15305 - The Secret Lives of Cepheids: Completing the Picture with HST-COS Observations of the Nearest Classical Cepheids, Polaris and delta Cephei

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) -ALF-UMI	COS/FUV	1	29-Nov-2018 17:01:57.0	yes
02	(1) -ALF-UMI	COS/FUV	1	29-Nov-2018 17:01:59.0	yes
03	(1) -ALF-UMI	COS/FUV	1	29-Nov-2018 17:02:01.0	yes
04	(1) -ALF-UMI	COS/FUV	1	29-Nov-2018 17:02:03.0	yes
05	(2) -DEL-CEP	COS/FUV COS/NUV	4	29-Nov-2018 17:02:05.0	yes
Z2	(1) -ALF-UMI	COS/FUV	1	29-Nov-2018 17:02:06.0	yes

9 Total Orbits Used

ABSTRACT

Classical Cepheids, although well studied in terms of their cosmologically important Period-Luminosity Law, are proving to be increasingly complex and astrophysically intriguing in terms of atmospheric energetics. This proposal expands on data collected by us in previous cycles to probe Cepheid atmospheres, understand their heating mechanisms and answer important questions. Our previous COS FUV spectra revealed a wealth of 10,000-300,000K plasma emission lines, phase-locked with each Cepheid's pulsation periods, showing that a pulsation-driven heating mechanism is at work. To significantly expand the parameter space of the Cepheid sample, we propose four visits to the nearest and brightest Cepheid, Polaris. Only two COS spectra of Polaris were acquired previously. But we have now seen that Cepheids undergo fairly large FUV emission line variations (flux level differences of 20x and more). Observations of the ultra-low amplitude Polaris will offer remarkable insights into the effects that even minimal pulsations have on a cool supergiant atmosphere, especially when compared to full amplitude Cepheids and also non-pulsating supergiants in the instability strip. We have also recently proven that delta Cep is an X-ray variable, with a tight pulsation phase-range where the star's X-ray activity increases by over 4x. However, no COS spectra exist at this phase, which will be necessary to determine atmospheric densities and dynamics during the X-ray enhancement. When combined with our existing X-ray and FUV data set, the proposed COS data will advance a much deeper understanding of Cepheids and their atmospheric plasmas.

OBSERVING DESCRIPTION

We propose 1 HST-COS visit (4 consecutive orbits) of the prototype Classical Cepheid delta Cep and 4 HST-COS visits (1 orbit each) of Polaris. The new data for delta Cep will allow us to study atmospheric properties and dynamics, including line ratios and flow velocities, during the phase of enhanced X-ray activity previously observed by us with both Chandra and XMM. We propose that the COS visit be phase-constrained to occur at phase ~ 0.48 for delta Cep to ensure that we observe right at or near the peak of the short-lived X-ray maximum. Polaris is a very interesting target as, although it is a Cepheid, it undergoes minimal pulsations, with a velocity amplitude almost 10x smaller than delta Cep. Also, only two phases of Polaris' pulsation cycle have yet been covered with COS, and yet flux differences are already seen between the two spectra. The new observations will allow us to map out the atmospheric variability of a near-negligible pulsator and make much more detailed relations between the amplitude of pulsation velocities and such parameters as the extent of pulsation-driven heating (emission line fluxes), and velocity / turbulence / density changes within the line-forming plasmas (line shifts, profiles and ratios). Polaris can also serve as an important bridge between the larger amplitude Cepheids previously observed with COS and the non-pulsating, non-variable and Hybrid supergiants observed with both COS and STIS. Three of the new Polaris observations will be constrained to occur around the phase of minimum radius (0.8 phase), which is where the FUV emissions of all other

observed Cepheids have undergone rapid intensifications. We also request one "control" observation to occur at 0.25 phase, where the emissions should be quiet. This is to check whether any variations observed are linked to the pulsations of the Cepheid, or perhaps the result of a long-term activity cycle.

Visit

Proposal 15305, Visit 01, completed Thu Nov 29 22:02:07 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: Period 3.972433 D AND ZERO-PHASE HJD2455909.91

Diagnostics

(Visit 01) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

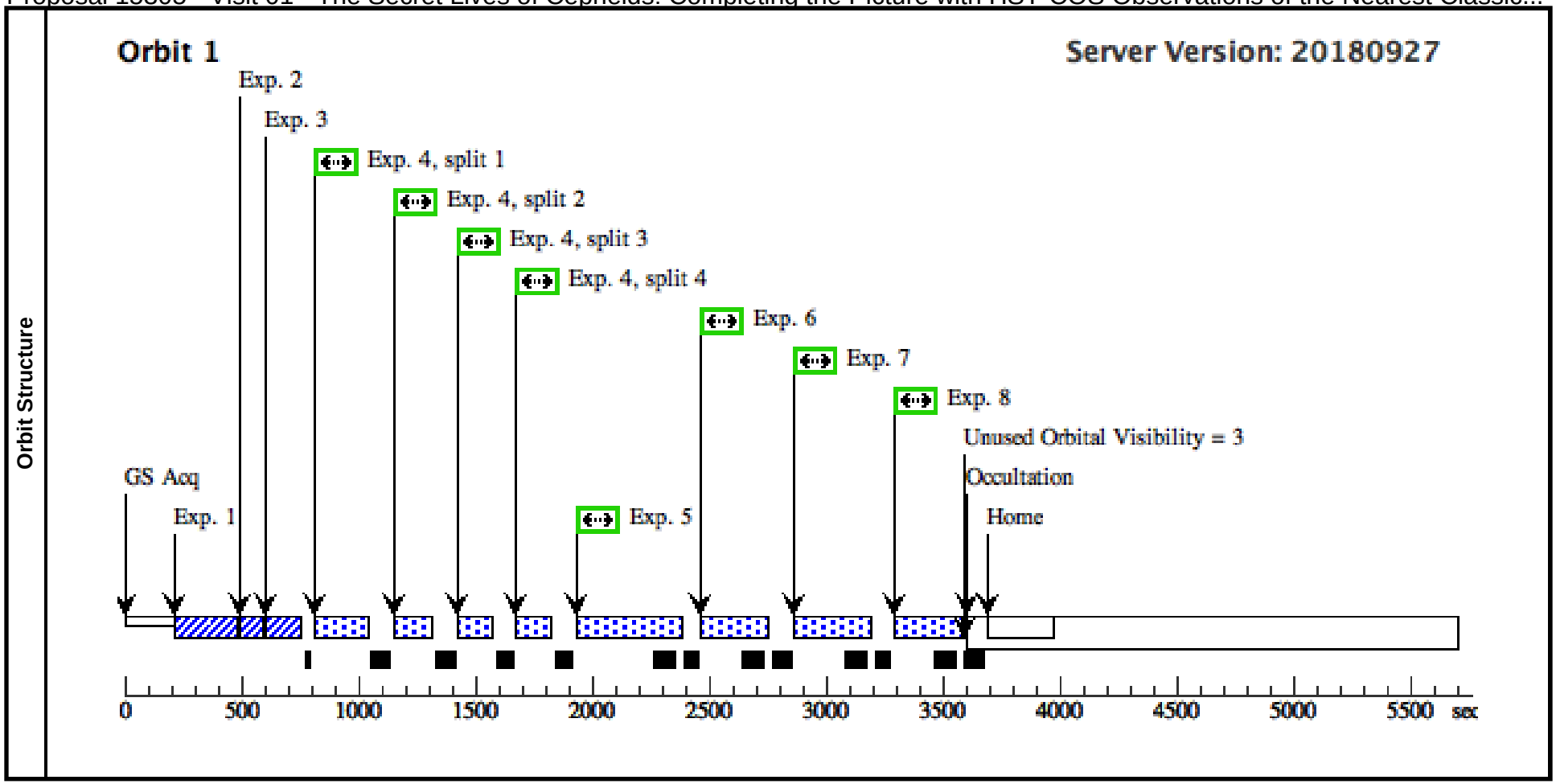
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-ALF-UMI	RA: 02 31 49.0946 (37.9545608d) Dec: +89 15 50.79 (89.26411d) Equinox: J2000	Proper Motion RA: 44.48 mas/yr Proper Motion Dec: -11.85 mas/yr Epoch of Position: 2000	V=2.02	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/SEARCH, PSA	G160M 1589 A	SCAN-SIZE=2; STEP-SIZE=1.767	PHASE 0.2 TO 0.3		1.1 Secs (1.1 Secs) *[==>]*	***[1]***
2	(COS.sa.101 3952)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKXD, PSA	G160M 1589 A				0.4 Secs (0.4 Secs) *[==>]*	***[1]***
3	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKD, PSA	G160M 1589 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			1.1 Secs (1.1 Secs) *[==>]*	***[1]***
4	(COS.sp.101 3947)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=150; FP-POS=ALL			1 Secs (420 Secs) *[==>110.0 Secs (Split 1)]* *[==>110.0 Secs (Split 2)]* *[==>100.0 Secs (Split 3)]* *[==>100.0 Secs (Split 4)]*	***[1]***
5	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=180			1 Secs (280 Secs) *[==>280.0 Secs]*	***[1]***
6	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=3			1 Secs (241 Secs) *[==>241.0 Secs]*	***[1]***
7	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=4			1 Secs (280 Secs) *[==>280.0 Secs]*	***[1]***
8	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=4			1 Secs (241 Secs) *[==>241.0 Secs]*	***[1]***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Exp. 3
Exp. 4, split 1
Exp. 4, split 2
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Exp. 4, split 4
Exp. 6
Exp. 7
Exp. 8
Unused Orbital Visibility = 3
Occultation
Home
GS Acq
Exp. 1
Exp. 5
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15305, Visit 02, failed Thu Nov 29 22:02:07 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: Period 3.972433 D AND ZERO-PHASE HJD2455909.91

Diagnostics

(Visit 02) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

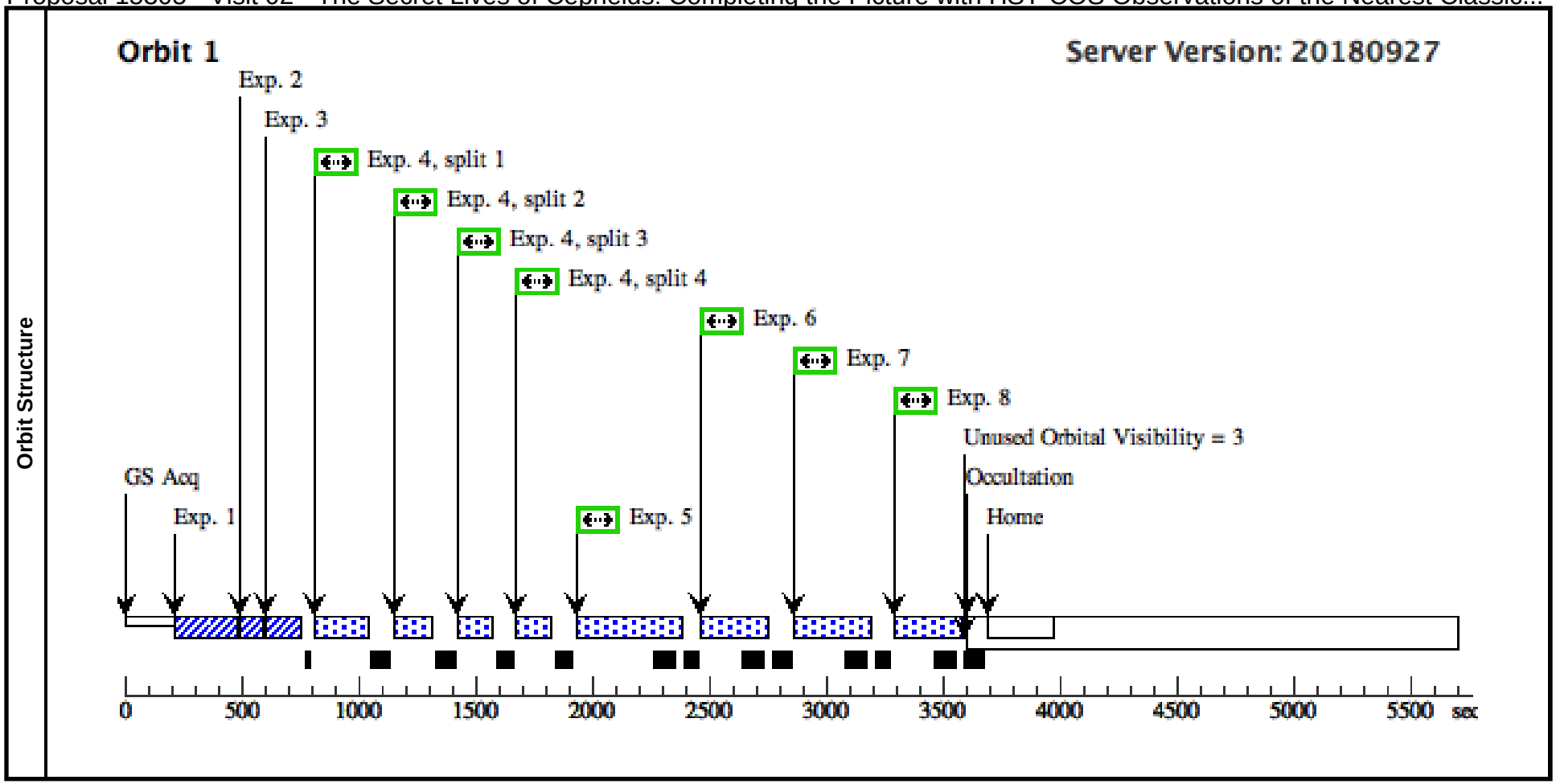
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-ALF-UMI	RA: 02 31 49.0946 (37.9545608d) Dec: +89 15 50.79 (89.26411d) Equinox: J2000	Proper Motion RA: 44.48 mas/yr Proper Motion Dec: -11.85 mas/yr Epoch of Position: 2000	V=2.02	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/SEARCH, PSA	G160M 1589 A	SCAN-SIZE=2; STEP-SIZE=1.767	PHASE 0.6 TO 0.7		1.1 Secs (1.1 Secs) *[==>]*	***[1]***
2	(COS.sa.101 3952)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKXD, PSA	G160M 1589 A				0.4 Secs (0.4 Secs) *[==>]*	***[1]***
3	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKD, PSA	G160M 1589 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			1.1 Secs (1.1 Secs) *[==>]*	***[1]***
4	(COS.sp.101 3947)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=150; FP-POS=ALL			1 Secs (420 Secs) *[==>110 Secs (Split 1)]* *[==>110 Secs (Split 2)]* *[==>100.0 Secs (Split 3)]* *[==>100.0 Secs (Split 4)]*	***[1]***
5	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=3			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
6	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=3			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***
7	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=4			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
8	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=4			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***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Exp. 3
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Exp. 4, split 4
Exp. 6
Exp. 7
Exp. 8
Unused Orbital Visibility = 3
Occultation
Home
GS Acq
Exp. 1
Exp. 5
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1500
2000
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4000
4500
5000
5500
sec

Visit

Proposal 15305, Visit 03, completed Thu Nov 29 22:02:07 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: Period 3.972433 D AND ZERO-PHASE HJD2455909.91

Diagnostics

(Visit 03) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

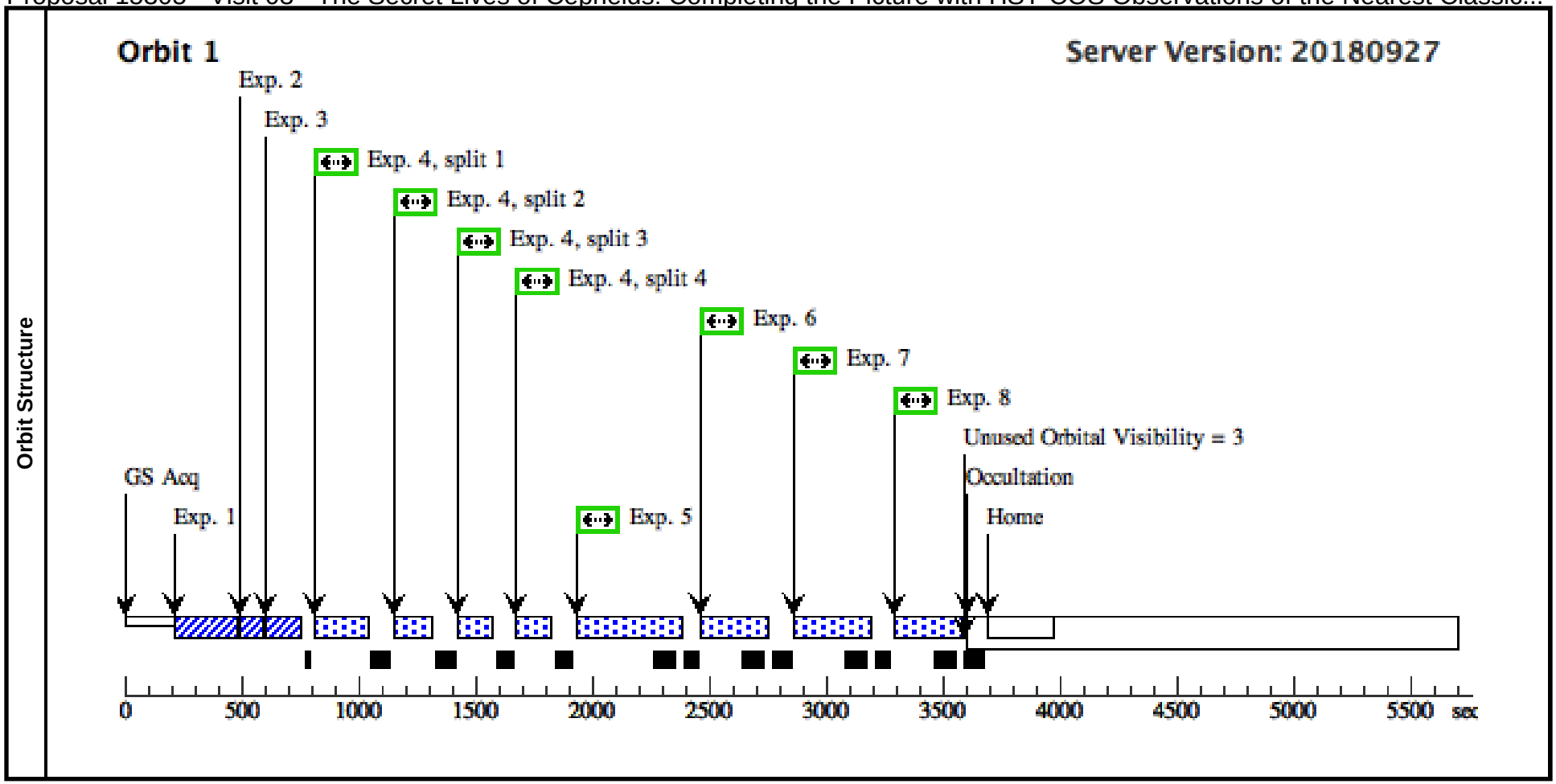
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-ALF-UMI	RA: 02 31 49.0946 (37.9545608d) Dec: +89 15 50.79 (89.26411d) Equinox: J2000	Proper Motion RA: 44.48 mas/yr Proper Motion Dec: -11.85 mas/yr Epoch of Position: 2000	V=2.02	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/SEARCH, PSA	G160M 1589 A	SCAN-SIZE=2; STEP-SIZE=1.767	PHASE 0.76 TO 0.82		1.1 Secs (1.1 Secs) *[==>]*	***[1]***
2	(COS.sa.101 3952)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKXD, PSA	G160M 1589 A				0.4 Secs (0.4 Secs) *[==>]*	***[1]***
3	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKD, PSA	G160M 1589 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			1.1 Secs (1.1 Secs) *[==>]*	***[1]***
4	(COS.sp.101 3947)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=150; FP-POS=ALL			1 Secs (420 Secs) *[==>110 Secs (Split 1)]* *[==>110 Secs (Split 2)]* *[==>100.0 Secs (Split 3)]* *[==>100.0 Secs (Split 4)]*	***[1]***
5	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=3			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
6	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=3			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***
7	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=4			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
8	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=4			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***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Exp. 4, split 3
Exp. 4, split 4
Exp. 6
Exp. 7
Exp. 8
Unused Orbital Visibility = 3
Occultation
Home
GS Acq
Exp. 1
Exp. 5
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sec

Visit

Proposal 15305, Visit 04, completed Thu Nov 29 22:02:08 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: Period 3.972433 D AND ZERO-PHASE HJD2455909.91

Diagnostics

(Visit 04) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

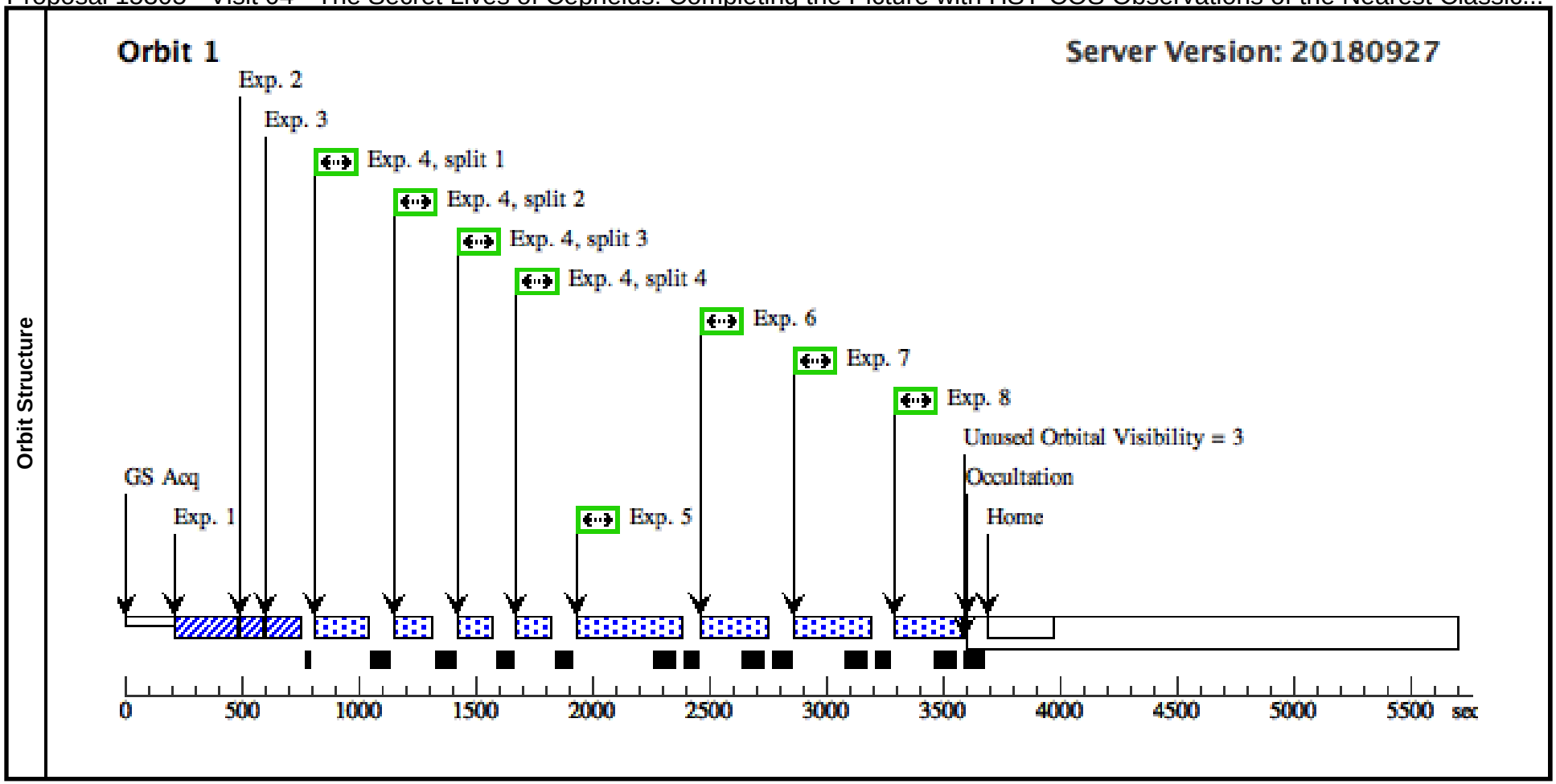
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-ALF-UMI	RA: 02 31 49.0946 (37.9545608d) Dec: +89 15 50.79 (89.26411d) Equinox: J2000	Proper Motion RA: 44.48 mas/yr Proper Motion Dec: -11.85 mas/yr Epoch of Position: 2000	V=2.02	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/SEARCH, PSA	G160M 1589 A	SCAN-SIZE=2; STEP-SIZE=1.767	PHASE 0.86 TO 0.94		1.1 Secs (1.1 Secs) *[==>]*	***[1]***
2	(COS.sa.101 3952)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKXD, PSA	G160M 1589 A				0.4 Secs (0.4 Secs) *[==>]*	***[1]***
3	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKD, PSA	G160M 1589 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			1.1 Secs (1.1 Secs) *[==>]*	***[1]***
4	(COS.sp.101 3947)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=150; FP-POS=ALL			1 Secs (420 Secs) *[==>110 Secs (Split 1)]* *[==>110 Secs (Split 2)]* *[==>100.0 Secs (Split 3)]* *[==>100.0 Secs (Split 4)]*	***[1]***
5	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=3			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
6	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=3			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***
7	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=4			1 Secs (280 Secs) *[==>280 Secs]*	***[1]***
8	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=4			1 Secs (241 Secs) *[==>241 Secs]*	***[1]***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Exp. 6
Exp. 7
Exp. 8
Unused Orbital Visibility = 3
Occultation
Home
GS Acq
Exp. 1
Exp. 5
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Visit

Proposal 15305, Visit 05, completed Thu Nov 29 22:02:08 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: Period 5.366341 D AND ZERO-PHASE HJD2450102.86

Diagnostics

(Visit 05) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

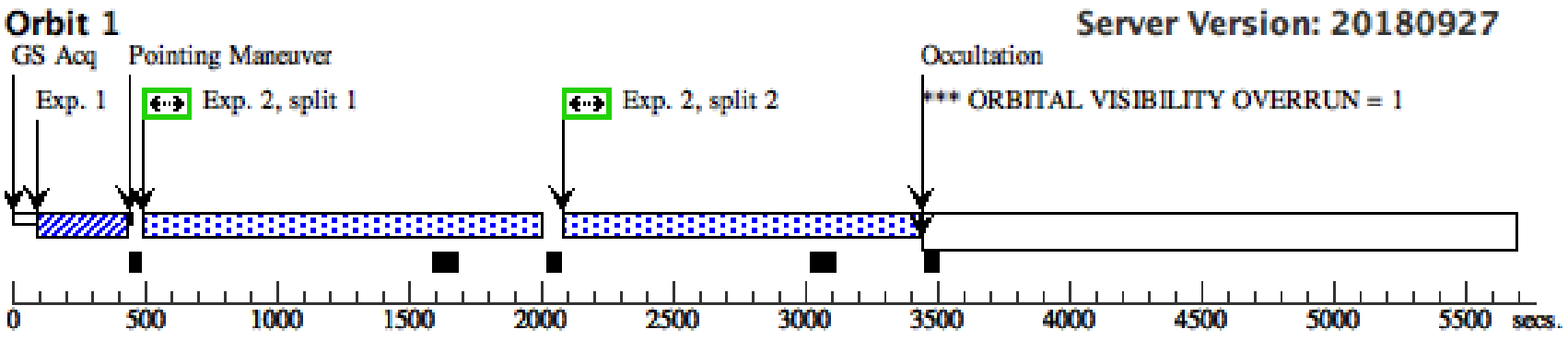
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	-DEL-CEP	RA: 22 29 10.2650 (337.2927708d)	Proper Motion RA: 15.35 mas/yr	V=3.75	Reference Frame: ICRS
		Dec: +58 24 54.71 (58.41520d)	Proper Motion Dec: 3.52 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

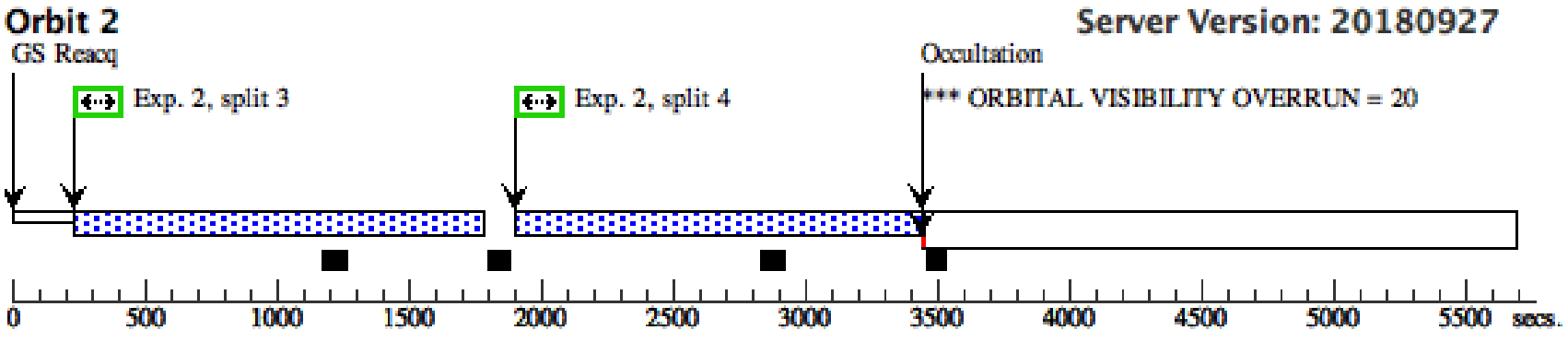
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

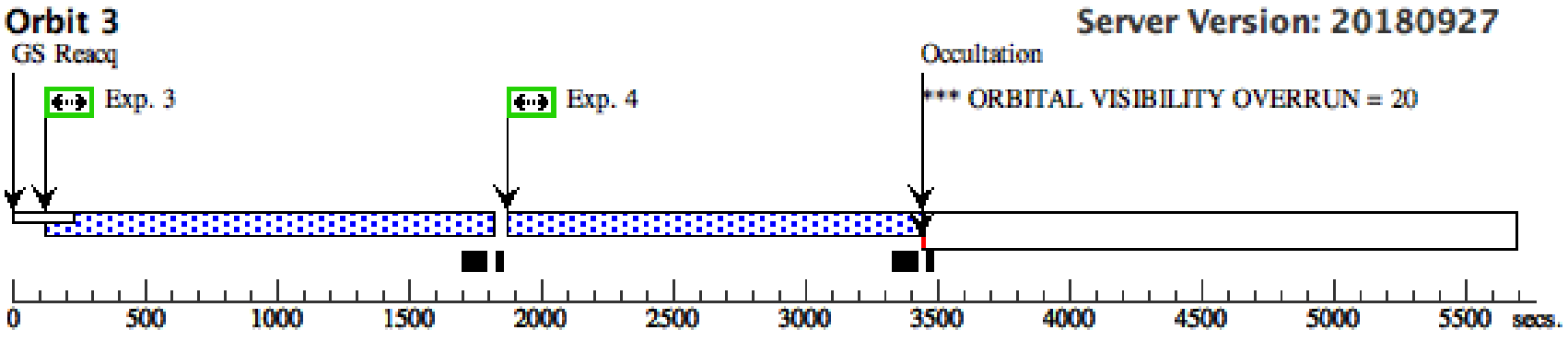
Exposures

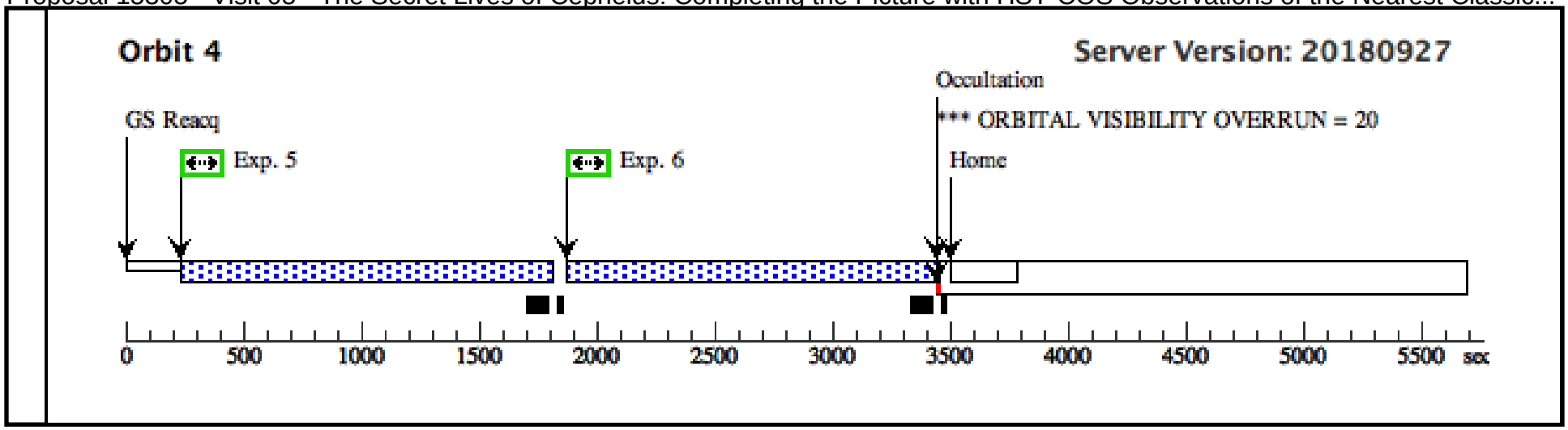
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1013983)	(2) -DEL-CEP	COS/NUV, ACQ/IMAGE, BOA	MIRRORB		PHASE 0.46 TO 0.49		16.1 Secs (16.1 Secs)	
								[==>]	***[1]***
2	(COS.sp.1013984)	(2) -DEL-CEP	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=900; FP-POS=ALL			1000 Secs (5589 Secs)	
								[==>1294.0 Secs (Split 1)]	***[1]***
								[==>1294.0 Secs (Split 2)]	
								[==>1501.0 Secs (Split 3)]	***[2]***
								[==>1500.0 Secs (Split 4)]	
3	(COS.sp.1013985)	(2) -DEL-CEP	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1430; FP-POS=3			1000 Secs (1530 Secs)	
								[==>1530.0 Secs]	***[3]***
4	(COS.sp.1013985)	(2) -DEL-CEP	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1429; FP-POS=3			1000 Secs (1529 Secs)	
								[==>1529.0 Secs]	***[3]***
5	(COS.sp.1013985)	(2) -DEL-CEP	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1431; FP-POS=4			1000 Secs (1531 Secs)	
								[==>1531.0 Secs]	***[4]***
6	(COS.sp.1013985)	(2) -DEL-CEP	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1430; FP-POS=4			1000 Secs (1530 Secs)	
								[==>1530.0 Secs]	***[4]***

Orbit Structure








Orbit 4
Server Version: 20180927
Occultation
GS Reacq
*** ORBITAL VISIBILITY OVERRUN = 20
Exp. 5
Exp. 6
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15305, HOPR (Z2) Thu Nov 29 22:02:08 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV

Special Requirements: Period 3.972433 D AND ZERO-PHASE HJD2455909.91

Diagnostics

(HOPR (Z2)) Warning (Form): For the best data quality, it is strongly recommended that the maximum number of allowed FP-POS positions is used when observing at a given COS CENWAVE setting. See full description for details.

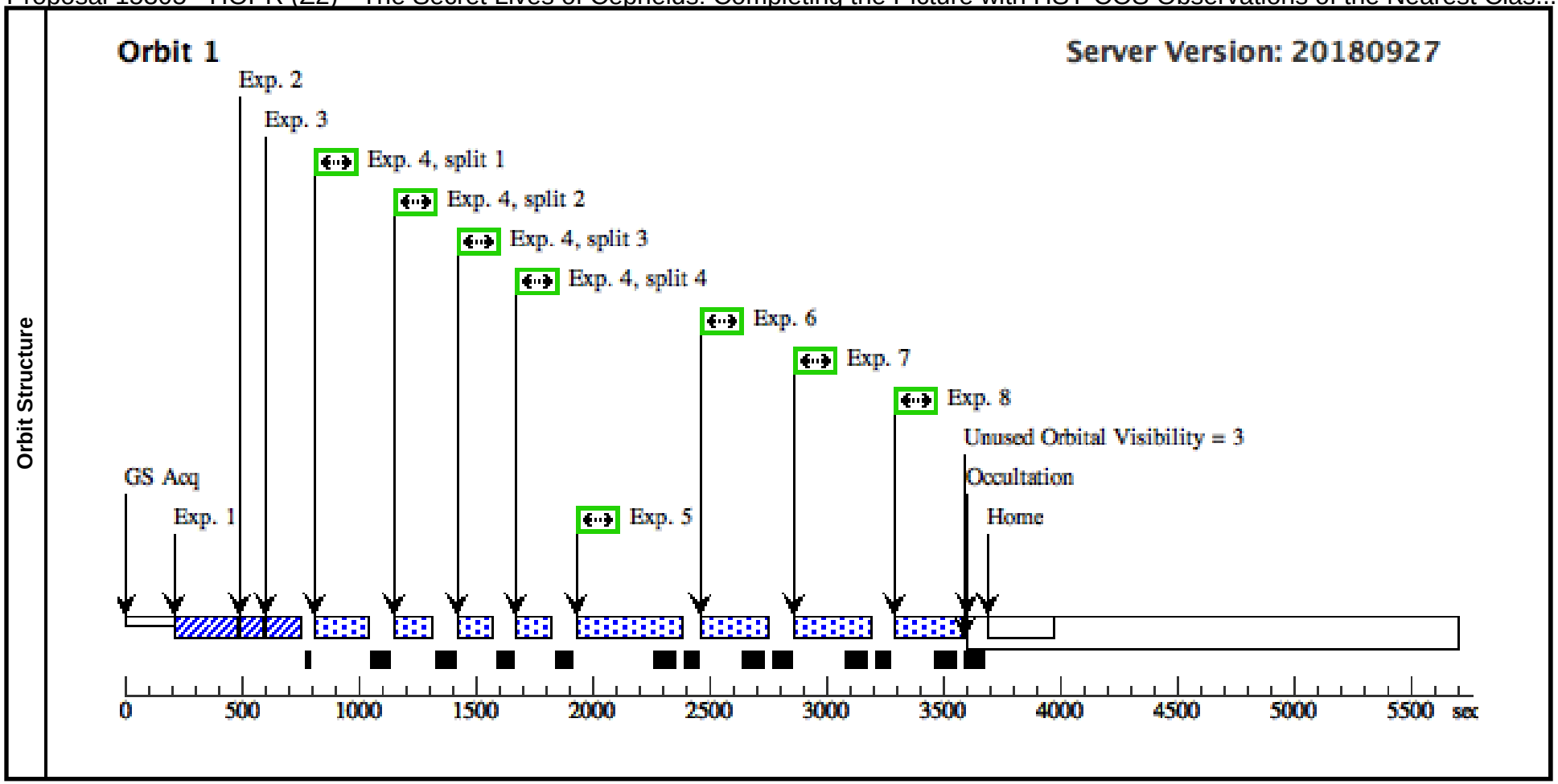
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	-ALF-UMI	RA: 02 31 49.0946 (37.9545608d)	Proper Motion RA: 44.48 mas/yr	V=2.02	Reference Frame: ICRS
		Dec: +89 15 50.79 (89.26411d)	Proper Motion Dec: -11.85 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[CEPHEID, F3-F9, PULSATING VARIABLE]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/SEARCH, PSA	G160M 1589 A	SCAN-SIZE=2; STEP-SIZE=1.767	PHASE 0.6 TO 0.7		1.1 Secs (1.1 Secs)	
								[==>]	***[1]***
2	(COS.sa.101 3952)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKXD, PSA	G160M 1589 A				0.4 Secs (0.4 Secs)	
								[==>]	***[1]***
3	(COS.sa.101 3954)	(1) -ALF-UMI	COS/FUV, ACQ/PEAKD, PSA	G160M 1589 A	NUM-POS=5; STEP-SIZE=0.9; CENTER=FLUX-WT-FLR			1.1 Secs (1.1 Secs)	
								[==>]	***[1]***
4	(COS.sp.101 3947)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=150; FP-POS=ALL			1 Secs (420 Secs)	
								[==>110 Secs (Split 1)] *[==>110 Secs (Split 2)]* *[==>100.0 Secs (Split 3)]* *[==>100.0 Secs (Split 4)]*	***[1]***
5	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=3			1 Secs (280 Secs)	
								[==>280 Secs]	***[1]***
6	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=3			1 Secs (241 Secs)	
								[==>241 Secs]	***[1]***
7	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=180; FP-POS=4			1 Secs (280 Secs)	
								[==>280 Secs]	***[1]***
8	(COS.sp.101 3944)	(1) -ALF-UMI	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=141; FP-POS=4			1 Secs (241 Secs)	
								[==>241 Secs]	***[1]***


Orbit Structure
Orbit 1
Server Version: 20180927
Exp. 2
Exp. 3
Exp. 4, split 1
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Exp. 6
Exp. 7
Exp. 8
Unused Orbital Visibility = 3
Occultation
Home
GS Acq
Exp. 1
Exp. 5
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec