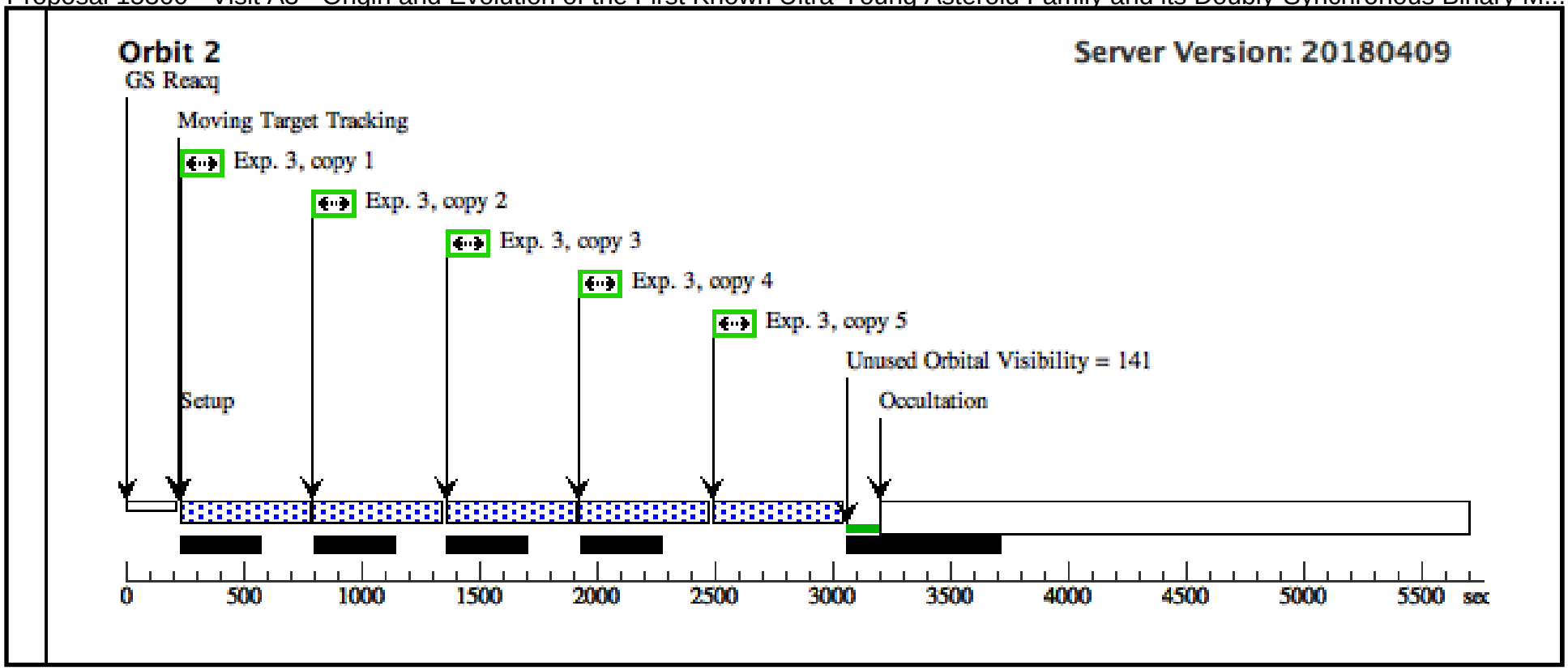
Comments: Description=Disrupted asteroid
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.50		295 Secs (295 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.50		438 Secs X 4 (1752 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]*	***[1]***
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 2.25,2.25		438 Secs X 5 (2190 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
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Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 141
Setup
Occultation
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5500
sec

Visit

Proposal 15360, Visit 04, completed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 140.5D TO 140.5 D; BETWEEN 17-MAY-2018:00:00:00 AND 18-MAY-2018:00:00:00

Solar System Targets

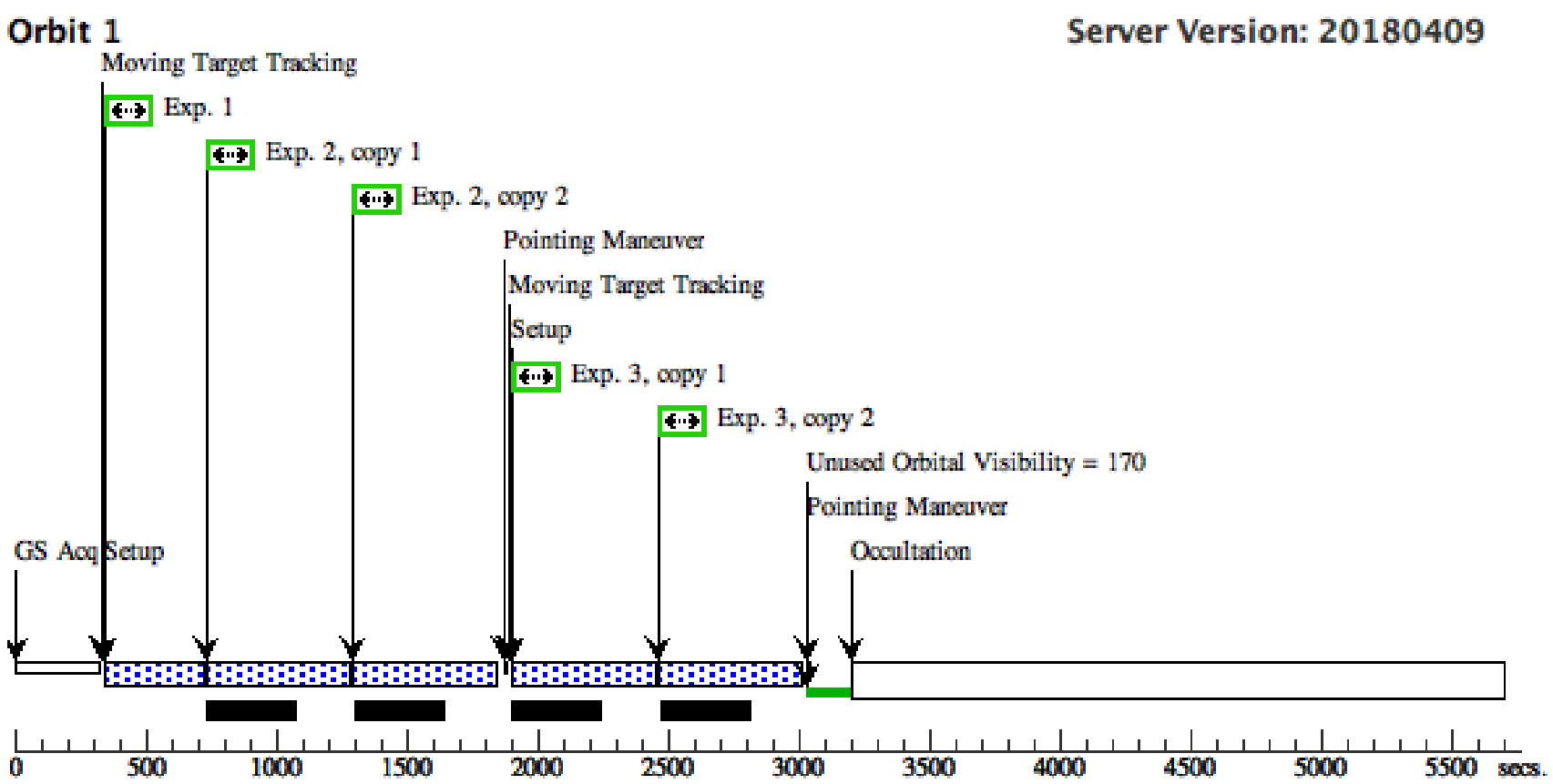
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

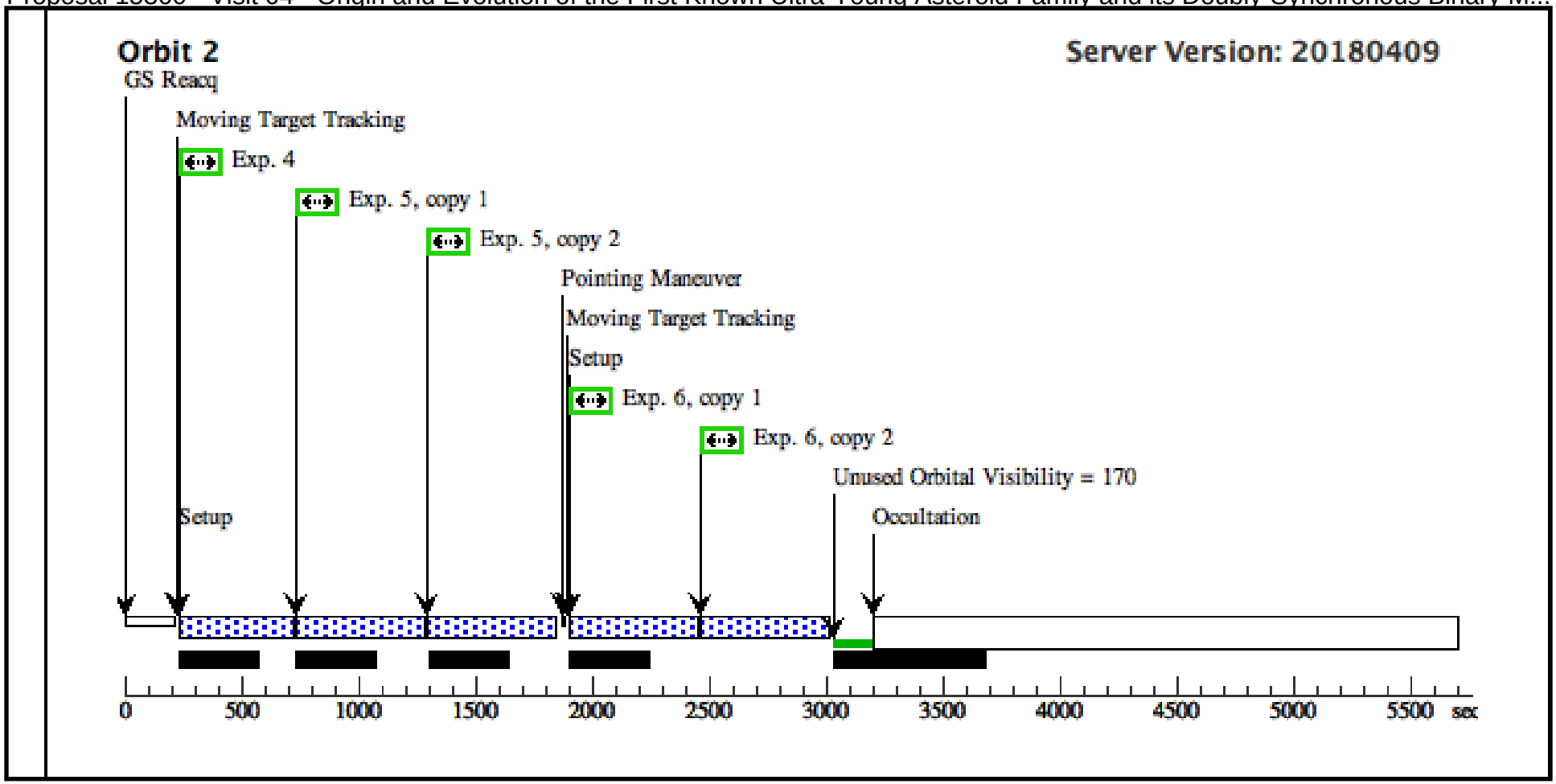
Comments: Description=Disrupted asteroid
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		231 Secs (231 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		438 Secs X 2 (876 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.75,0.7 5		438 Secs X 2 (876 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
4		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		374 Secs (374 Secs)	
								[==>]	***[2]***
5		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		438 Secs X 2 (876 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[2]***
6		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 2.25,2.2 5		438 Secs X 2 (876 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
Exp. 4
Exp. 5, copy 1
Exp. 5, copy 2
Pointing Maneuver
Moving Target Tracking
Setup
Exp. 6, copy 1
Exp. 6, copy 2
Unused Orbital Visibility = 170
Occultation
Setup
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15360, Visit 05, failed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 132D TO 132 D; BETWEEN 02-JUN-2018:00:00:00 AND 05-JUN-2018:00:00:00

