14755 - Understanding Callisto's Atmosphere

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. John R. Spencer (PI) (Contact)	**Southwest Research Institute**	**spencer@boulder.swri.edu**
Dr. Nathaniel J. Cunningham (CoI)	Nebraska Wesleyan University	ncunning@nebrwesleyan.edu
Dr. Darrell F. Strobel (CoI)	The Johns Hopkins University	strobel@jhu.edu
Dr. Paul D. Feldman (CoI)	The Johns Hopkins University	pfeldman@jhu.edu
Dr. Lorenz Roth (CoI) (ESA Member)	Royal Institute of Technology	lorenzr@kth.se
Dr. Joachim Saur (CoI) (ESA Member)	Universitat zu Koeln	saur@geo.uni-koeln.de
Mr. Oliver Hartkorn (CoI) (ESA Member)	Universitat zu Koeln	hartkorn@geo.uni-koeln.de

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(2) CALLISTO-TRAILING	COS/FUV COS/NUV	4	29-Jul-2016 15:13:40.0	yes
02	(1) CALLISTO-LEADING	COS/FUV COS/NUV	4	29-Jul-2016 15:13:44.0	yes

8 Total Orbits Used

ABSTRACT

We plan to address first-order questions about the nature and origin of the mysterious atmosphere of Callisto, including its composition, longitudinal distribution, formation, and support mechanisms. This investigation is made possible by the remarkable sensitivity of the COS instrument, which has

recently detected faint 1304 A and 1356 A O I emission from Callisto's leading / Jupiter-facing quadrant. The emission is probably due to dissociation of O2 molecules in Callisto's atmosphere by photo-electrons, and resonant scattering from an extended atomic O corona. We suspect, from Galileo ionospheric data, that the atmosphere may be much denser, and brighter in emission, on the trailing hemisphere, as expected for a sputter-generated atmosphere, and propose to test the sputter generation hypothesis with 4-orbit COS integrations on the leading and trailing hemispheres. If the trailing side emissions are indeed brighter, the improved SNR there will also allow much improved determination of atmospheric and coronal composition and optical depth. The observations will set the stage for, and aid in planning of, the extensive observations of Callisto's environment planned for the JUICE mission. Because Callisto's atmospheric oxygen emissions are indirectly illuminated by sunlight, which is uniform and quantifiable, it is much easier to understand atmospheric spatial distribution, and thus origin, than on Europa and Ganymede were emissions depend on magnetospheric excitation which is spatially variable and poorly understood. Callisto's atmosphere thus provides a unique chance to better understand the oxygen atmospheres of all the icy Galilean moons.

OBSERVING DESCRIPTION

Four orbits with the G130M grating at 1300?, to achieve >= 8000s.

Visit

Proposal 14755, Trailing Hemisphere (01) Fri Jul 29 19:13:45 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 80%

*Comments: * We use four consecutive orbits to minimize exposure time loss due to acquisition*
** For the first two orbits, after acquisition, Callisto is offset 0.9" in the aperture- an identical strategy to visit 4 of our previous program 11535*
** For the second two orbits, we use the second half of orbit 3 and the first half of orbit 4 to characterize the background 5" away from Callisto, at the same HST orbital position as integrations centered on Callisto in the first half of orbit 3 and the second half of orbit 4. For each of these integrations we use just 2 FP-POS positions to minimize overhead*

Diagnostics

(Trailing Hemisphere (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS
(Trailing Hemisphere (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS
(Trailing Hemisphere (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS
(Trailing Hemisphere (01)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE NO ORIENT
(Trailing Hemisphere (01)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE
(Trailing Hemisphere (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS
(Acq/search (01.001)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Acq/peak (01.002)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Acq/peakd (01.003)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 0.9 (01.004)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 0.9 (01.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 0.9 (01.005)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 0.9 (01.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 0.9 (01.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 0.9 (01.006)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Center (01.007)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.008)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.008)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 5.0 (01.009)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 5.0 (01.009)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 5.0 (01.010)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 5.0 (01.010)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 5.0 (01.011)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 5.0 (01.011)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Offset 5.0 (01.012)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Offset 5.0 (01.012)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.013)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.013)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.
(Center (01.014)) Warning (Form): Sensitive exposures should have an ETC run number provided.
(Center (01.014)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	CALLISTO-TRAILING	STD=JUPITER	STD=CALLISTO		SEP OF CALLISTO-TRAILING JUPITER FROM EARTH GT 30", SEP OF CALLISTO-TRAILING IO FROM EARTH GT 10", SEP OF CALLISTO-TRAILING EUROPA FROM EARTH GT 10", SEP OF CALLISTO-TRAILING GANYMEDE FROM EARTH GT 10", OLG OF CALLISTO-TRAILING FROM EARTH BETWEEN 240 300, SEP OF CALLISTO-TRAILING SUN FROM EARTH GT 160D	EARTH

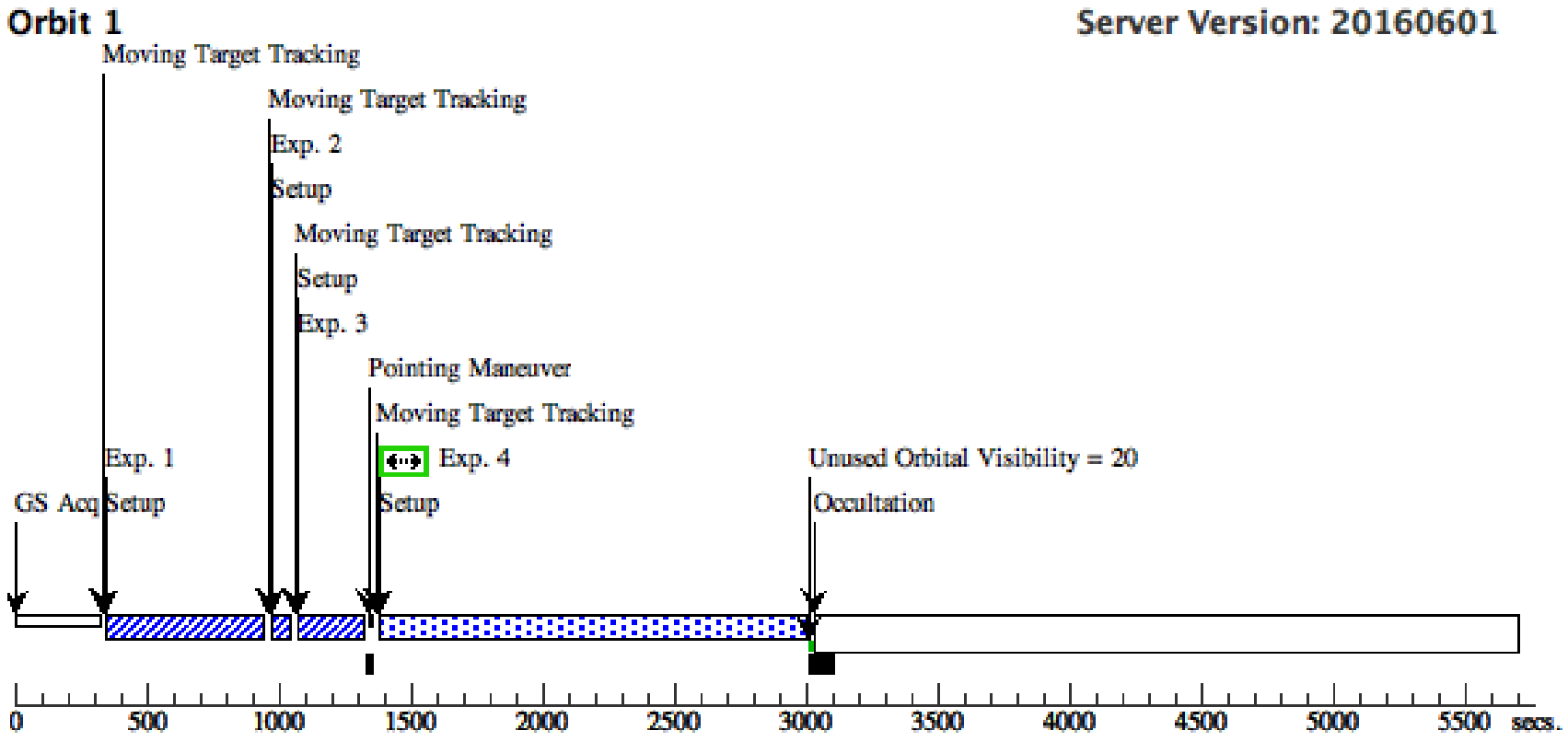
Comments: As the oxygen lines to be observed are also present in terrestrial airglow, we choose to observe near opposition to maximize time in Earth's shadow. We specify this by requiring that the solar elongation of Callisto be greater than 160 degrees
Extended=YES

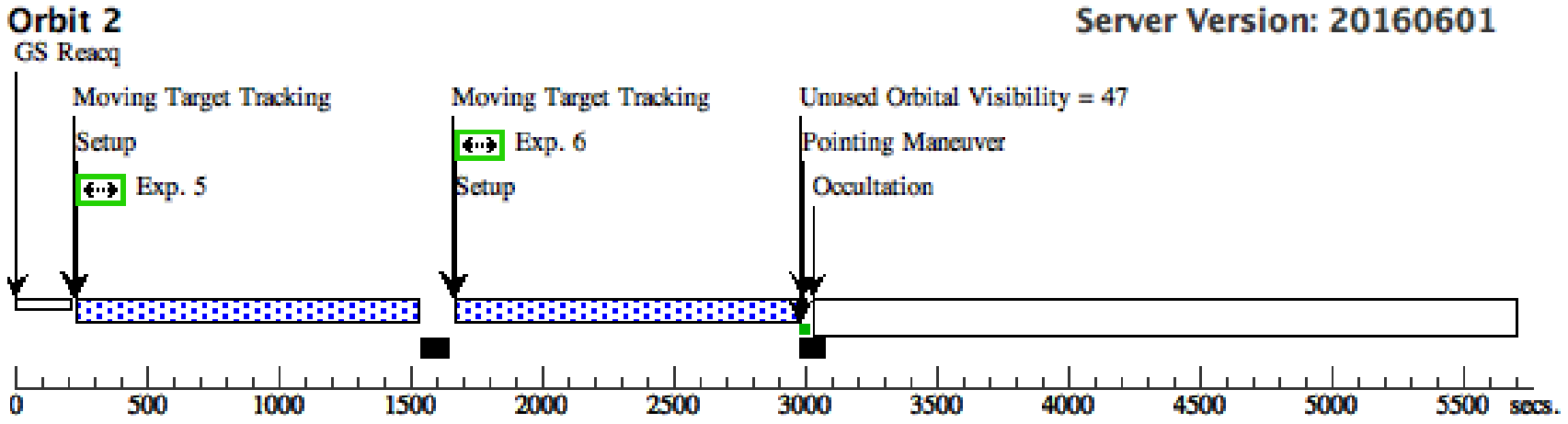
Exposures

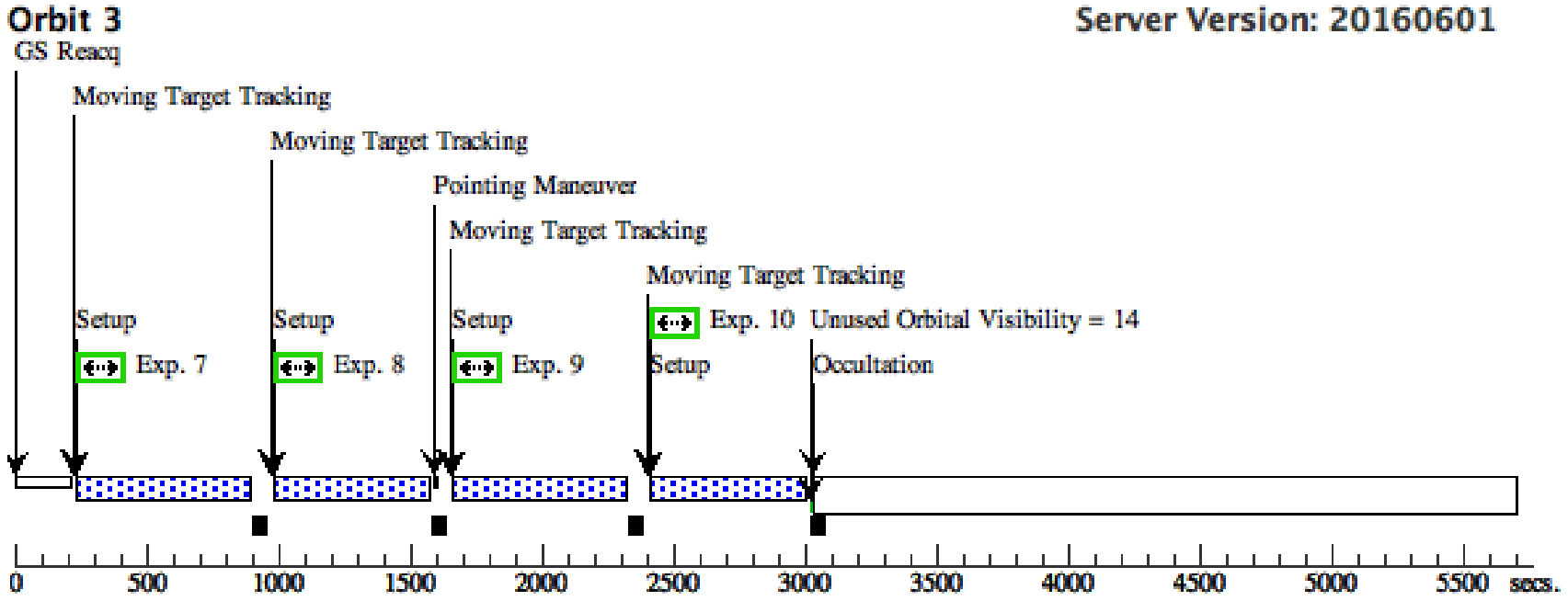
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acq/search	(2) CALLISTO-TRAILING	COS/NUV, ACQ/SEARCH, PSA	G285M 2709 A	SCAN-SIZE=3	GS ACQ SCENARIO BASE1B3		5 Secs (5 Secs) [==>]	[1]
	Comments: Callisto is 6.2 +/- 0.5 mags over 2009 (based on JPL ephem generator), and is effectively 1.1 mag dimmer in this grating bandpass than in the visible (based on albedo = 0.06 here vs. 0.17 in visible).								
	So I use mV_effective = 7.3 and get 0.44/0.96 seconds for ACQ-Search/ACQ-PeakXD modes to reach S/N = 40 (ETC IDs COS78131 / COS78132). 5 seconds gives plenty of margin								
2	Acq/peak	(2) CALLISTO-TRAILING	COS/NUV, ACQ/PEAKXD, PSA	G285M 2709 A				5 Secs (5 Secs) [==>]	[1]
	Comments: Callisto is 6.2 +/- 0.5 mags over 2009 (based on JPL ephem generator), and is effectively 1.1 mag dimmer in this grating bandpass than in the visible (based on albedo = 0.06 here vs. 0.17 in visible).								
	So I use mV_effective = 7.3 and get 0.44/0.96 seconds for ACQ-Search/ACQ-PeakXD modes to reach S/N = 40 (ETC IDs COS78131 / COS78132)								
3	Acq/peakd	(2) CALLISTO-TRAILING	COS/NUV, ACQ/PEAKD, PSA	G285M 2709 A	NUM-POS=7; STEP-SIZE=1.2			5 Secs (5 Secs) [==>]	[1]
	Comments: estimates are same as for exposure 1, ACQ/SEARCH								
4	Offset 0.9	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1712	POS TARG 0,-0.9		1450 Secs (1450 Secs) [==>]	[1]
	*Comments: COS76584 for calculation of buffer time. Assumes effective mV = 6.8 and 15 Rayleigh (8.2e-16 ergs/cm^2/s) 1356? line. Gives buffer time = 2/3 * 5939s.*								
	POS TARG is designed to place Callisto 0.9" in the cross-dispersion (+Y) direction. This is intended to allow a portion of the the aperture, and therefore a portion of the spectrum, to contain purely airglow, while the upper part of the aperture contains Callisto's spectrum in addition to oxygen airglow. The cross-dispersion variation in oxygen emission line intensity will help indicate whether Callisto has a significant additional oxygen signal.								
5	Offset 0.9	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1298	SAME POS AS 4		1250 Secs (1250 Secs) [==>]	[2]
6	Offset 0.9	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408	SAME POS AS 4		1250 Secs (1250 Secs) [==>]	[2]
7	Center	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[3]
8	Center	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[3]
9	Offset 5.0	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1408	POS TARG null,5		540 Secs (540 Secs) [==>]	[3]
10	Offset 5.0	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[3]
11	Offset 5.0	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[4]
12	Offset 5.0	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[4]
13	Center	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[4]

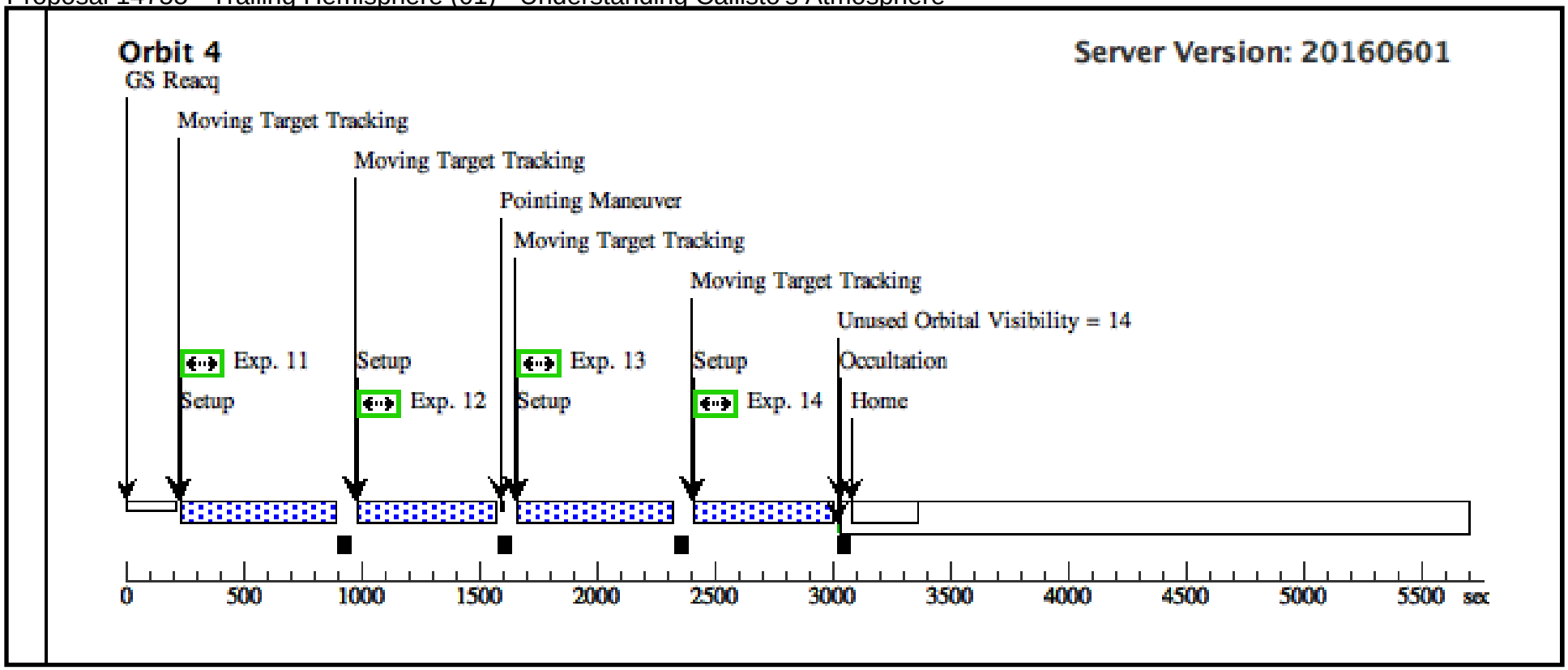
	14	Center	(2) CALLISTO-TRAILING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=1408	540 Secs (540 Secs) *[==>]*	***[4]***

Orbit Structure




Orbit 2
Server Version: 20160601
GS Reacq
Moving Target Tracking
Setup
Exp. 5
Moving Target Tracking
Exp. 6
Setup
Unused Orbital Visibility = 47
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20160601
GS Reacq
Moving Target Tracking
Moving Target Tracking
Pointing Maneuver
Moving Target Tracking
Moving Target Tracking
Setup
Exp. 7
Setup
Exp. 8
Setup
Exp. 9
Exp. 10
Setup
Unused Orbital Visibility = 14
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20160601
GS Reacq
Moving Target Tracking
Moving Target Tracking
Pointing Maneuver
Moving Target Tracking
Moving Target Tracking
Unused Orbital Visibility = 14
Exp. 11
Setup
Setup
Exp. 12
Setup
Exp. 13
Setup
Exp. 14
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14755, Leading Hemisphere (02) Fri Jul 29 19:13:46 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 80%

*Comments: * We use four consecutive orbits to minimize exposure time loss due to acquisition*
** For the first two orbits, after acquisition, Callisto is offset 0.9" in the aperture- an identical strategy to visit 4 of our previous program 11535*
** For the second two orbits, we use the second half of orbit 3 and the first half of orbit 4 to characterize the background 5" away from Callisto, at the same HST orbital position as integrations centered on Callisto in the first half of orbit 3 and the second half of orbit 4. For each of these integrations we use just 2 FP-POS positions to minimize overhead*

Diagnostics

(Leading Hemisphere (02)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE

(Leading Hemisphere (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Leading Hemisphere (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Leading Hemisphere (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Leading Hemisphere (02)) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE NO ORIENT

(Leading Hemisphere (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.

(Leading Hemisphere (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

(Acq/search (02.001)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Acq/peak (02.002)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Acq/peakd (02.003)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 0.9 (02.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 0.9 (02.004)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 0.9 (02.005)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 0.9 (02.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 0.9 (02.006)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 0.9 (02.006)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Center (02.007)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Center (02.007)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Center (02.008)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Center (02.008)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 5.0 (02.009)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 5.0 (02.009)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 5.0 (02.010)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 5.0 (02.010)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 5.0 (02.011)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 5.0 (02.011)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Offset 5.0 (02.012)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Offset 5.0 (02.012)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Center (02.013)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(Center (02.013)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Center (02.014)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Center (02.014)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	CALLISTO-LEADING	STD=JUPITER	STD=CALLISTO		SEP OF CALLISTO-LEADING JUPITER FROM EARTH GT 30", SEP OF CALLISTO-LEADING IO FROM EARTH GT 10", SEP OF CALLISTO-LEADING EUROPA FROM EARTH GT 10", SEP OF CALLISTO-LEADING GANYMEDE FROM EARTH GT 10", OLG OF CALLISTO-LEADING FROM EARTH BETWEEN 60 120, SEP OF CALLISTO-LEADING SUN FROM EARTH GT 160D	EARTH

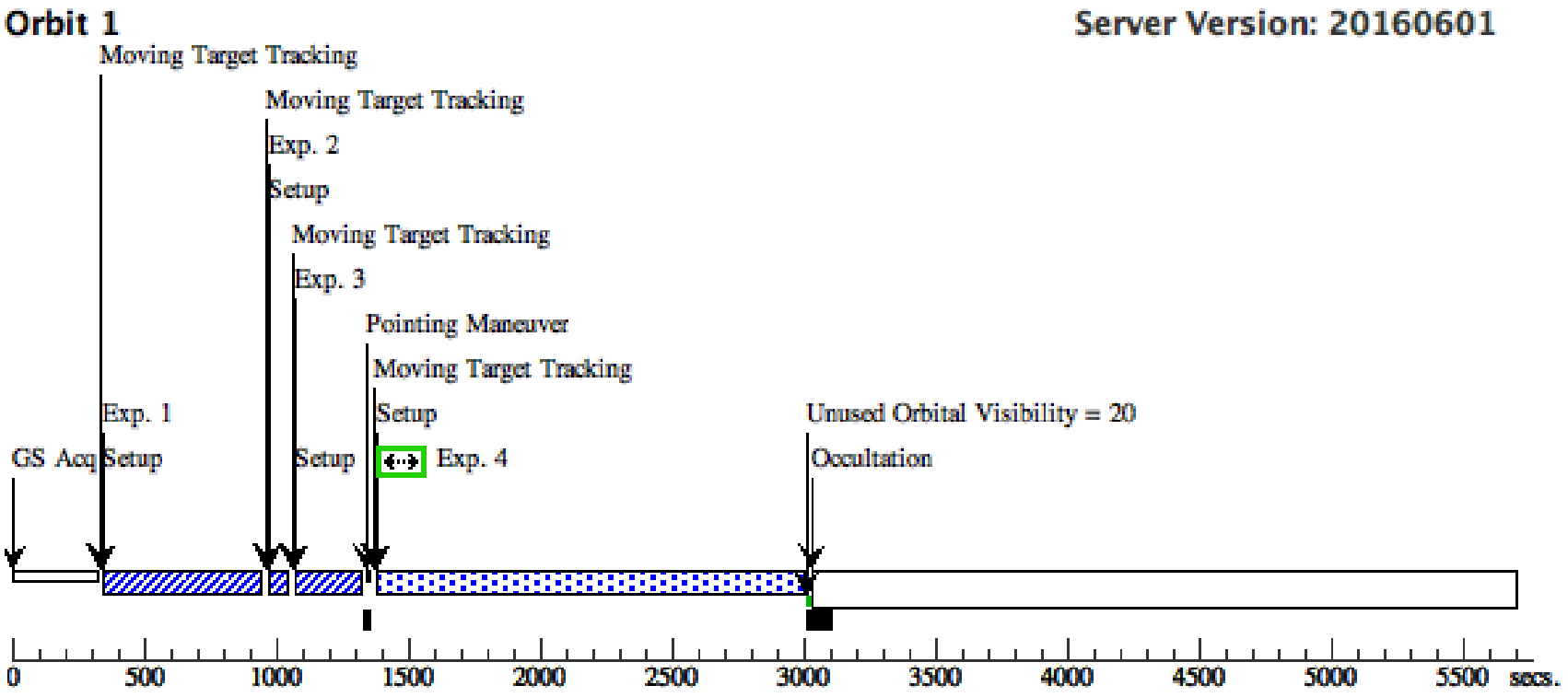
Comments: As the oxygen lines to be observed are also present in terrestrial airglow, we choose to observe near opposition to maximize time in Earth's shadow. We specify this by requiring that the solar elongation of Callisto be greater than 160 degrees
Extended=YES

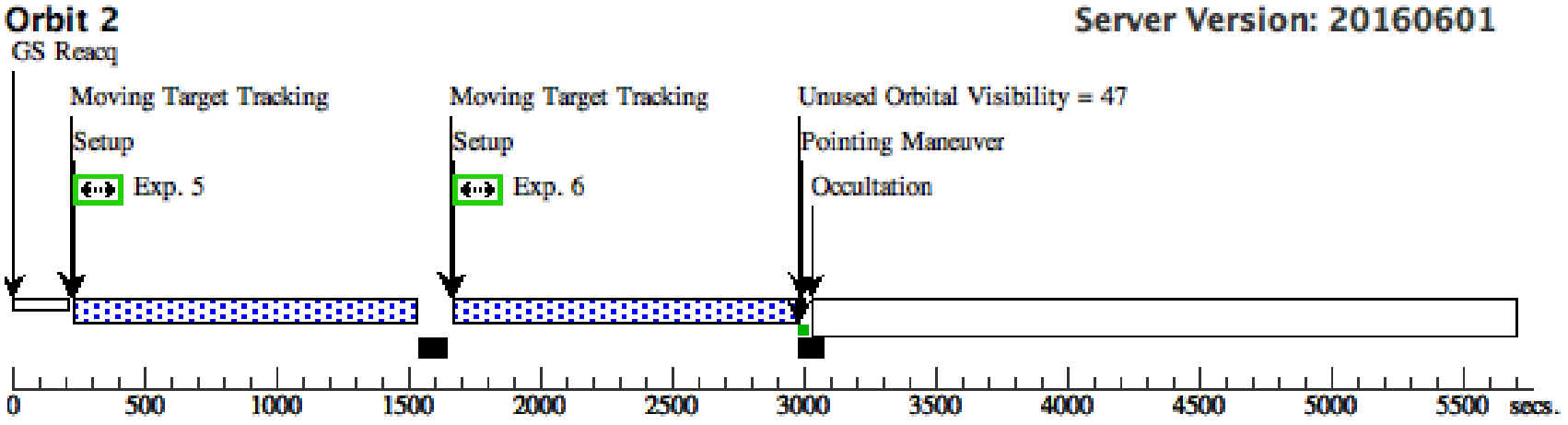
Exposures

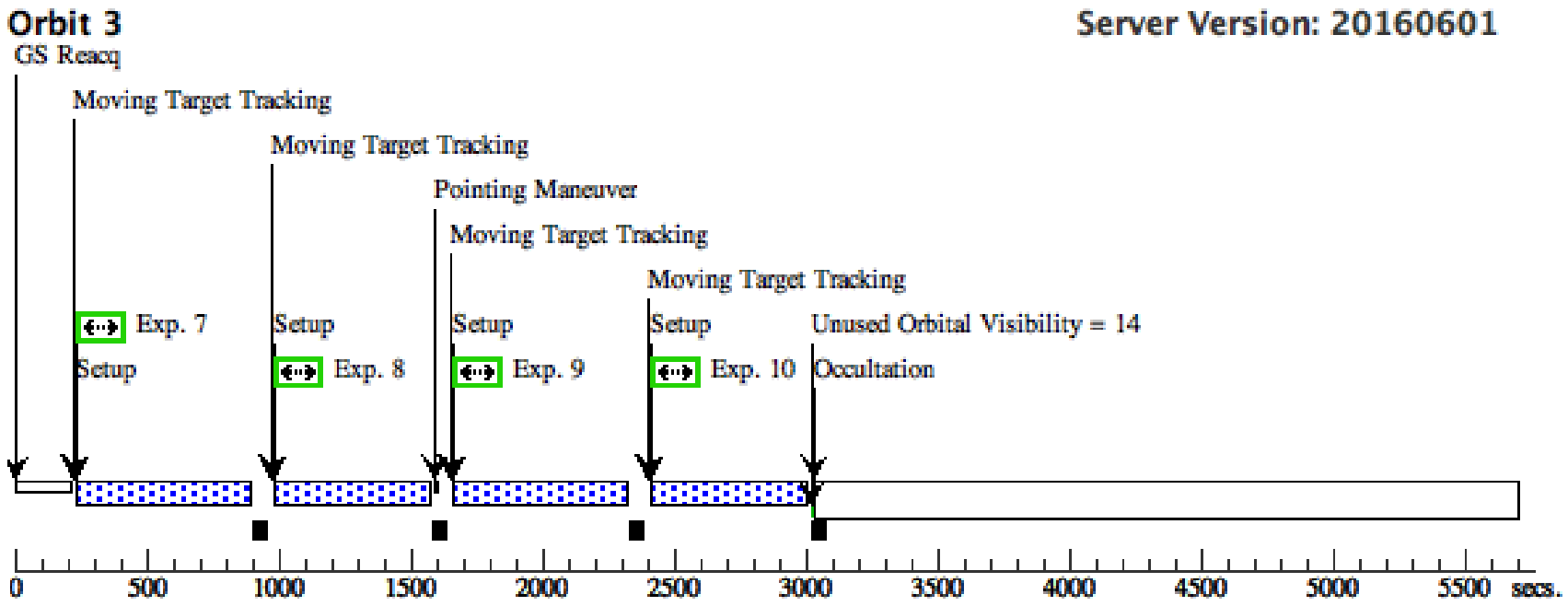
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acq/search	(1) CALLISTO-LEADING	COS/NUV, ACQ/SEARCH, PSA	G285M 2709 A	SCAN-SIZE=3	GS ACQ SCENARIO BASE1B3		5 Secs (5 Secs) [==>]	[1]
	Comments: Callisto is 6.2 +/- 0.5 mags over 2009 (based on JPL ephem generator), and is effectively 1.1 mag dimmer in this grating bandpass than in the visible (based on albedo = 0.06 here vs. 0.17 in visible).								
	So I use mV_effective = 7.3 and get 0.44/0.96 seconds for ACQ-Search/ACQ-PeakXD modes to reach S/N = 40 (ETC IDs COS78131 / COS78132). 5 seconds gives plenty of margin								
2	Acq/peak	(1) CALLISTO-LEADING	COS/NUV, ACQ/PEAKXD, PSA	G285M 2709 A				5 Secs (5 Secs) [==>]	[1]
	Comments: Callisto is 6.2 +/- 0.5 mags over 2009 (based on JPL ephem generator), and is effectively 1.1 mag dimmer in this grating bandpass than in the visible (based on albedo = 0.06 here vs. 0.17 in visible).								
	So I use mV_effective = 7.3 and get 0.44/0.96 seconds for ACQ-Search/ACQ-PeakXD modes to reach S/N = 40 (ETC IDs COS78131 / COS78132)								
3	Acq/peakd	(1) CALLISTO-LEADING	COS/NUV, ACQ/PEAKD, PSA	G285M 2709 A	NUM-POS=7; STEP-SIZE=1.2			5 Secs (5 Secs) [==>]	[1]
	Comments: estimates are same as for exposure 1, ACQ/SEARCH								
4	Offset 0.9	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=1712	POS TARG 0,-0.9		1450 Secs (1450 Secs) [==>]	[1]
	*Comments: COS76584 for calculation of buffer time. Assumes effective mV = 6.8 and 15 Rayleigh (8.2e-16 ergs/cm^2/s) 1356? line. Gives buffer time = 2/3 * 5939s.*								
	POS TARG is designed to place Callisto 0.9" in the cross-dispersion (+Y) direction. This is intended to allow a portion of the the aperture, and therefore a portion of the spectrum, to contain purely airglow, while the upper part of the aperture contains Callisto's spectrum in addition to oxygen airglow. The cross-dispersion variation in oxygen emission line intensity will help indicate whether Callisto has a significant additional oxygen signal.								
5	Offset 0.9	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1298	SAME POS AS 4		1250 Secs (1250 Secs) [==>]	[2]
6	Offset 0.9	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408	SAME POS AS 4		1250 Secs (1250 Secs) [==>]	[2]
7	Center	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[3]
8	Center	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[3]
9	Offset 5.0	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1408	POS TARG null,5		540 Secs (540 Secs) [==>]	[3]
10	Offset 5.0	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[3]
11	Offset 5.0	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[4]
12	Offset 5.0	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408	SAME POS AS 9		540 Secs (540 Secs) [==>]	[4]
13	Center	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=1408			540 Secs (540 Secs) [==>]	[4]

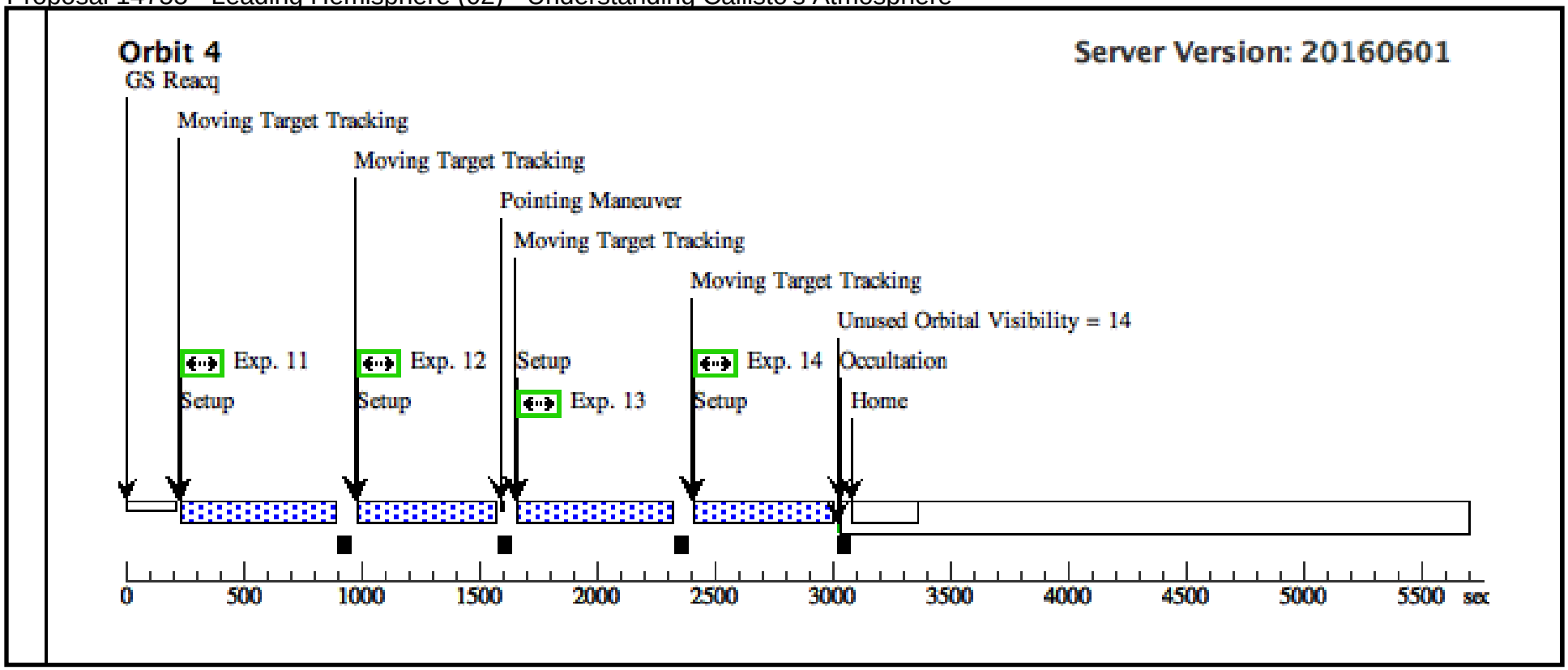
	14	Center	(1) CALLISTO-LEADING	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=1408	540 Secs (540 Secs) *[==>]*	***[4]***

Orbit Structure






Orbit 3
Server Version: 20160601
GS Reacq
Moving Target Tracking
Moving Target Tracking
Pointing Maneuver
Moving Target Tracking
Moving Target Tracking
Exp. 7
Setup
Setup
Exp. 8
Setup
Exp. 9
Setup
Exp. 10
Unused Orbital Visibility = 14
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 4
Server Version: 20160601
GS Reacq
Moving Target Tracking
Moving Target Tracking
Pointing Maneuver
Moving Target Tracking
Moving Target Tracking
Unused Orbital Visibility = 14
Exp. 11
Setup
Exp. 12
Setup
Setup
Exp. 13
Exp. 14
Setup
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec