14458 - Hubble Investigation of Active Asteroid 324P/La Sagra

Cycle: 23, 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) 324P-LA-SAGRA	WFC3/UVIS	1	25-Nov-2015 21:08:26.0	yes
02	(1) 324P-LA-SAGRA	WFC3/UVIS	1	25-Nov-2015 21:08:27.0	yes
03	(1) 324P-LA-SAGRA	WFC3/UVIS	1	25-Nov-2015 21:08:28.0	yes
04	(1) 324P-LA-SAGRA	WFC3/UVIS	1	25-Nov-2015 21:08:29.0	yes

4 Total Orbits Used

ABSTRACT

Active asteroid 324P/La Sagra has recently reactivated. We propose WFC3 observations to characterize the activity, to measure the size distribution of the ejected dust, its velocity and the time profile of the mass production rate. These Mid-Cycle observations will be combined with observations from our Cycle 23 (2-orbit) ToO program GO 14263 in order to produce the best possible dataset for this body. Reactivation of an active asteroid near perihelion suggests that sublimating ice is the activity driver. 324P/La Sagra orbits near 3 AU, widely posited as a likely source region for the

Earth's oceans and other volatiles. Characterizing ice in the asteroid belt is scientifically interesting in the broad context of the origin of planetary volatiles.

OBSERVING DESCRIPTION

We request four HST orbits to image La Sagra, with one scheduled as early as possible in November and three as close as possible to December 19 to study the nucleus and capture the object from an in-plane perspective, which provides data that are particularly diagnostic of the dust velocity distribution. Our basic observing strategy is to take multiple long exposures (400 s) using WFC3 and a wide bandpass filter (F350LP) for maximum sensitivity. (In some previous HST programs we used long exposures through the F606W filter to provide maximum sensitivity. The F350LP filter provides an 1.6 higher count rate for a target with a solar-type spectrum.) We also plan to dither the exposures to mitigate the effects from bad pixels, cosmic rays, and the inter-chip gap. We already have observations from Sep 29 (orbit plane angle 10 degrees), and observations for Oct 8 are already scheduled under our two-orbit ToO program 14263. Two additional visits, as early in November as practical (3 degrees) and as close as possible to the Dec 19 Sun exclusion zone (0 degrees), will provide sufficient input to derive the properties of the dust coma from the dynamical models. To test the role of spin in 324P, we request 3 consecutive or near-consecutive orbits to sample the nucleus lightcurve over a 3 hour interval. Observations over 3 hours will allow us to measure the lightcurve over slightly more than one period, in order to ensure that periodicity has been detected. The apparent rates of motion are 30 arcsec per hour, which are easily within Hubble's tracking capabilities. This rate of motion is also slow enough to keep a single pair of guide stars within the FGS pickles for an entire visibility window. The ephemeris uncertainty of La Sagra is negligible (sub-arcsecond), compared to the WFC3 field-of-view. Ephemeris issues are of no concern to this observation. We understand that we will have essentially no control over the spacecraft roll angle, which means we will not be able to optimize the orientation of the dust tail on the CCD (i.e., to orient the tail along the longest dimension of the detector). However, the field-of-view of the camera is large enough that we should obtain excellent data on a portion of the tail, no matter what spacecraft roll angle is used.

Visit

Proposal 14458, Visit 01, implementation Thu Nov 26 02:08:30 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BEFORE 09-DEC-2015:00:00:00

Comments: Please schedule this visit as soon as possible.

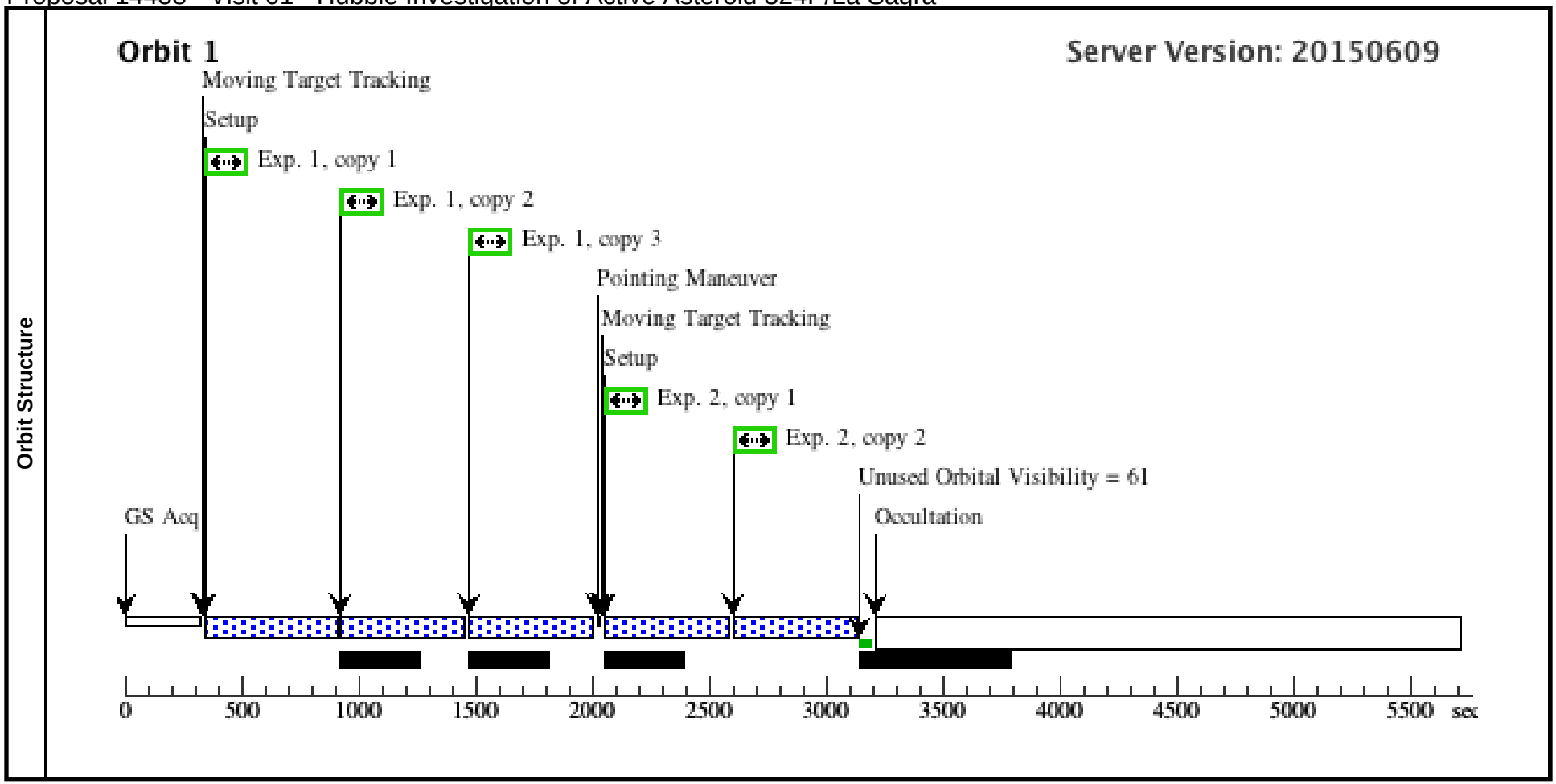
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	324P-LA-SAGRA	TYPE=COMET,Q=2.619823310911345,E=.153784445570409,I=21.41695747394586,O=270.6516569004608,W=58.56915804482286,T=29-NOV-2015:22:58:09,TTimeScale=UTC,EQUINOX=J2000,EPOCH=28-AUG-2015:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO		Sequence 1-2 Non-Int in Visit 01	420 Secs X 3 (1260 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
2		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.0	Sequence 1-2 Non-Int in Visit 01	420 Secs X 2 (840 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	


Orbit Structure
Orbit 1
Server Version: 20150609
Moving Target Tracking
Setup
Exp. 1, copy 1
Exp. 1, copy 2
Exp. 1, copy 3
Pointing Maneuver
Moving Target Tracking
Setup
Exp. 2, copy 1
Exp. 2, copy 2
Unused Orbital Visibility = 61
Occultation
GS Acq
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14458, Visit 02, implementation Thu Nov 26 02:08:30 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 18-DEC-2015:00:00:00 AND 20-DEC-2015:00:00:00; SEQ 02,03,04 WITHIN 3.2 Orbits

Comments: Please schedule visits 2,3,4 in sequence as late as possible before solar exclusion begins.

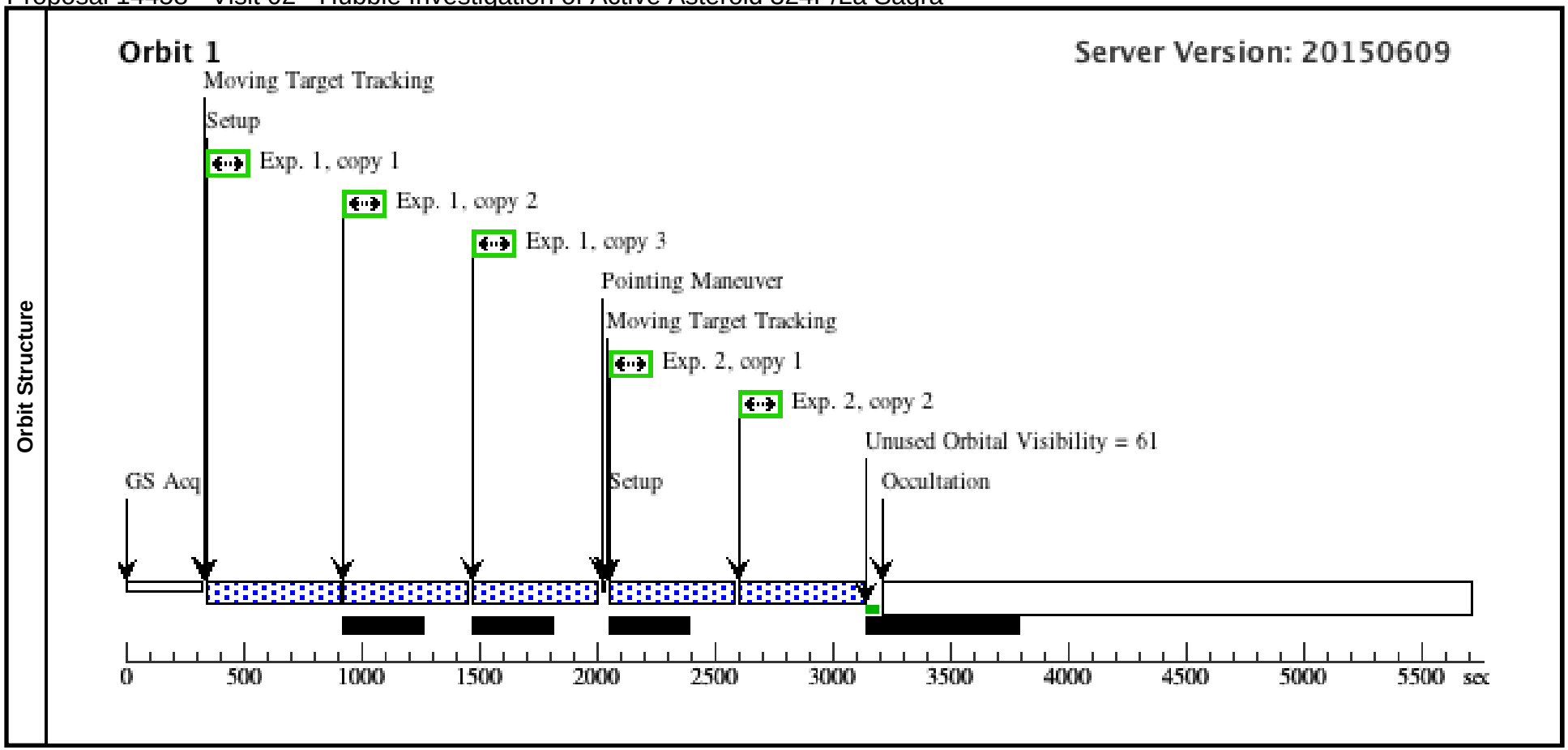
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	324P-LA-SAGRA	TYPE=COMET,Q=2.619823310911345,E=.153784445570409,I=21.41695747394586,O=270.6516569004608,W=58.56915804482286,T=29-NOV-2015:22:58:09,TTimeScale=UTC,EQUINOX=J2000,EPOCH=28-AUG-2015:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO		Sequence 1-2 Non-Int in Visit 02	420 Secs X 3 (1260 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***
2		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.0	Sequence 1-2 Non-Int in Visit 02	420 Secs X 2 (840 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20150609
Moving Target Tracking
Setup
Exp. 1, copy 1
Exp. 1, copy 2
Exp. 1, copy 3
Pointing Maneuver
Moving Target Tracking
Exp. 2, copy 1
Exp. 2, copy 2
Unused Orbital Visibility = 61
GS Acq
Setup
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14458, Visit 03, implementation Thu Nov 26 02:08:30 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: Please schedule visits 2,3,4 in sequence as late as possible before solar exclusion begins.

Solar System Targets

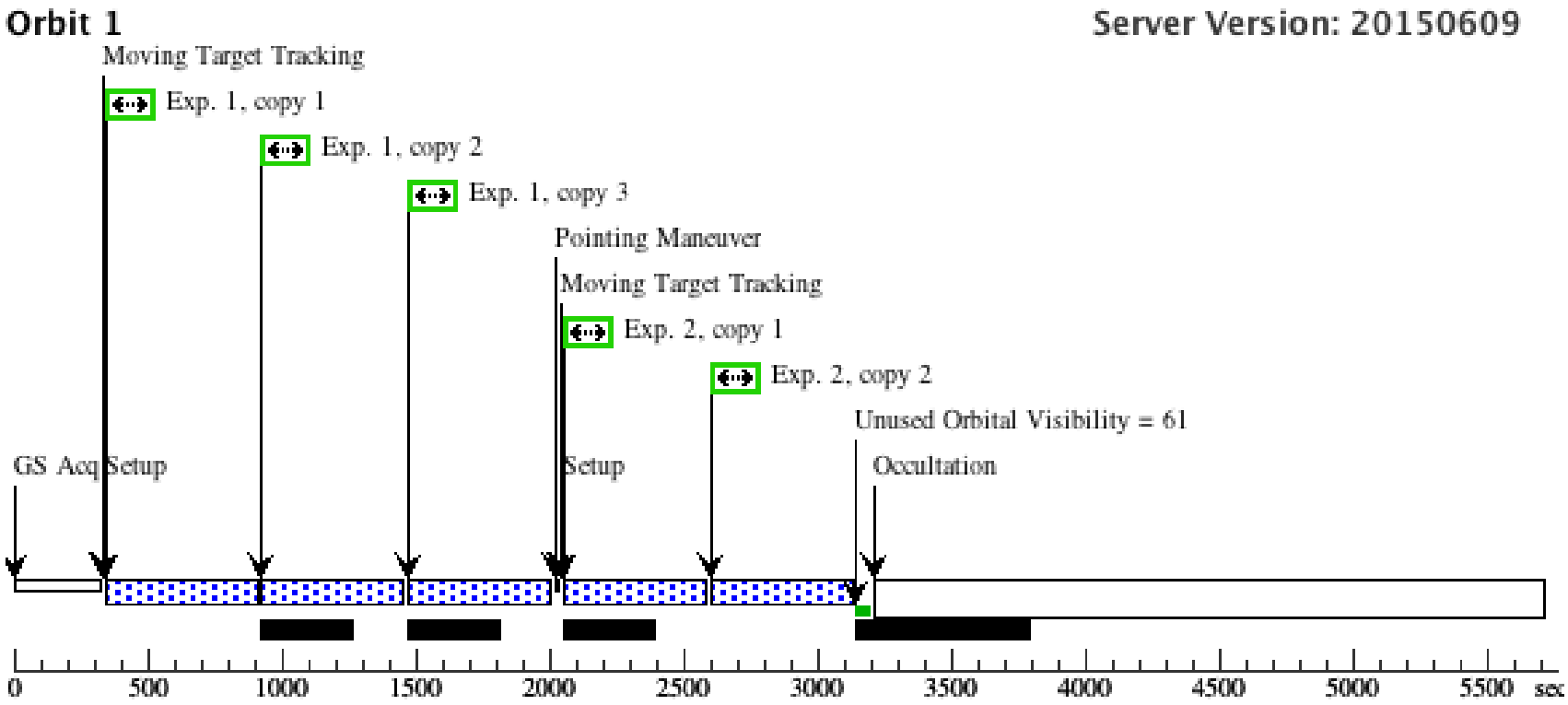
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	324P-LA-SAGRA	TYPE=COMET,Q=2.619823310911345,E=.153784445570409,I=21.41695747394586,O=270.6516569004608,W=58.56915804482286,T=29-NOV-2015:22:58:09,TTimeScale=UTC,EQUINOX=J2000,EPOCH=28-AUG-2015:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO		Sequence 1-2 Non-Int in Visit 03	420 Secs X 3 (1260 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
2		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.0	Sequence 1-2 Non-Int in Visit 03	420 Secs X 2 (840 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	

Orbit Structure



Visit

Proposal 14458, Visit 04, implementation Thu Nov 26 02:08:30 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: Please schedule visits 2,3,4 in sequence as late as possible before solar exclusion begins.

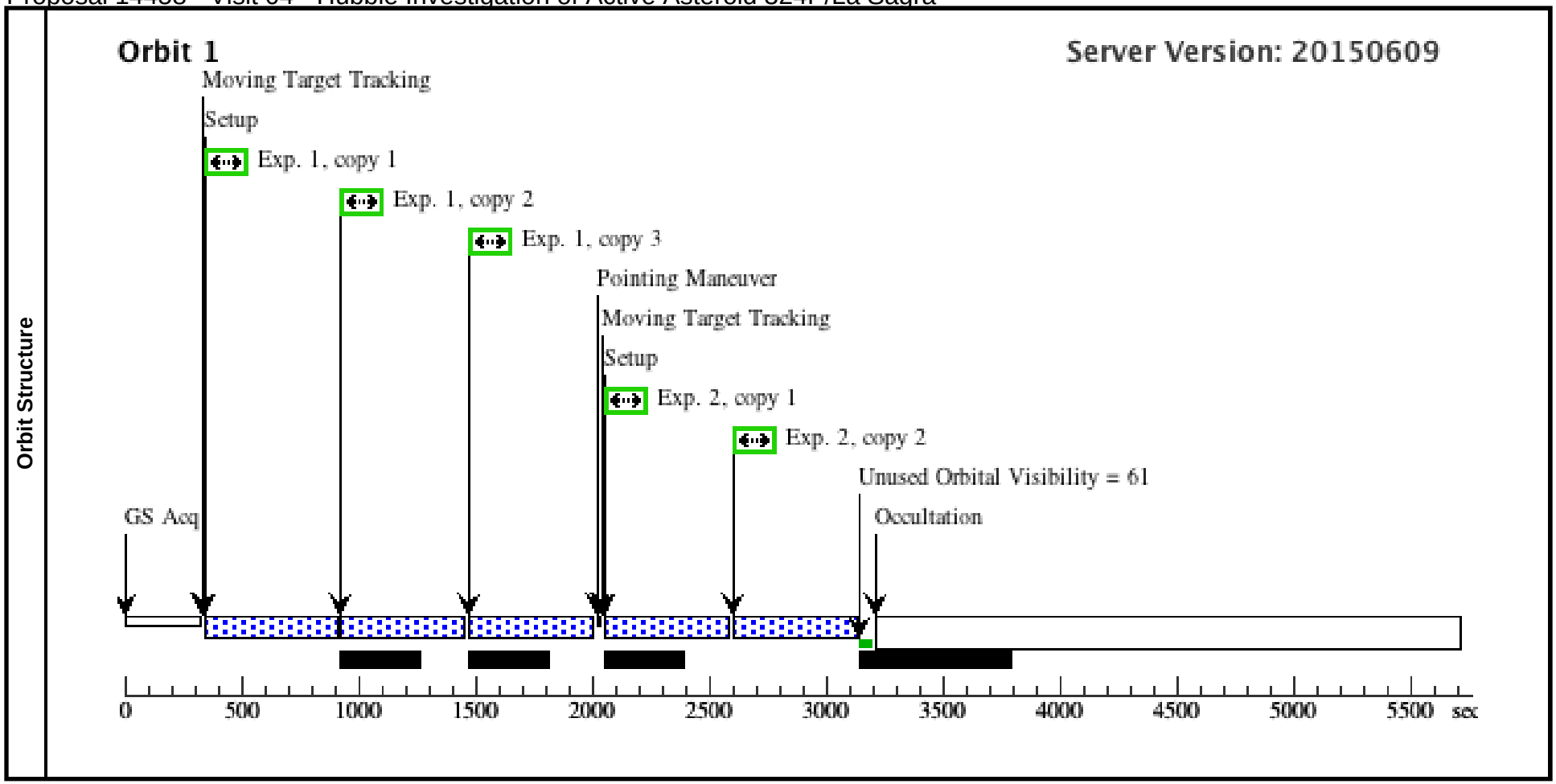
Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	324P-LA-SAGRA	TYPE=COMET,Q=2.619823310911345,E=.153784445570409,I=21.41695747394586,O=270.6516569004608,W=58.56915804482286,T=29-NOV-2015:22:58:09,TTimeScale=UTC,EQUINOX=J2000,EPOCH=28-AUG-2015:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO		Sequence 1-2 Non-Int in Visit 04	420 Secs X 3 (1260 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
								[==>(Copy 3)]	
2		(1) 324P-LA-SAGRA	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.0	Sequence 1-2 Non-Int in Visit 04	420 Secs X 2 (840 Secs)	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	


Orbit Structure
Orbit 1
Server Version: 20150609
Moving Target Tracking
Setup
Exp. 1, copy 1
Exp. 1, copy 2
Exp. 1, copy 3
Pointing Maneuver
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Unused Orbital Visibility = 61
Occultation
GS Acq
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1500
2000
2500
3000
3500
4000
4500
5000
5500
sec