Comments: Repeat of Visit 01

Solar System Targets

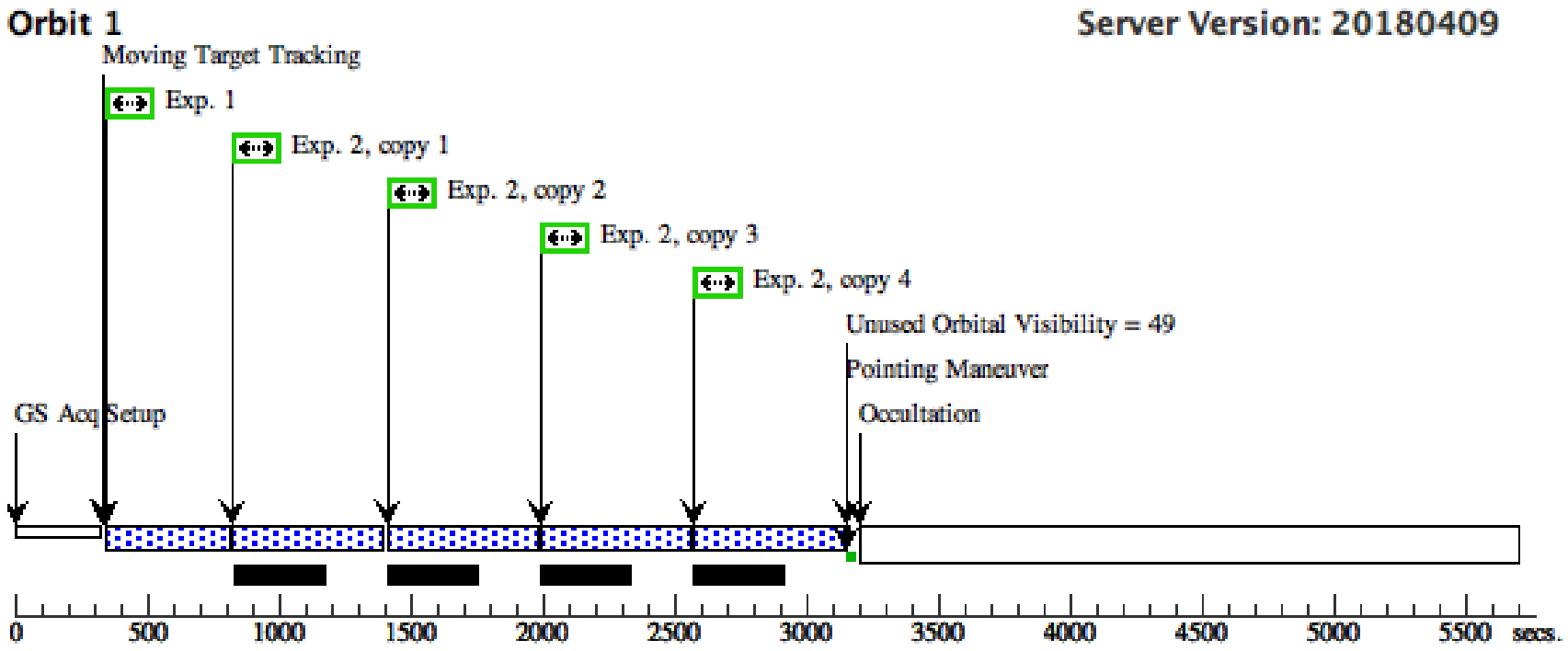
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

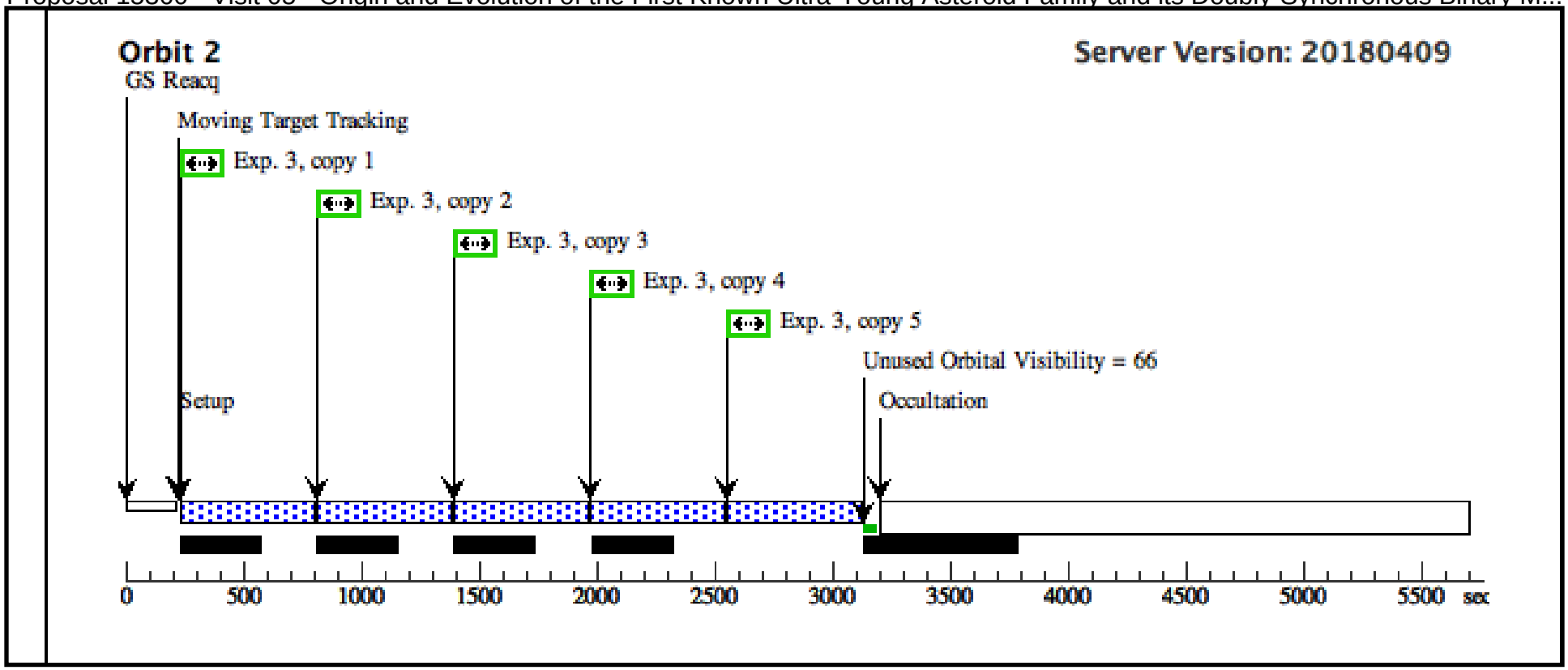
Comments: Description=Disrupted asteroid
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		327 Secs (327 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		453 Secs X 4 (1812 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]*	***[1]***
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.75,0.7 5		453 Secs X 5 (2265 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 66
Setup
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15360, Visit 54, implementation Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 95.17D TO 95.17 D

Comments: Repeat of Visit 05

Solar System Targets

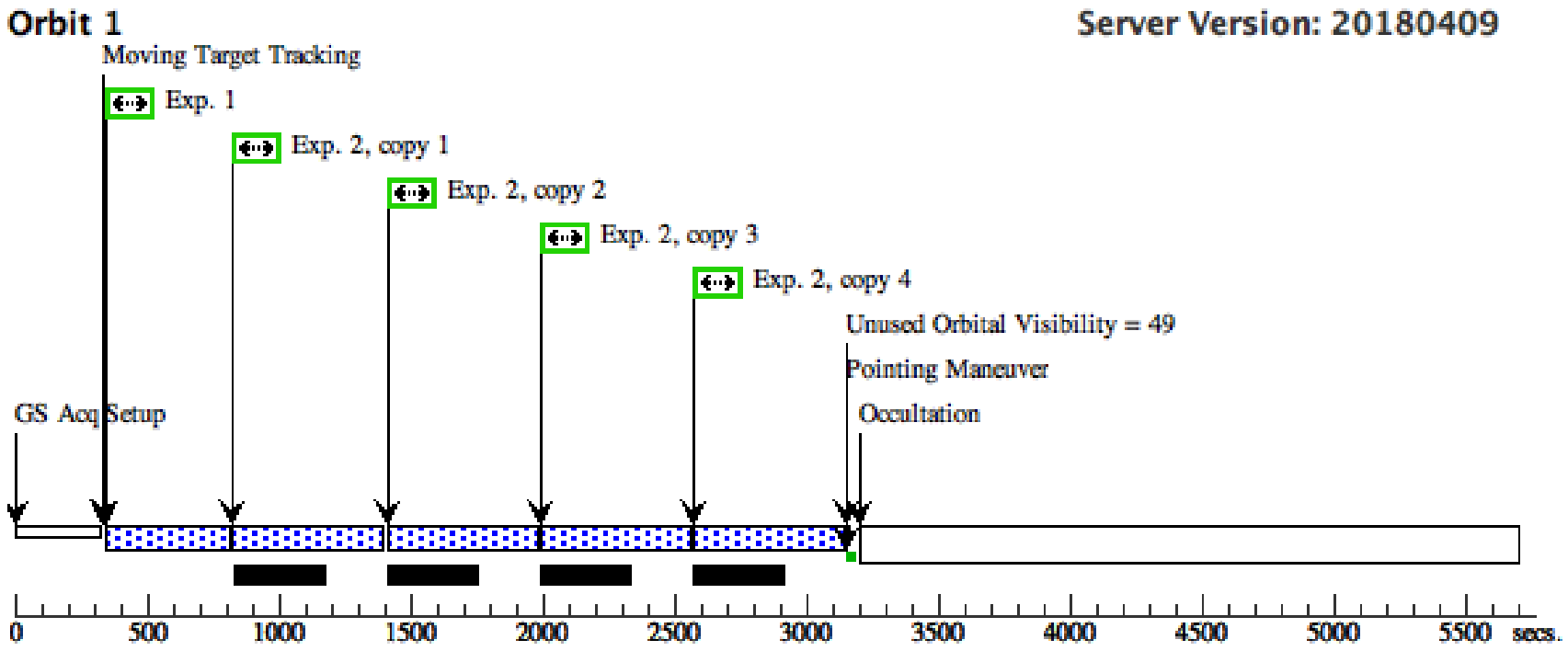
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

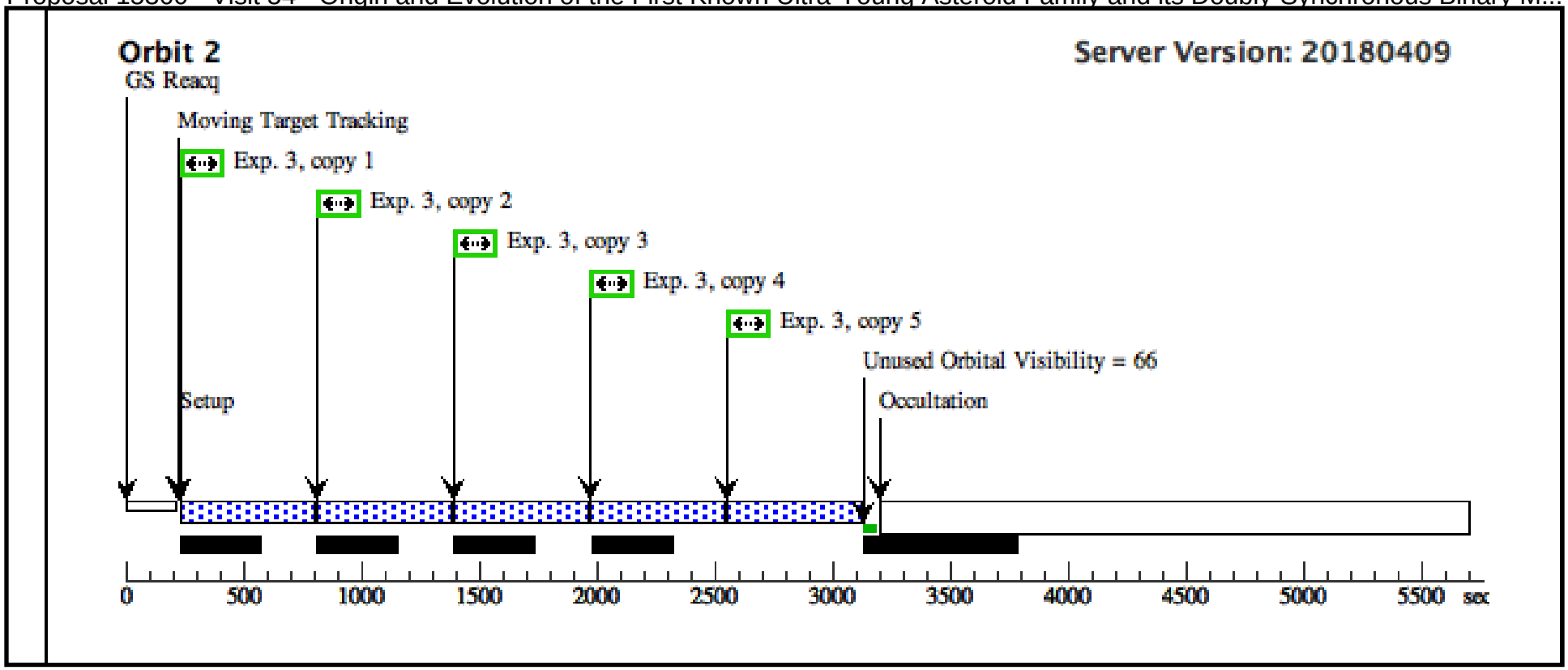
Comments: Description=Disrupted asteroid Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		327 Secs (327 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.00,0.0 0		453 Secs X 4 (1812 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]*	***[1]***
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 0.75,0.7 5		453 Secs X 5 (2265 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 66
Setup
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15360, Visit 06, failed Mon Jun 11 22:04:41 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 132D TO 132 D; BETWEEN 02-JUN-2018:00:00:00 AND 05-JUN-2018:00:00:00

Comments: Repeat of Visit 01

Solar System Targets

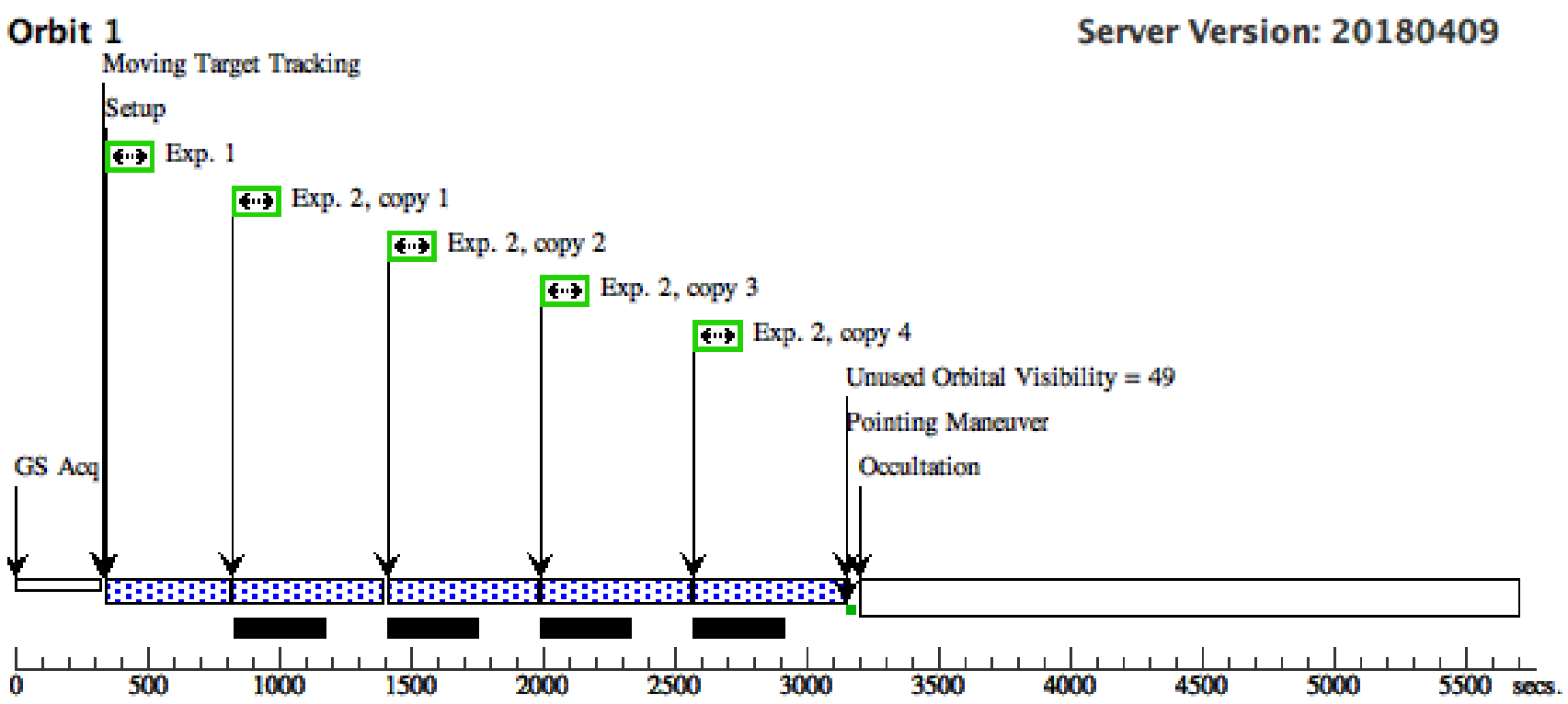
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

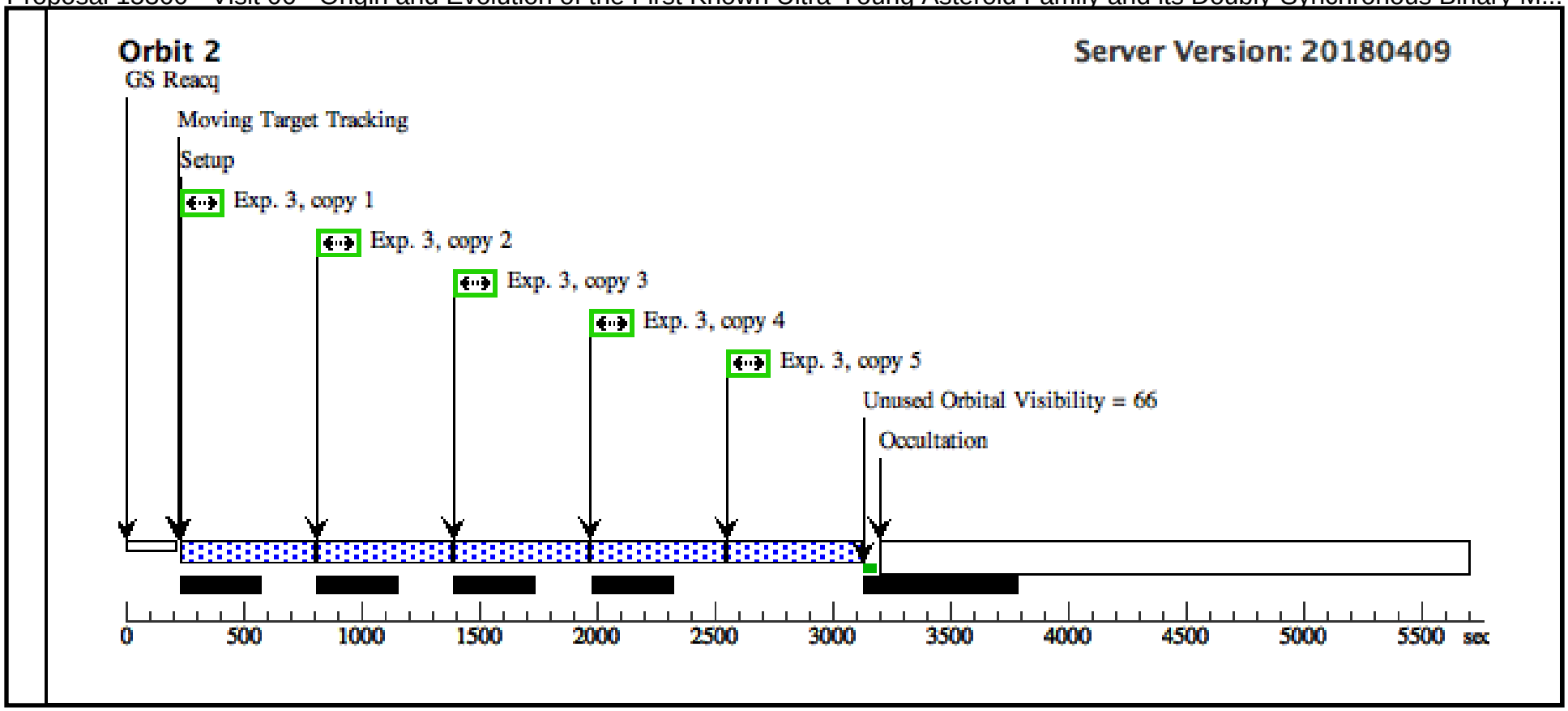
Comments: Description=Disrupted asteroid Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		327 Secs (327 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		453 Secs X 4 (1812 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 2.25,2.2 5		453 Secs X 5 (2265 Secs)	
								[==>(Copy 1)]	***[2]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
Setup
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 66
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15360, Visit 55, implementation Mon Jun 11 22:04:42 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 95.17D TO 95.17 D; AFTER 54 BY 2.8 Orbits TO 3.2 Orbits

Comments: Repeat of Visit 06

Solar System Targets

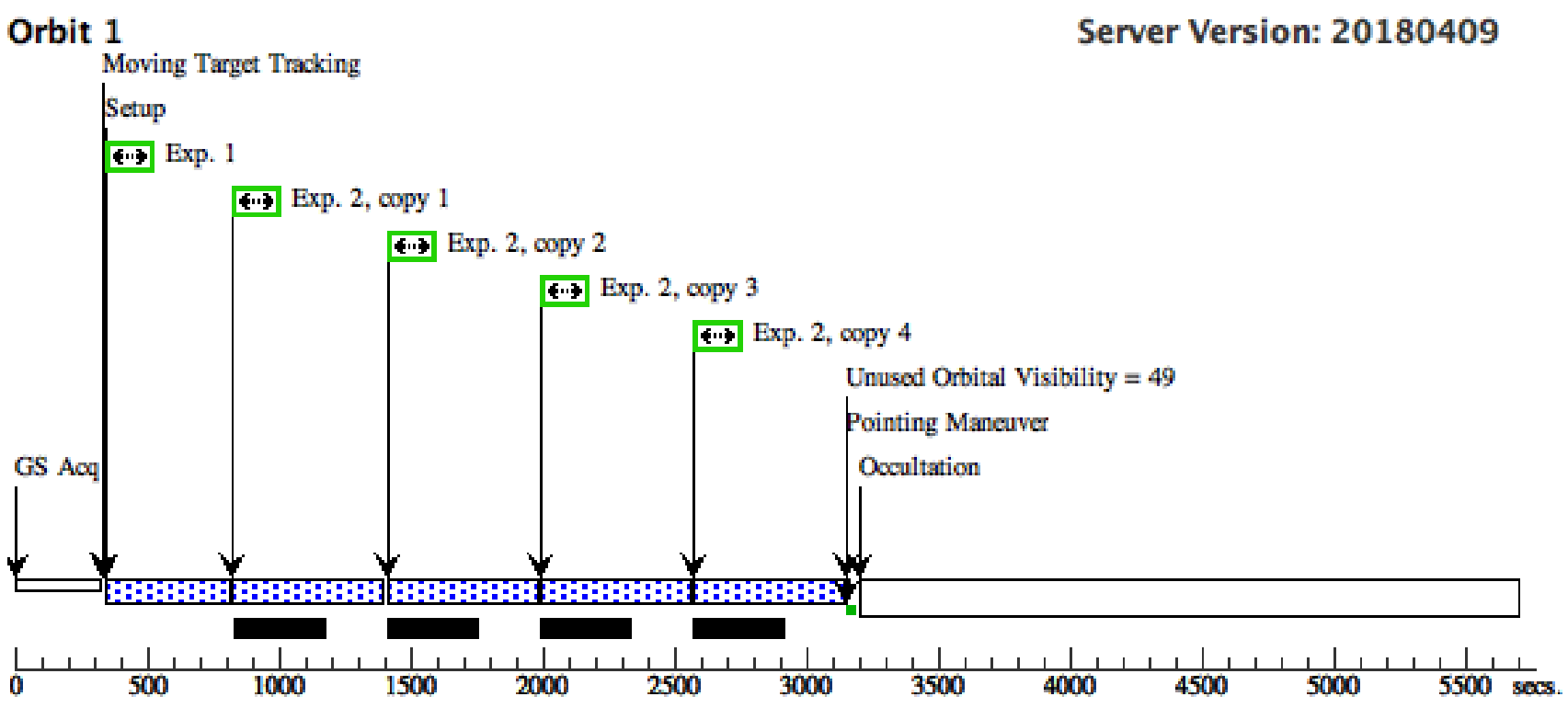
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	P2012F5	TYPE=COMET,Q=2.8773739883836 8,E=.04208657647672002,I=9.739682 411701132,O=216.8596526258896,W =177.4017799220638,T=28-MAR-2010:01:59:12,TTimeScale=UTC,EQ UINOX=J2000,EPOCH=04-FEB-2012:00:00:00,EpochTimeScale=TDB				EARTH

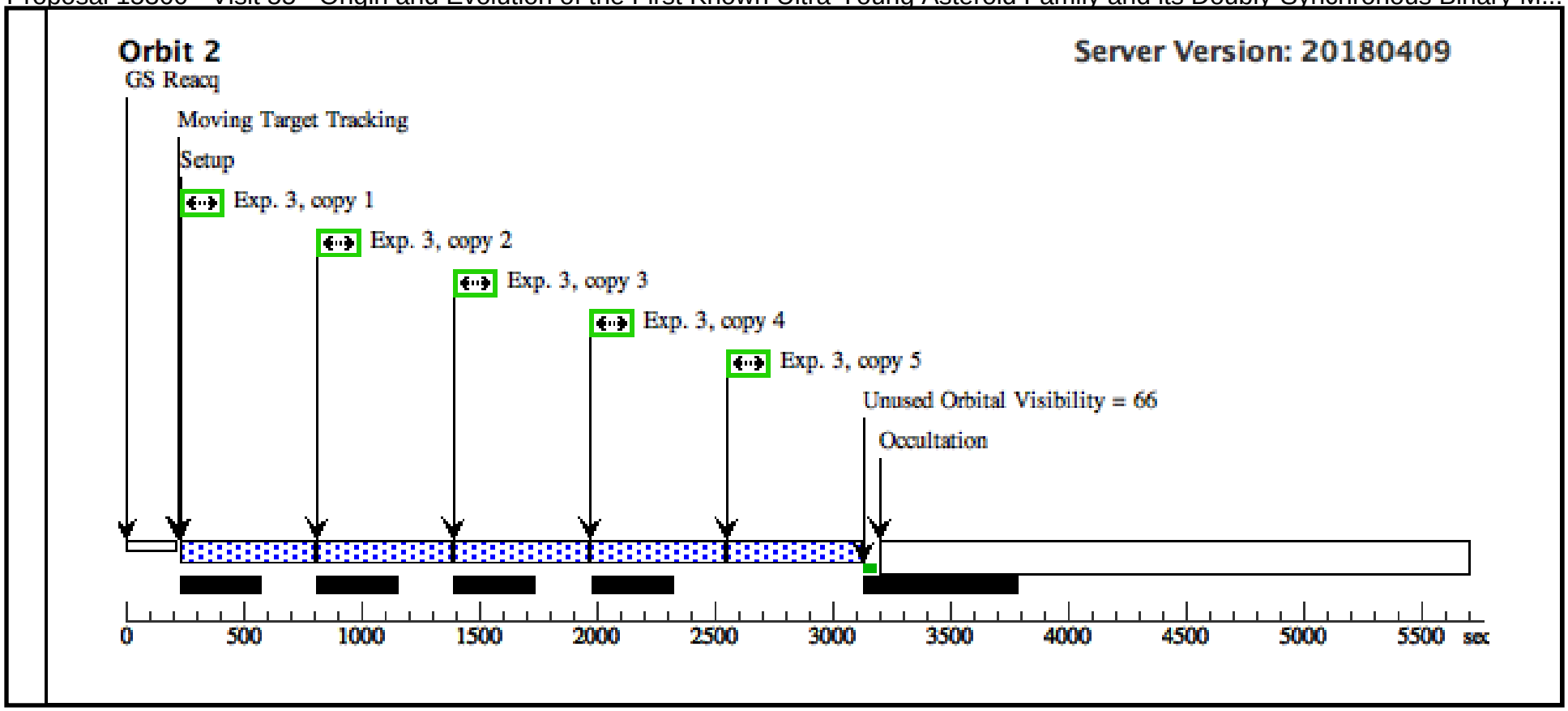
Comments: Description=Disrupted asteroid Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		327 Secs (327 Secs)	
								[==>]	***[1]***
2		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 1.50,1.5 0		453 Secs X 4 (1812 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
3		(1) P2012F5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F350LP		POS TARG 2.25,2.2 5		453 Secs X 5 (2265 Secs)	
								[==>(Copy 1)]	***[2]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	

Orbit Structure




Orbit 2
Server Version: 20180409
GS Reacq
Moving Target Tracking
Setup
Exp. 3, copy 1
Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Unused Orbital Visibility = 66
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec