15396 - Observing the beta Pic Hill Sphere Transit in the far-UV

Cycle: 25, Proposal Category: GO/DD

(Availability Mode: AVAILABLE)

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) -BET-PIC	COS/FUV	3	17-Oct-2017 15:06:17.0	yes
02	(1) -BET-PIC	COS/FUV	3	17-Oct-2017 15:06:20.0	yes

6 Total Orbits Used

ABSTRACT

The Hill sphere of the directly-imaged planet Beta Pic b is currently transiting its host-star, Beta Pic. During this event, material in the Hill sphere (e.g. left-over debris from planet formation, rings, gas torus around satellites, etc.) could transit the star. With the Cycle 24 HST/COS observations of

the first half of the Hill sphere transit from April to August 2017, we detected a significant flux decrease in the blue and red wings of the HI Ly-alpha emission line and the 1334.53 CII absorption line. This is consistent with the first ever detection of an extended envelope of hydrogen and carbon surrounding Beta Pic b.

We propose to monitor the second half of the Hill sphere transit, which will take place in October-November 2017, using the same instrument setup and observation strategy. As with the previous 2017 observations, we will again use the "Airglow Virtual Motion" technique, which is an extremely powerful technique to observe Lyman-alpha with COS. This is a very unique opportunity to monitor the transit of the environment of a ~20 million years old young planet that has been directly imaged orbiting a 4th magnitude star; the next such transit will not happen again for another 20 years. The aims for this proposal are to 1) probe the shape and the dynamics of the gas in the Hill sphere 2) continue to probe the composition of the gas in the Hill sphere, and 3) Track the compositional variations as a function of Hill sphere radius.

OBSERVING DESCRIPTION

We have a total of two visits scheduled. Each visit consists of three orbits. Each visit has an identical observing strategy.

For each visit:
Orbit 1: Observe target centered in the aperture
Orbit 2: The target (Beta Pictoris) is to be offset -1.1 arcseconds in the dispersion direction
Orbit 3: The target (Beta Pictoris) is to be offset +1.1 arcseconds in the dispersion direction

The 1.1 arcsecond offsets shifts are important for the detection of hydrogen, nitrogen and oxygen which are all affected by airglow contamination. An increase in the off-axis target distance along the dispersion axis effectively shifts the line emission feature in wavelength relative to the airglow emission.

Proposal 15396 - Visit 1 (01) - Observing the beta Pic Hill Sphere Transit in the far-UV

Visit

Proposal 15396, Visit 1 (01), scheduled Tue Oct 17 19:06:22 GMT 2017

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: SCHED 90%; BEFORE 31-OCT-2017:00:00:00

Comments: Orbit 1: Observe target centered in the aperture
Orbit 2: The target (Beta Pictoris) is to be offset -1.1 arcseconds in the dispersion direction
Orbit 3: The target (Beta Pictoris) is to be offset +1.1 arcseconds in the dispersion direction

Diagnostics

(Visit 1 (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS

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(Visit 1 (01)) Warning (Orbit Planner): REFERENCE-FRAME MUST BE ICRS OR GSC1 FOR SMALL APERTURE

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Fixed Targets

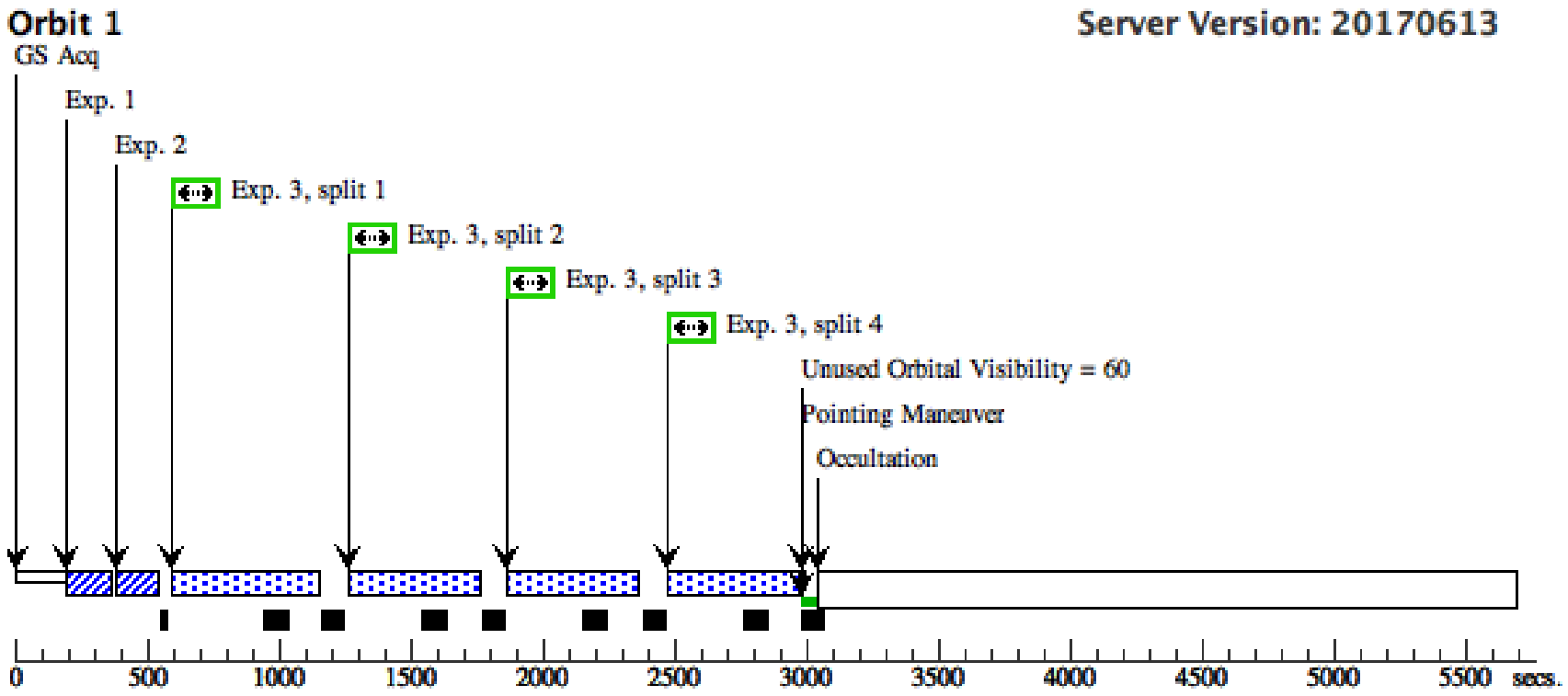
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-BET-PIC	RA: 05 47 17.0877 (86.8211988d)	Proper Motion RA: 4.65 mas/yr	V=3.861	Reference Frame: SIMBAD
		Dec: -51 03 59.44 (-51.06651d)	Proper Motion Dec: 83.10 mas/yr		
		Equinox: J2000	Parallax: 0.051"		
			Epoch of Position: 2000		

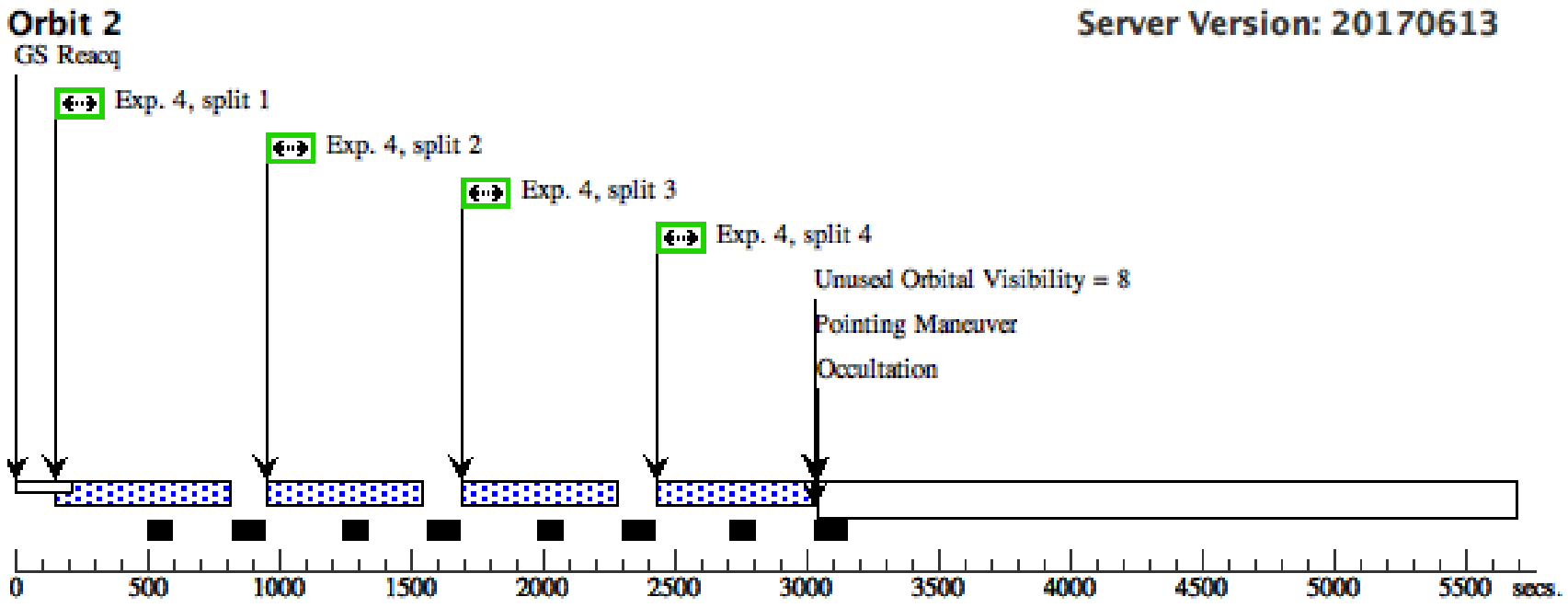
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

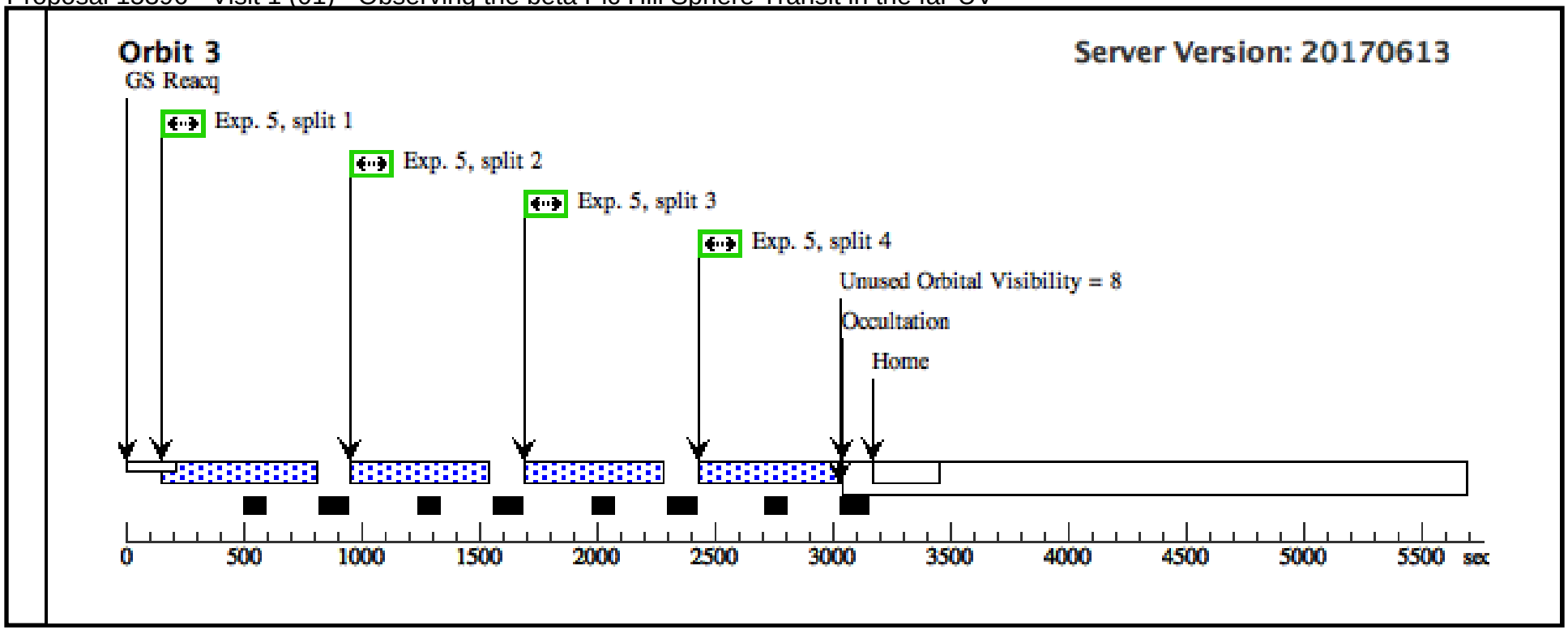
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Positioning (COS.sa.729672)	(1) -BET-PIC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	NUM-POS=1; LIFETIME-POS=LP3		Sequence 1-3 Non-Int in Visit 1 (01)	1.4 Secs (1.4 Secs) *[==>]*	***[1]***
2	Max-Light (COS.sa.729672)	(1) -BET-PIC	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	CENTER=DEF; NUM-POS=5; STEP-SIZE=0.9; LIFETIME-POS=LP3		Sequence 1-3 Non-Int in Visit 1 (01)	1.4 Secs (1.4 Secs) *[==>]*	***[1]***
3	Center (COS.sp.848182)	(1) -BET-PIC	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=2500; FLASH=YES; FP-POS=ALL; LIFETIME-POS=LP3		Sequence 1-3 Non-Int in Visit 1 (01)	534 Secs (1776 Secs) *[==>444.0 Secs (Split 1)]* *[==>444.0 Secs (Split 2)]* *[==>444.0 Secs (Split 3)]* *[==>444.0 Secs (Split 4)]*	***[1]***
Comments: The strength of the Stellar Lyman-alpha line has been set to an conservative upper limit to calculate the Buffer-time and check the Bright Objects Limit (FWHM=5 Angstrom, Flux=1e-11).									
4	Blueward-1.1arcsec (COS.sp.848182)	(1) -BET-PIC	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=2500; FLASH=YES; FP-POS=ALL; LIFETIME-POS=LP3	POS TARG -1.1,null	Sequence 4-4 Non-Int in Visit 1 (01)	534 Secs (2152 Secs) *[==>538.0 Secs (Split 1)]* *[==>538.0 Secs (Split 2)]* *[==>538.0 Secs (Split 3)]* *[==>538.0 Secs (Split 4)]*	***[2]***
Comments: The strength of the Stellar Lyman-alpha line has been set to an conservative upper limit to calculate the Buffer-time and check the Bright Objects Limit (FWHM=5 Angstrom, Flux=1e-11).									
5	Redward+1.1arcsec (COS.sp.848182)	(1) -BET-PIC	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=2500; FLASH=YES; FP-POS=ALL; LIFETIME-POS=LP3	POS TARG 1.1,null	Sequence 5-5 Non-Int in Visit 1 (01)	534 Secs (2152 Secs) *[==>538.0 Secs (Split 1)]* *[==>538.0 Secs (Split 2)]* *[==>538.0 Secs (Split 3)]* *[==>538.0 Secs (Split 4)]*	***[3]***
Comments: The strength of the Stellar Lyman-alpha line has been set to an conservative upper limit to calculate the Buffer-time and check the Bright Objects Limit (FWHM=5 Angstrom, Flux=1e-11).									

Orbit Structure




Orbit 2
Server Version: 20170613
GS Reacq
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Unused Orbital Visibility = 8
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20170613
GS Reacq
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Unused Orbital Visibility = 8
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15396, Visit 2 (02), scheduling Tue Oct 17 19:06:22 GMT 2017

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: SCHED 90%; AFTER 01 BY 30 D TO 80 D

Comments: Orbit 1: Observe target centered in the aperture
Orbit 2: The target (Beta Pictoris) is to be offset -1.1 arcseconds in the dispersion direction
Orbit 3: The target (Beta Pictoris) is to be offset +1.1 arcseconds in the dispersion direction

Diagnostics

(Visit 2 (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS
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Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-BET-PIC	RA: 05 47 17.0877 (86.8211988d) Dec: -51 03 59.44 (-51.06651d) Equinox: J2000	Proper Motion RA: 4.65 mas/yr Proper Motion Dec: 83.10 mas/yr Parallax: 0.051" Epoch of Position: 2000	V=3.861	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Positioning (COS.sa.729672)	(1) -BET-PIC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	NUM-POS=1; LIFETIME-POS=LP3	GS ACQ SCENARIO BASE1B3	Sequence 1-3 Non-Int in Visit 2 (02)	1.4 Secs (1.4 Secs) *[==>]*	***[1]***
2	Max-Light (COS.sa.729672)	(1) -BET-PIC	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	CENTER=DEF; NUM-POS=5; STEP-SIZE=0.9; LIFETIME-POS=LP3		Sequence 1-3 Non-Int in Visit 2 (02)	1.4 Secs (1.4 Secs) *[==>]*	***[1]***
3	Center (COS.sp.848182)	(1) -BET-PIC	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=2500; FLASH=YES; FP-POS=ALL; LIFETIME-POS=LP3		Sequence 1-3 Non-Int in Visit 2 (02)	534 Secs (1776 Secs) *[==>444.0 Secs (Split 1)]* *[==>444.0 Secs (Split 2)]* *[==>444.0 Secs (Split 3)]* *[==>444.0 Secs (Split 4)]*	***[1]***
Comments: The strength of the Stellar Lyman-alpha line has been set to an conservative upper limit to calculate the Buffer-time and check the Bright Objects Limit (FWHM=5 Angstrom, Flux=1e-11).									
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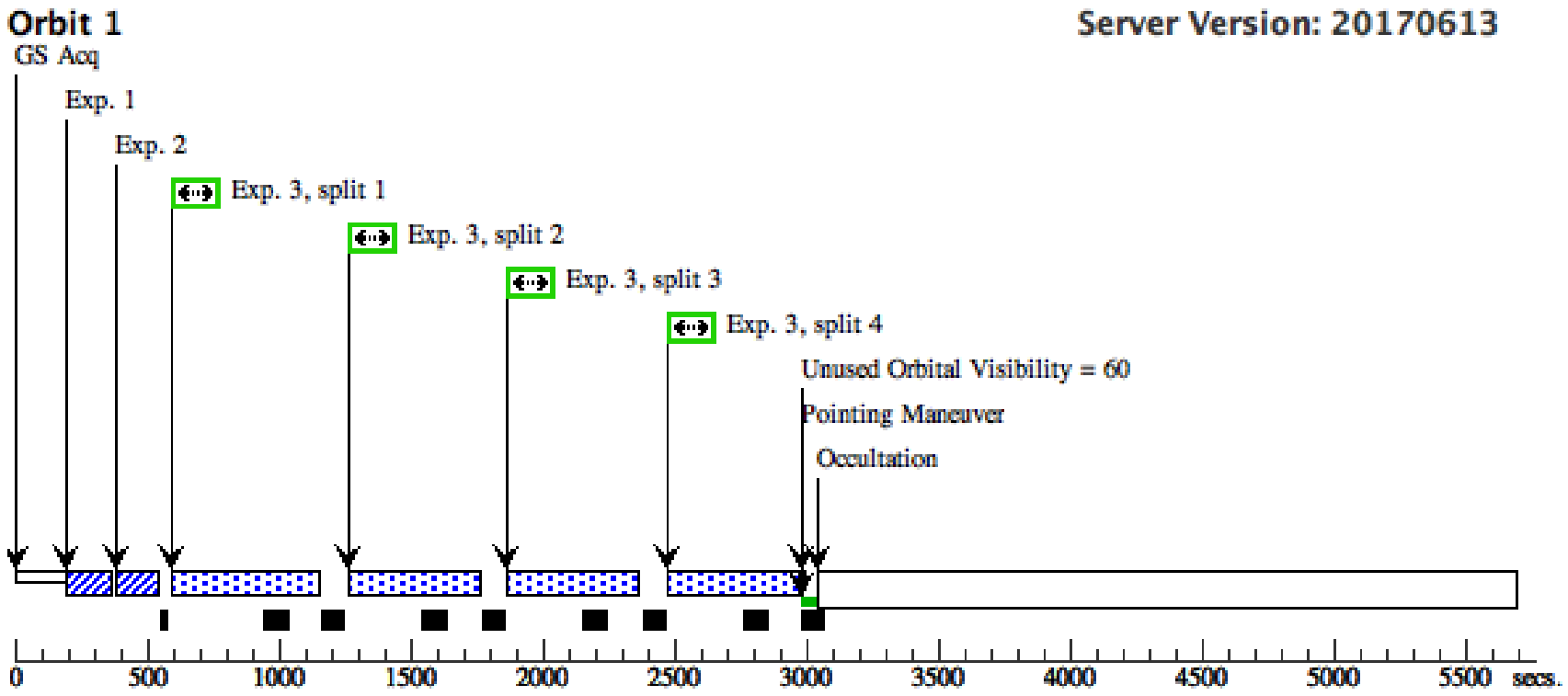
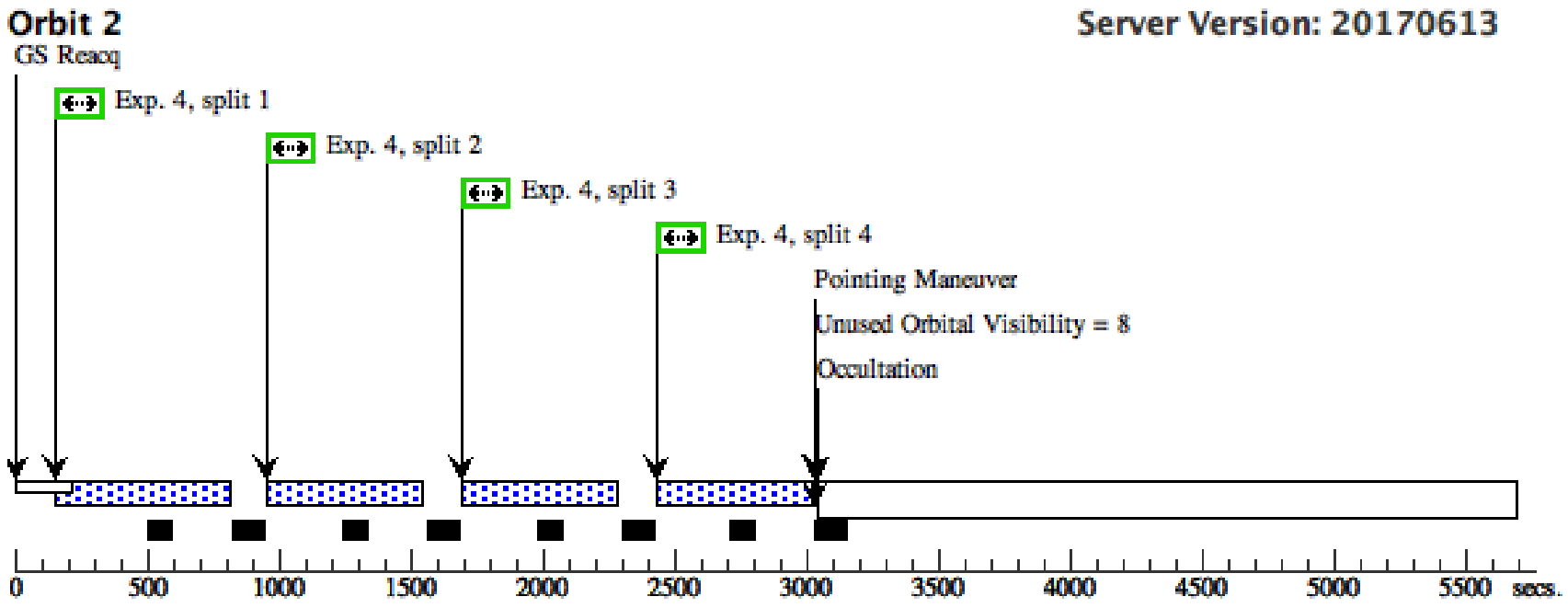
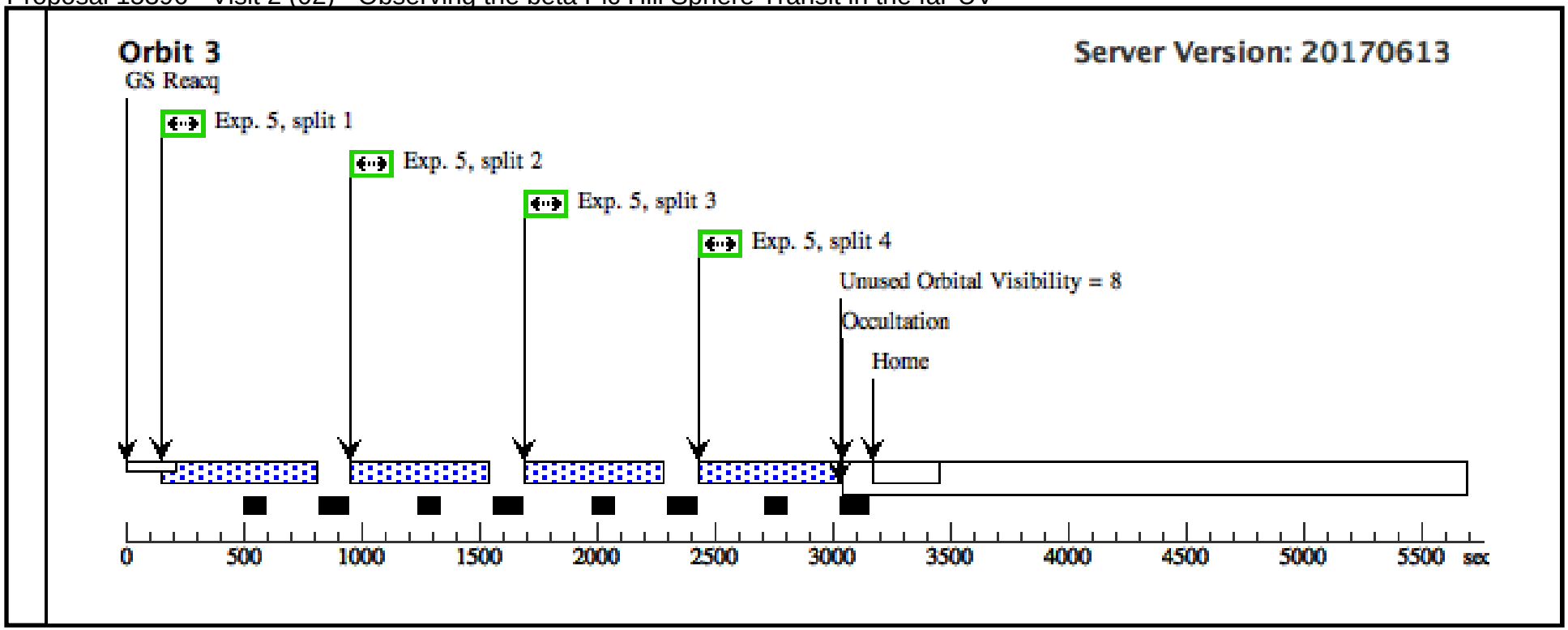
Orbit Structure




Orbit 2
Server Version: 20170613
GS Reacq
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Pointing Maneuver
Unused Orbital Visibility = 8
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20170613
GS Reacq
Exp. 5, split 1
Exp. 5, split 2
Exp. 5, split 3
Exp. 5, split 4
Unused Orbital Visibility = 8
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec