



13197 - Distant Activity of Comet ISON

Cycle: 20, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) ISON	COS/FUV COS/NUV	1	02-Apr-2013 21:36:15.0	yes
02	(1) ISON	COS/FUV COS/NUV	1	02-Apr-2013 21:36:24.0	yes
03	(1) ISON	STIS/CCD STIS/NUV-MAMA	1	02-Apr-2013 21:36:32.0	yes
04	(1) ISON	COS/FUV COS/NUV	1	02-Apr-2013 21:36:39.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
05	(1) ISON	COS/FUV COS/NUV	1	02-Apr-2013 21:36:46.0	yes

5 Total Orbits Used

ABSTRACT

We propose to obtain spectra of the newly discovered, sun-grazing comet ISON (C/2012 S1) well before it reaches the heliocentric distance at which water-sublimation would dominate the activity, i.e. $r > 3$ AU. The comet is clearly active beyond 5 AU and understanding which volatiles are driving the activity is a key question that must be answered before the physical processes change with the onset of rapid water sublimation.

OBSERVING DESCRIPTION

We request 4 orbits using COS/G160M to provide a sensitive search for CO (via the 4PG emissions). If Q is $\sim 10^{28}$, the CO emission can be detected in a single orbit. Observing in 4 different orbits will allow us to determine the temporal variability in the comet's activity if it is roughly 10^{28} s^{-1} . Otherwise we plan to co-add the data from all four orbits to place even stricter constraints, at the level of several 10^{27} s^{-1} , on the CO production rate. COS/NUV ACQ/SEARCH and ACQ/IMAGE will be used in each COS orbit to accurately place the nucleus in the aperture (PSA), a technique that worked beautifully during our previous comet observations.

We also request 1 orbit using STIS/G230L with the 2" slit to search for OH emission, from which we can determine the H₂O production rate. Using a vectorial model for the OH spatial distribution (Festou, A&A, v95, p69, 1981) and the sensitivity of STIS/G230L based on our previous cometary observations, we estimate the OH emission could be detected with S/N ~ 5 in a single orbit if $Q_{\text{H}_2\text{O}} \sim 10^{29}$. Although such a high H₂O production rate from the nucleus is not expected, a cloud of icy grains might surround C/ISON, and the sublimation of those grains could dramatically raise the amount of H₂O in the coma. Our observations with STIS/G230L could test this hypothesis. The STIS/G230L observations will also cover emissions from CS, S₂, and the forbidden Cameron bands of CO (from which the CO₂ production rate can be derived; see Weaver et al., ApJ, v422, p374, 1994), although the chances of detecting these emissions are slim. STIS/CCD ACQ will be used in each STIS orbit to accurately center the nucleus in the slit, and this has worked well during previous comet observations. We also plan to take one STIS/CCD F28x50LP full-frame image at the back end of the STIS/G230L orbit to provide context for our spectroscopic program (e.g., to provide information on jets and other coma asymmetries). Given its large heliocentric and geocentric distances, the comet's apparent motion is relatively slow ($\sim 18''/\text{hr}$) and is easily within HST's tracking capabilities.

We have requested that the STIS orbit be the middle of the five orbits, all of which are optimized if they are sequential. This placement maximizes

the chance of seeing variability in the CO outgassing if it is significant and provides our context image at the midpoint of the observations

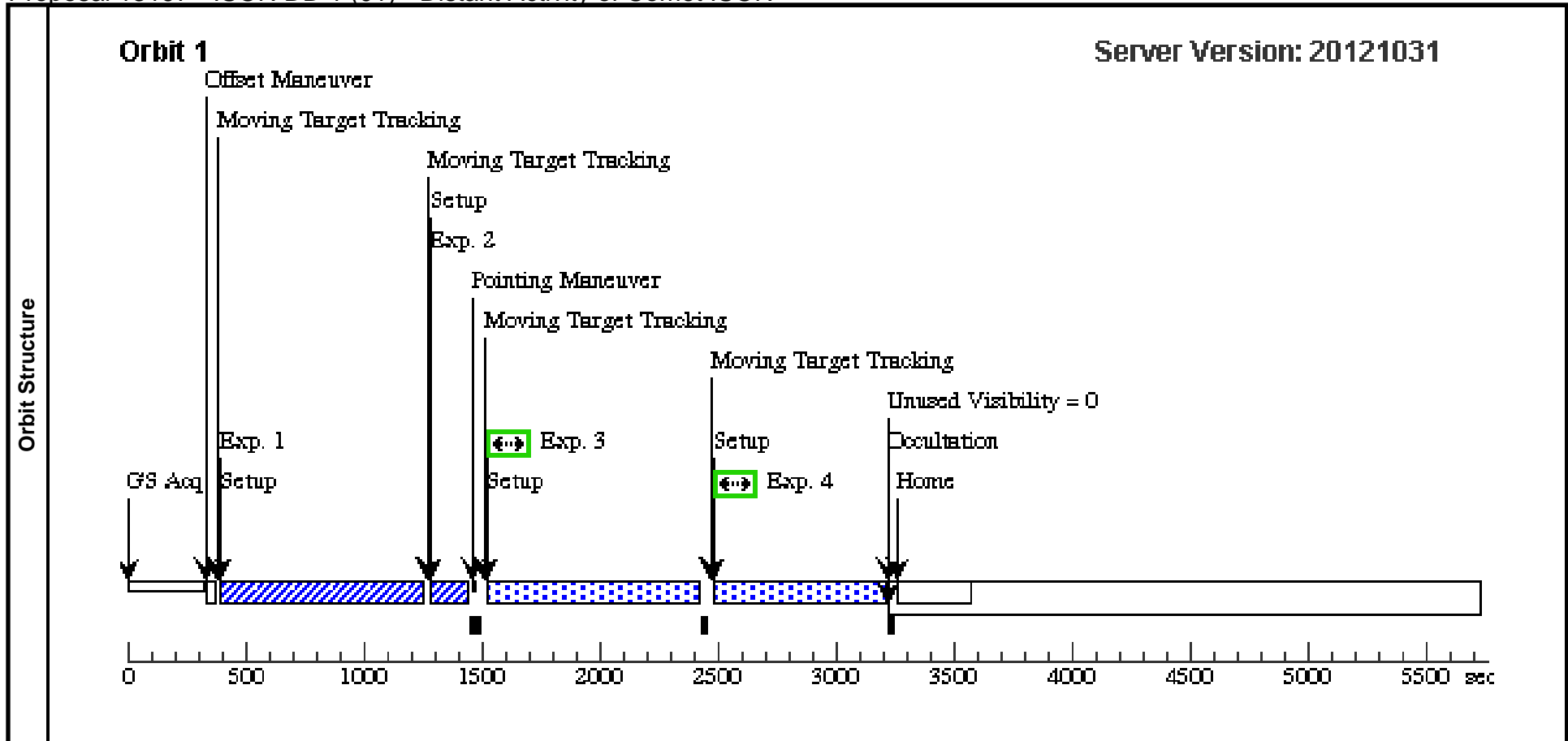
ADDITIONAL COMMENTS

Ephemeris updates will be required

Proposal 13197 - ISON DD 1 (01) - Distant Activity of Comet ISON

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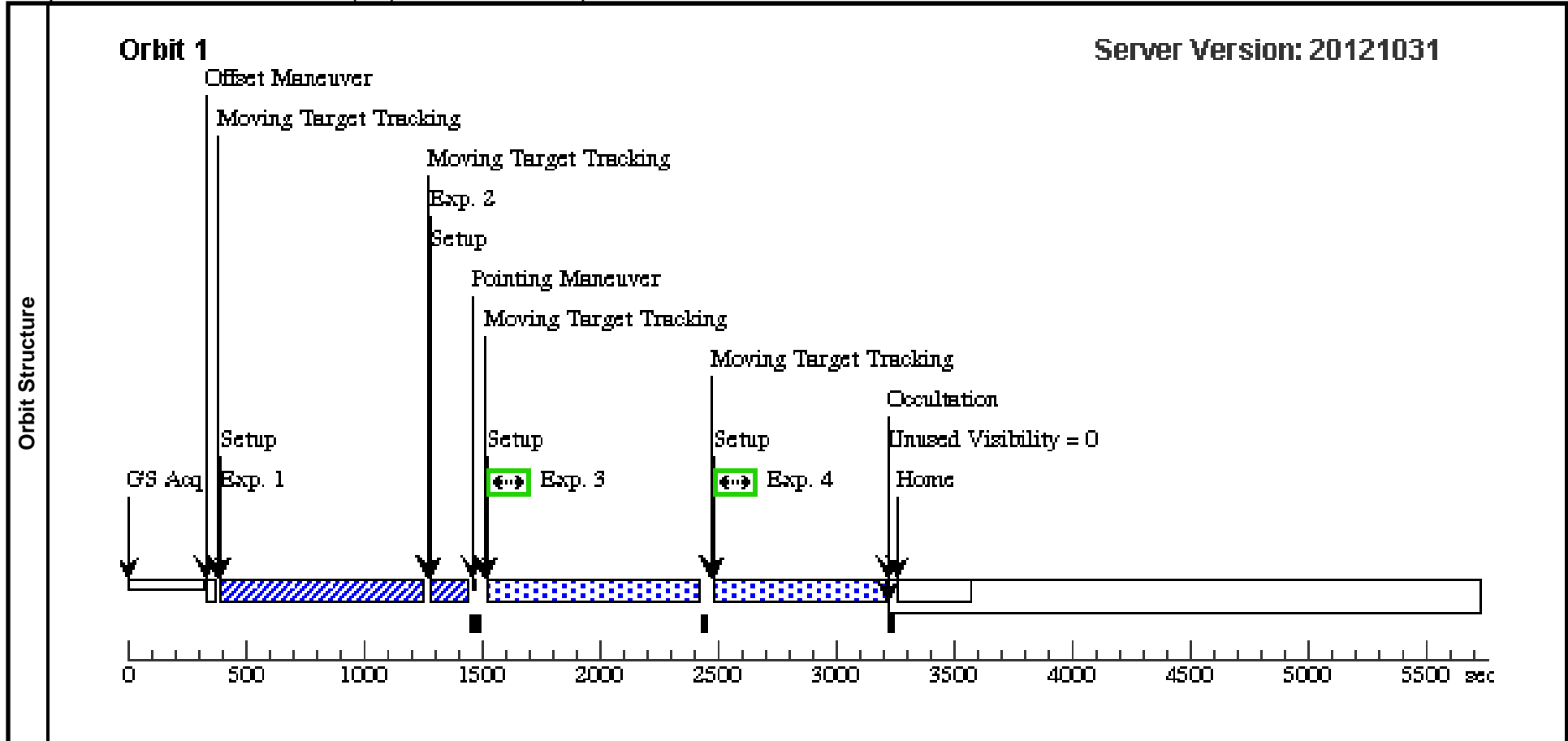
Visit	Proposal 13197, ISON DD 1 (01) Diagnostic Status: Warning Scientific Instruments: COS/NUV, COS/FUV Special Requirements: SEQ 01,02,03,04,05 WITHIN 6 Orbits									
	Diagnosics (ISON DD 1 (01)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.									
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(1)	ISON	TYPE=COMET,Q=0.0125022883361 5271,E=1.000004178571949,I=61.861 20174134099,O=295.7371915514632, W=345.5093083227027,T=28-NOV- 2013:18:42:10,TimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN- 2013,EpochTimeScale=TDT				MOSS Planning Start: 02-APR- 2013:00:00:00 MOSS Planning End: 10-MAY- 2013:00:00:00 MOSS Show Windows: true	EARTH		
<i>Comments: V-mags are for the nucleus. Ephemeris offsets will be uplinked, if necessary, to correct for any errors in the JPL #20 solution.</i> <i>Acquisition Uncertainty: 5 Arcsec Ephemeris Uncertainty: 15000 Kilometers</i>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	ISON ACQ SRCH (497995)	(1) ISON	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=3	REQ EPHEM CORR ISON01		30 Secs [==>]	[1]
	<i>Comments: Requires ephemeris update</i>									
	2	ISON ACQ IMG (497282)	(1) ISON	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR ISON01		30 Secs [==>]	[1]
	<i>Comments: Requires ephemeris update</i>									
3	ISON COS 1 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10 000; FP-POS=2; EXTENDED=YES	REQ EPHEM CORR ISON01		500 Secs [==>682.0 Secs]	[1]
<i>Comments: Requires ephemeris correction ISON</i>										
4	ISON COS 2 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10 000; FP-POS=3; EXTENDED=YES	REQ EPHEM CORR ISON01		500 Secs [==>682.0 Secs]	[1]
<i>Comments: Requires ephemeris correction ISON</i>										



Proposal 13197 - ISON DD 2 (02) - Distant Activity of Comet ISON

Wed Apr 03 01:36:55 GMT 2013

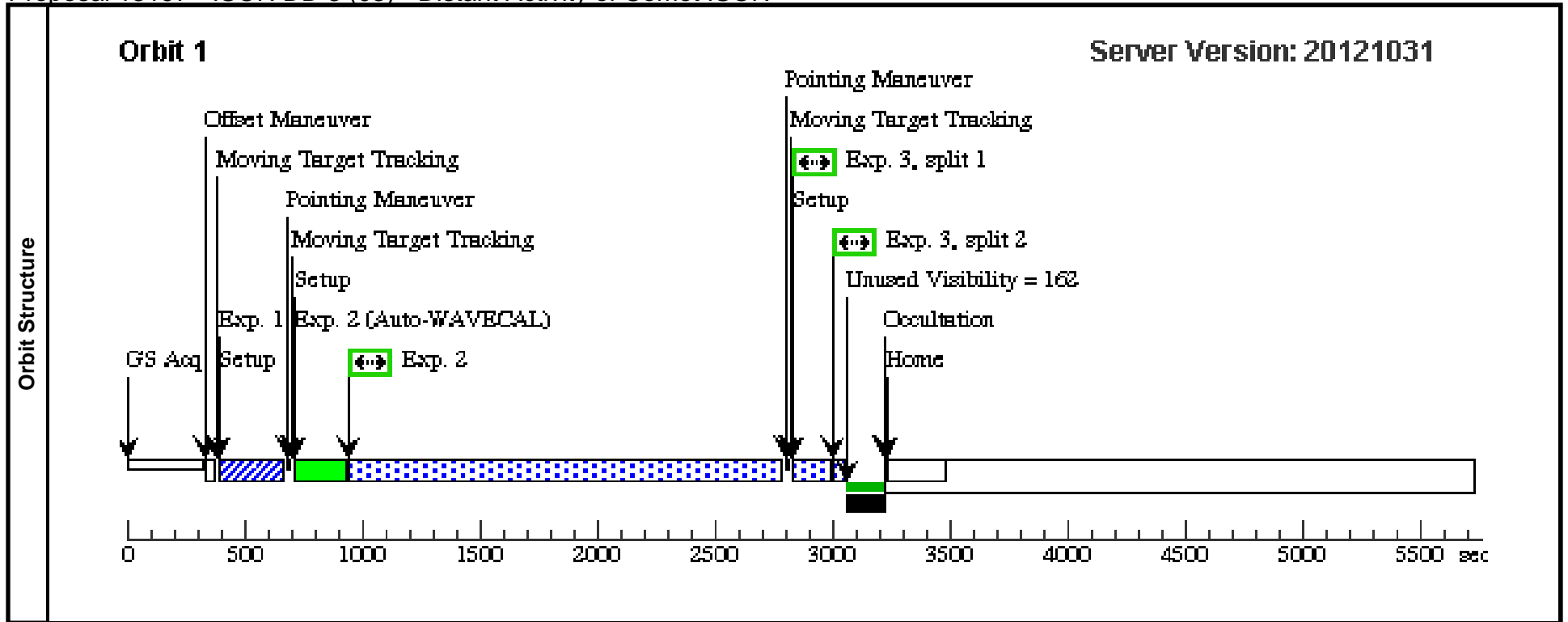
Visit	Proposal 13197, ISON DD 2 (02) Diagnostic Status: Warning Scientific Instruments: COS/NUV, COS/FUV Special Requirements: (none)									
	Diagnosics (ISON DD 2 (02)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.									
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(1)	ISON	TYPE=COMET,Q=0.0125022883361 5271,E=1.000004178571949,I=61.861 20174134099,O=295.7371915514632, W=345.5093083227027,T=28-NOV- 2013:18:42:10,TimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN- 2013,EpochTimeScale=TDT				MOSS Planning Start: 02-APR- 2013:00:00:00 MOSS Planning End: 10-MAY- 2013:00:00:00 MOSS Show Windows: true	EARTH		
<i>Comments: V-mags are for the nucleus. Ephemeris offsets will be uplinked, if necessary, to correct for any errors in the JPL #20 solution.</i> <i>Acquisition Uncertainty: 5 Arcsec Ephemeris Uncertainty: 15000 Kilometers</i>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	ISON ACQ SRCH (497995)	(1) ISON	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=3	REQ EPHEM CORR ISON02		30 Secs [==>]	[1]
	2	ISON ACQ IMG (497995)	(1) ISON	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		REQ EPHEM CORR ISON02		30 Secs [==>]	[1]
	<i>Comments: Requires ephemeris correction</i>									
	3	ISON COS 3 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=10 000; FP-POS=2; EXTENDED=YES	REQ EPHEM CORR ISON02		500 Secs [==>682.0 Secs]	[1]
<i>Comments: Requires ephemeris correction</i>										
4	ISON COS 4 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=10 000; FP-POS=3; EXTENDED=YES	REQ EPHEM CORR ISON02		500 Secs [==>682.0 Secs]	[1]	
<i>Comments: Requires ephemeris correction</i>										



Proposal 13197 - ISON DD 3 (03) - Distant Activity of Comet ISON

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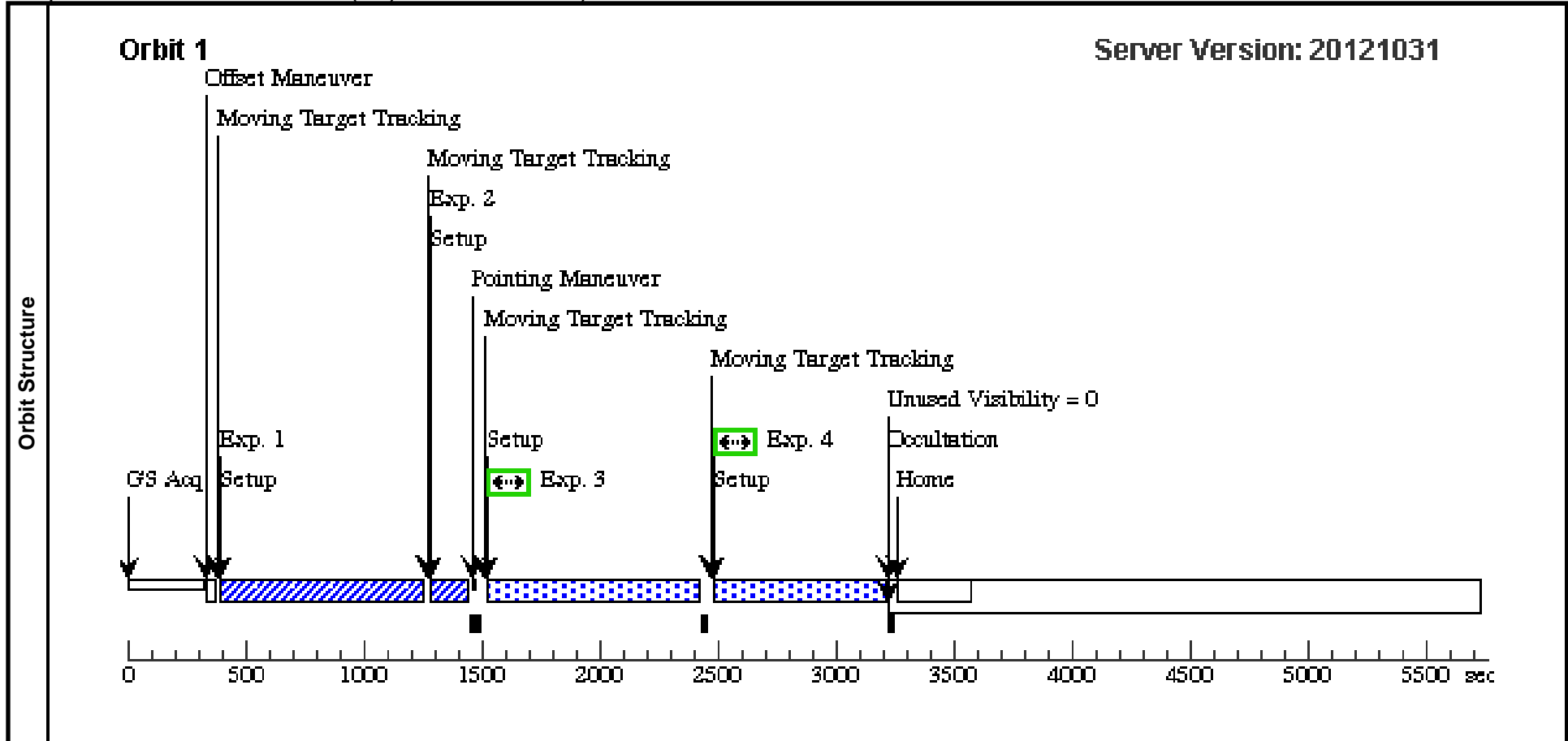
Visit	Proposal 13197, ISON DD 3 (03) Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/NUV-MAMA Special Requirements: BEFORE 10-MAY-2013:00:00:00									
	Solar System Targets									
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
(1)	ISON	TYPE=COMET,Q=0.0125022883361 5271,E=1.000004178571949,I=61.861 20174134099,O=295.7371915514632, W=345.5093083227027,T=28-NOV- 2013:18:42:10,TTTimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN- 2013,EpochTimeScale=TDT				MOSS Planning Start: 02-APR- 2013:00:00:00 MOSS Planning End: 10-MAY- 2013:00:00:00 MOSS Show Windows: true	EARTH			
<i>Comments: V-mags are for the nucleus. Ephemeris offsets will be uplinked, if necessary, to correct for any errors in the JPL #20 solution.</i> Acquisition Uncertainty: 5 Arcsec Ephemeris Uncertainty: 15000 Kilometers										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	ISON STIS ACQ (498003)	(1) ISON	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	REQ EPHEM CORR ISON03		1 Secs [==>]	[1]
	<i>Comments: requires ephemeris correction</i>									
	2	ISON STIS (498006)	(1) ISON	STIS/NUV-MAMA, ACCUM, 52X2	G230L 2376 A		REQ EPHEM CORR ISON03		1800 Secs [==>]	[1]
<i>Comments: requires ephemeris correction</i>										
3	ISON STIS IMG (498003)	(1) ISON	STIS/CCD, ACCUM, F28X50LP	MIRROR	CR-SPLIT=2; GAIN=1	REQ EPHEM CORR ISON03		20 Secs [==>(Split 1)] [==>(Split 2)]	[1]	
<i>Comments: requires ephemeris correction</i>										



Proposal 13197 - ISON DD 4 (04) - Distant Activity of Comet ISON

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Visit	Proposal 13197, ISON DD 4 (04) Diagnostic Status: Warning Scientific Instruments: COS/NUV, COS/FUV Special Requirements: BEFORE 10-MAY-2013:00:00:00										
	Diagnosics (ISON DD 4 (04)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(1)	ISON	TYPE=COMET,Q=0.0125022883361 5271,E=1.000004178571949,I=61.861 20174134099,O=295.7371915514632, W=345.5093083227027,T=28-NOV- 2013:18:42:10,TimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN- 2013,EpochTimeScale=TDT				MOSS Planning Start: 02-APR- 2013:00:00:00 MOSS Planning End: 10-MAY- 2013:00:00:00 MOSS Show Windows: true	EARTH			
<i>Comments: V-mags are for the nucleus. Ephemeris offsets will be uplinked, if necessary, to correct for any errors in the JPL #20 solution.</i> <i>Acquisition Uncertainty: 5 Arcsec Ephemeris Uncertainty: 15000 Kilometers</i>											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	ISON COS ACQ (497995)	(1) ISON	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=3	REQ EPHEM CORR ISON04		30 Secs [==>]	[1]	
	<i>Comments: requires ephemeris correction</i>										
	2	ISON ACQ IMG (497995)	(1) ISON	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			REQ EPHEM CORR ISON04		30 Secs [==>]	[1]
	3	ISON COS 5 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10 000; FP-POS=2; EXTENDED=YES	REQ EPHEM CORR ISON04		500 Secs [==>682.0 Secs]	[1]
<i>Comments: requires ephemeris update</i>											
4	ISON COS 6 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10 000; FP-POS=3; EXTENDED=YES	REQ EPHEM CORR ISON04		500 Secs [==>682.0 Secs]	[1]	
<i>Comments: requires ephemeris update</i>											



Proposal 13197 - ISON DD 5 (05) - Distant Activity of Comet ISON

Wed Apr 03 01:37:00 GMT 2013

Visit	Proposal 13197, ISON DD 5 (05) Diagnostic Status: Warning Scientific Instruments: COS/NUV, COS/FUV Special Requirements: BEFORE 10-MAY-2013:00:00:00										
	Diagnosics (ISON DD 5 (05)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.										
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(1)	ISON	TYPE=COMET,Q=0.0125022883361 5271,E=1.000004178571949,I=61.861 20174134099,O=295.7371915514632, W=345.5093083227027,T=28-NOV- 2013:18:42:10,TimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN- 2013,EpochTimeScale=TDT				MOSS Planning Start: 02-APR- 2013:00:00:00 MOSS Planning End: 10-MAY- 2013:00:00:00 MOSS Show Windows: true	EARTH			
Comments: V-mags are for the nucleus. Ephemeris offsets will be uplinked, if necessary, to correct for any errors in the JPL #20 solution. Acquisition Uncertainty: 5 Arcsec Ephemeris Uncertainty: 15000 Kilometers											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	ISON COS ACQ SRCh (497995)	(1) ISON	COS/NUV, ACQ/SEARCH, PSA	MIRRORA	SCAN-SIZE=3	REQ EPHEM CORR ISON05		30 Secs [==>]	[1]	
	Comments: requires ephemeris correction										
	2	ISON DD C OS ACQ IMG (497995)	(1) ISON	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			REQ EPHEM CORR ISON05		30 Secs [==>]	[1]
	3	ISON DD C OS 7 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10000; FP-POS=2; EXTENDED=YES	REQ EPHEM CORR ISON05		500 Secs [==>682.0 Secs]	[1]
Comments: requires ephemeris correction											
4	ISON COS 8 (497998)	(1) ISON	COS/FUV, TIME-TAG, PSA	G160M 1589 A		BUFFER-TIME=10000; FP-POS=3; EXTENDED=YES	REQ EPHEM CORR ISON05		500 Secs [==>682.0 Secs]	[1]	
Comments: requires ephemeris correction											

