15916 - Exocometary gas inventories at the epoch of volatile delivery

Cycle: 27, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Luca Matra (PI) (Contact)	**Smithsonian Institution Astrophysical Observatory**	**luca.matra@cfa.harvard.edu**
Dr. Aki Roberge (CoI)	NASA Goddard Space Flight Center	aki.roberge@nasa.gov
Dr. Seth Redfield (CoI)	Wesleyan University	sredfield@wesleyan.edu
Dr. Karin Oberg (CoI)	Harvard University	koberg@cfa.harvard.edu
Dr. Meredith Hughes (CoI)	Wesleyan University	amhughes@wesleyan.edu
Dr. David Wilner (CoI)	Smithsonian Institution Astrophysical Observatory	dwilner@cfa.harvard.edu
Dr. ANTONIO HALES (CoI)	Associated Universities, Inc.	ahales@alma.cl

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(2) HD110058	COS/FUV	3	03-Oct-2019 16:00:47.0	yes
19	(2) HD110058	COS/FUV	3	03-Oct-2019 16:00:49.0	yes
20	(2) HD110058	COS/FUV	3	03-Oct-2019 16:00:50.0	yes
21	(2) HD110058	COS/FUV	3	03-Oct-2019 16:00:51.0	yes
05	(1) HD131488	COS/FUV	1	03-Oct-2019 16:00:52.0	yes
22	(1) HD131488	COS/FUV	1	03-Oct-2019 16:00:53.0	yes
23	(1) HD131488	COS/FUV	1	03-Oct-2019 16:00:54.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
08	(2) HD110058	STIS/CCD STIS/FUV-MAMA	3	03-Oct-2019 16:00:55.0	yes
09	(1) HD131488	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	3	03-Oct-2019 16:00:57.0	yes
10	(2) HD110058	STIS/CCD STIS/NUV-MAMA	2	03-Oct-2019 16:01:00.0	yes
11	(2) HD110058	STIS/CCD STIS/NUV-MAMA	1	03-Oct-2019 16:01:01.0	yes

24 Total Orbits Used

ABSTRACT

The presence of exocometary gas in young (10-100 Myr) debris disks presents a unique opportunity to probe the composition of exocomets during the late stages of terrestrial planet formation. This is the evolutionary stage when ice-rich impacts are proposed to change the volatile environment of terrestrial planets, setting the stage for prebiotic chemistry.

In these young exocometary belts, high concentrations of debris result in frequent collisions and release of molecular gas, which rapidly photodissociates to produce atomic gas. Atomic inventories can only be comprehensively probed at UV wavelengths with HST, in absorption against the stellar background, within systems that are viewed edge-on.

We propose a UV chemical survey of gas released in two newly discovered, 15-16 Myr old exocometary belts around A stars HD110058 and HD131488. These are ideal targets as they are edge-on, rich in molecular gas based on CO emission detected by ALMA, and present circumstellar gas absorption at optical wavelengths. Exploiting the ALMA-HST synergy will allow us to put better constraints on the composition of these belts than ALMA observations alone can provide.

We will use COS and STIS to measure abundance ratios such as C/O, C/N and C/Fe and further model the elemental composition of exocometary belts. These ratios will be compared to exoplanets, young disks and Solar System comets, providing a missing link in the study of planet formation and physical-chemical evolution.

Finally, splitting our observations into several visits will enable us to look for star-grazing exocomets, providing evidence that inward scattering, and potentially volatile delivery, is ongoing in these systems.

OBSERVING DESCRIPTION

Our goal is to carry out a UV spectroscopic line survey of the edge-on exocometary belts around A stars HD110058 and HD131488, detecting all species of interest (N I, O I, C I, C II, C IV, CO, Mg I, Mg II, Al I, Al II, Si I, Si II, S I, Fe I and Fe II) seen in absorption against the stellar continuum. The shortest wavelength region we will observe in the FUV covers strong resonantlines of N I(1200A), O I(1302A)and C II(1335A). So far, these have been found to be the most abundant species in exocometary gas belts (e.g. Roberge et al., 2006; Wilson et al., 2019). Being the species of interest with the shortest wavelength transitions (where the stars are faintest), N I (1200A) COS observations drive our sensitivity and hence orbit request. Our calculations show that, even if carbon is depleted by a factor of 10 compared to the famous exocometary gas host beta Pictoris, the strength of the N I line ensures that we can detect nitrogen in our targets even for C/N ratios as high as found for the bulk silicate Earth (C/N~49). We note that atomic hydrogen may be abundant if water is being released with the observed CO (and then rapidly dissociated) from the exocomets. However, Lyman series detection of H I is prevented by severe airglow contamination, so we deem hydrogen detection unfeasible.

Given the steeply decreasing stellar spectrum at shorter FUV wavelengths, meeting our sensitivity requirement to detect these transitions requires use of COS below ~1500A. Therefore,we request use of the COS G130M grating,centered at 1222A, covering resonant lines of C I, C II, O I, N I and Si II. Longward of 1500A, STIS is able to detect transitions of interest, and we prefer it to COS given its advantage in resolving power (R=114000 vs R=14000 for COS) which is crucial to extract information on the absorption profiles and enable accurate modelling of the lower resolution COS spectra. At the velocity resolutions of ~2.6 (STIS) and ~21 km/s (COS), we expect that lines will be unresolved, unless heavily saturated, in which case we will use weaker, optically thin lines of the same species to constrain the gas column densities. The fact that lines will be unresolved is acceptable since we are most interested in column density, rather than line broadening measurements; the gas excitation temperature will instead be retrieved from comparison of absorption lines originating from different low-lying energy levels (available e.g. for C I, C II, O I and CO, as shown in Roberge et al., 2000).

Note that the resolution of STIS is also sufficient to separate circumstellar absorption lines from any absorption lines originating from the local interstellar medium (ISM). Optical spectroscopy indicates that potential ISM lines lie ~11.5 and ~7.2 km/s away from the stellar velocities of HD110058 and HD131488 (Rebollido et al., 2018). While COS will not be able to resolve these from circumstellar absorption, for the affected species we will be able to establish the contribution of the circumstellar component using a combination of 1) absorption lines from energy states above ground covered by COS, which are not expected from ISM gas, 2) other absorption lines from the same species observed at higher resolution by STIS, and 3) lines from other species expected to have similar ISM abundances observed by STIS.

We request four STIS spectral settings, all observed with the narrow spectroscopic slit (0.2"x0.09") recommended for the highest spectral resolution gratings and for minimizing air- glow contamination. In the FUV, we will use the E140H grating (i1562) to cover the CO A-X 0-0 (1544A), 1-0(1510A) and 2-0(1478A) bands, as well as resonant lines of C I(1560A,1657A), C IV (1548A) and Al II (1671A). In the NUV, we will use the E230H grating in 3 settings (c1763, i2463, and i2912) to cover the region between 1600 and 3000 A containing resonant transitions of remaining species S I Al I, Si I, Fe I, Fe II, Mg I and Mg II.

To predict UV stellar fluxes, since the shortest wavelength measurement available for both stars is U band, we ran a fit to the UBV, JHK, and Gaia G, BP and RP photometry using MESA evolutionary tracks through the isochrones python code. We use the best fit parameters (including Teff and AV as reported here in APT) to derive a probability distribution for predicted GALEX FUV magnitudes. To double-check, we also ran a fit using the pysynphot package which employs the same Castelli and Kurucz models as the ETC. While the Castelli-Kurucz best-fit Teffs are cooler by a few hundred K, the fits are also less extincted compared to the MESA results, leading overall to a similar predicted distribution of GALEX FUV magnitudes. Note that the spectral types reported by SIMBAD (A0V and A1V) come from a very old spectral catalog from optical plates measurements, and likely less reliable than the photometric fits carried out here.

We will also search for variability on day/week timescales in the line wings, originating from star-grazing exocomets. We request 4 (3) separate COS visits for HD110058 (HD131488) and 2 separate STIS visits covering the 1763 A setting for HD110058; these visits will be separated by 3-14 days from one another.

Visit

Proposal 15916, COS FUV HD110058 (01), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: COS FUV Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

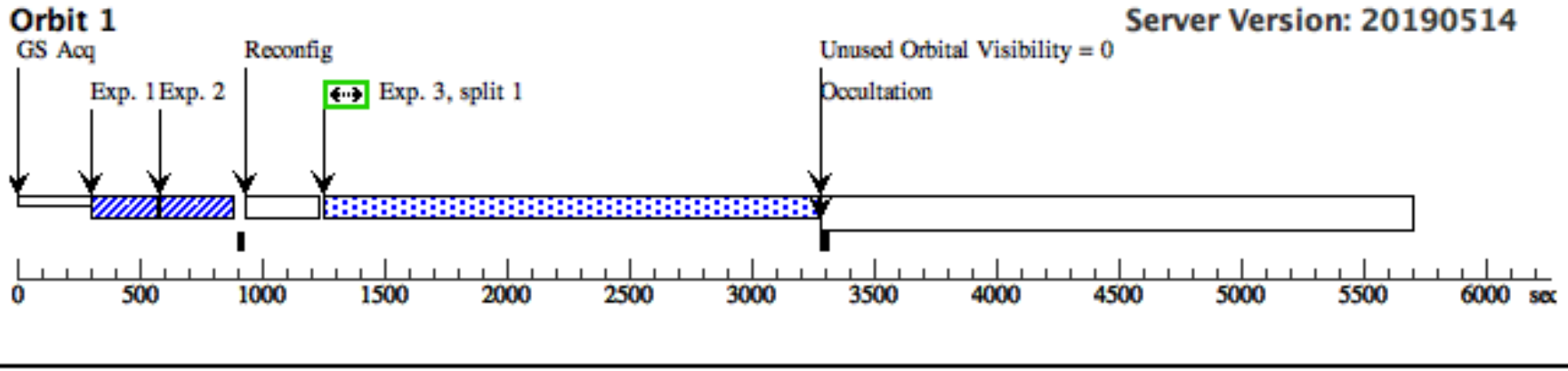
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

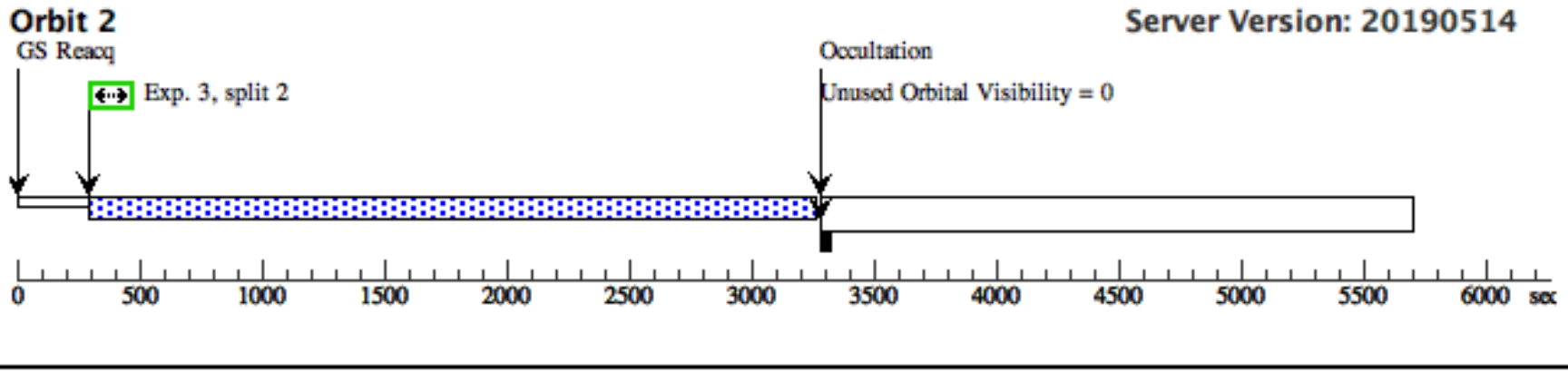
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

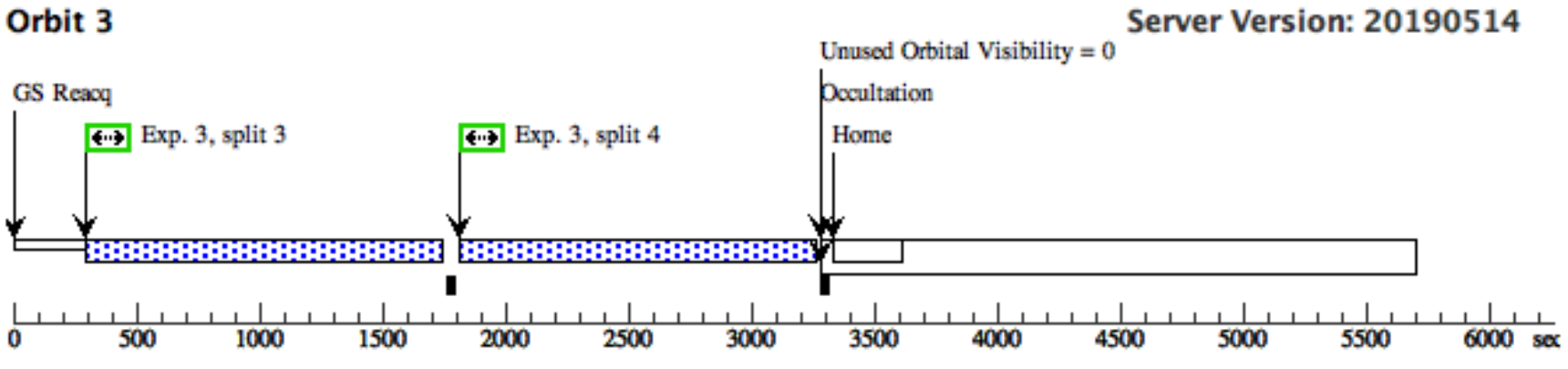
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			30 Secs (30 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAKD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			30 Secs (30 Secs) *[==>]*	 ***[1]***
3	TIME-TAG (1367985)	(2) HD110058	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=12184			1600 Secs (7588 Secs) *[==>1865.0 Secs (Split 1)]* *[==>2919 Secs (Split 2)]* *[==>1402 Secs (Split 3)]* *[==>1402.0 Secs (Split 4)]*	 ***[1]*** ***[2]*** ***[3]***

Orbit Structure







Visit

Proposal 15916, COS FUV HD110058 (19), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: AFTER 01 BY 3 D TO 14 D

Comments: COS FUV Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

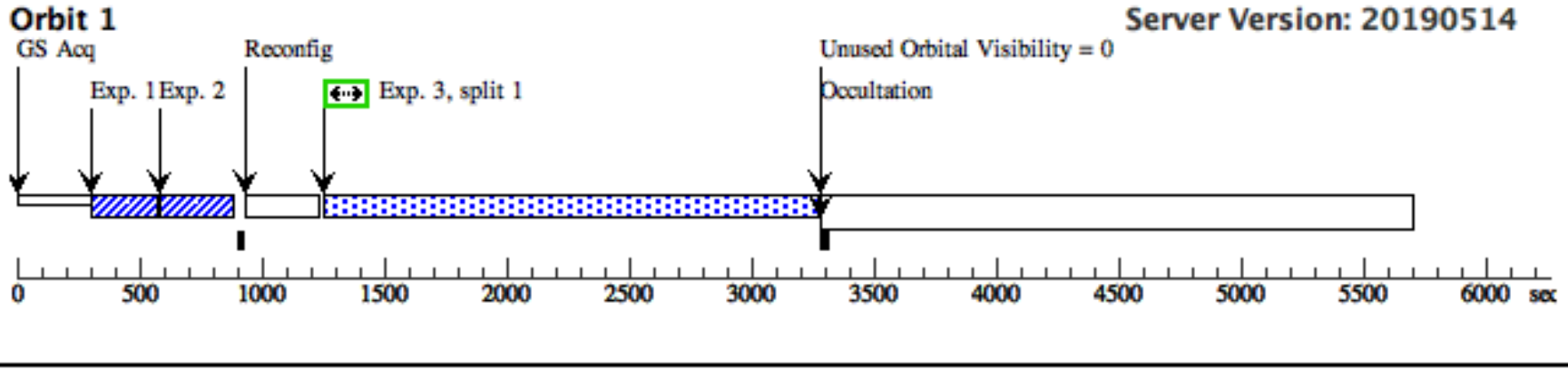
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

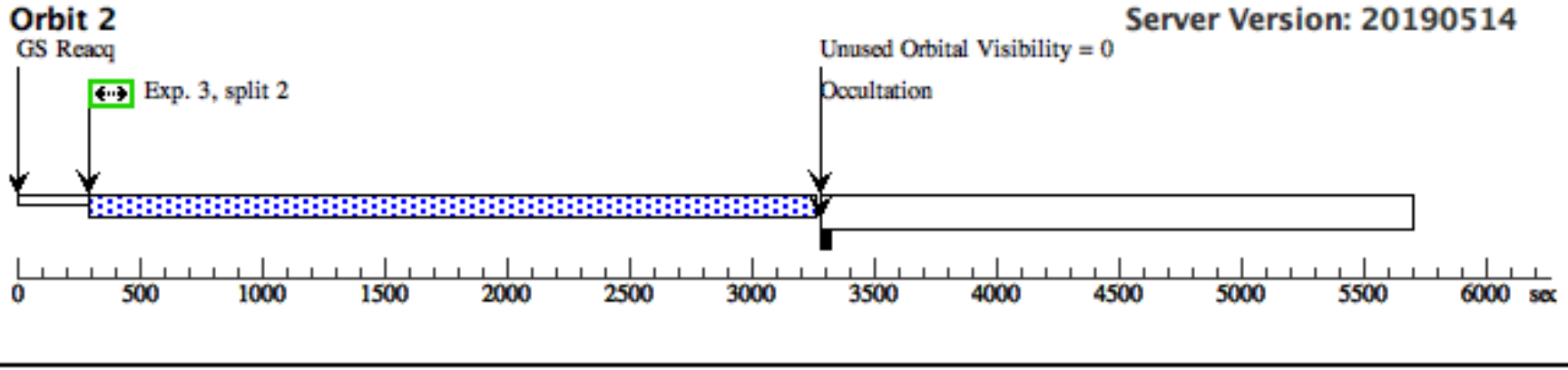
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

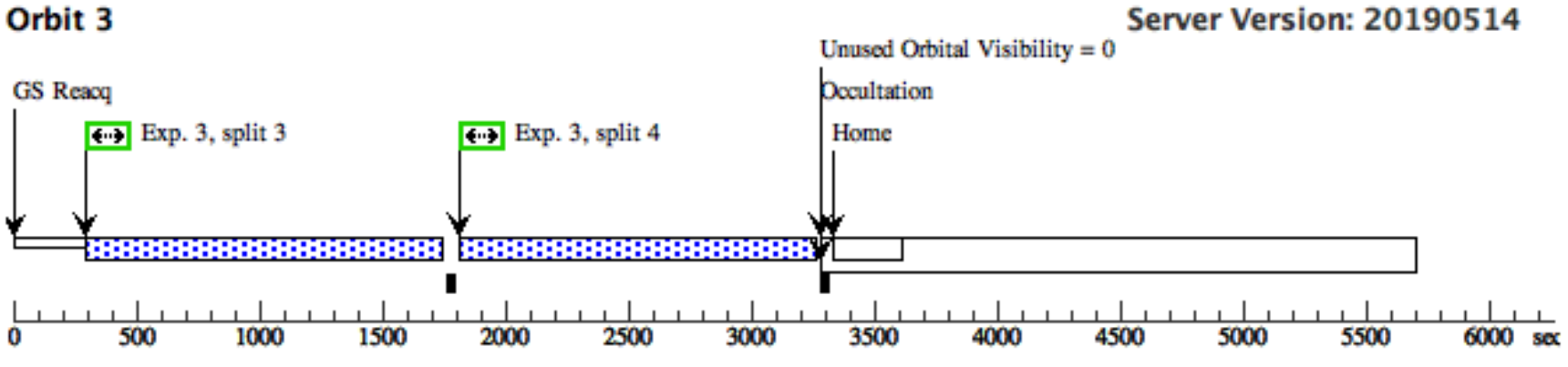
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			30 Secs (30 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAKD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			30 Secs (30 Secs) *[==>]*	 ***[1]***
3	TIME-TAG (1367985)	(2) HD110058	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=12184			1600 Secs (7588 Secs) *[==>1865.0 Secs (Split 1)]* *[==>2919.0 Secs (Split 2)]* *[==>1402.0 Secs (Split 3)]* *[==>1402.0 Secs (Split 4)]*	 ***[1]*** ***[2]*** ***[3]***

Orbit Structure







Visit

Proposal 15916, COS FUV HD110058 (20), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: AFTER 19 BY 3 D TO 14 D

Comments: COS FUV Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

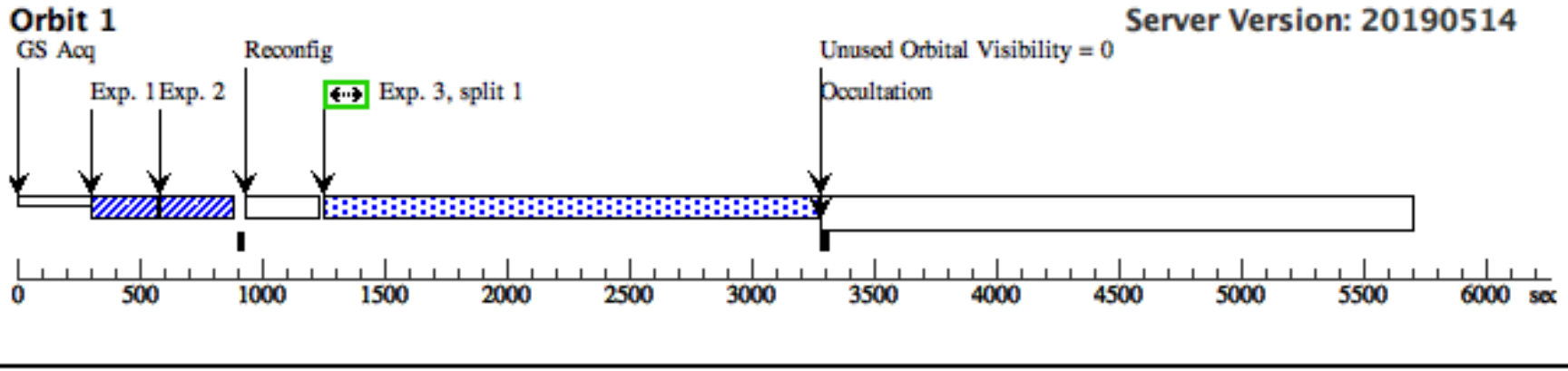
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

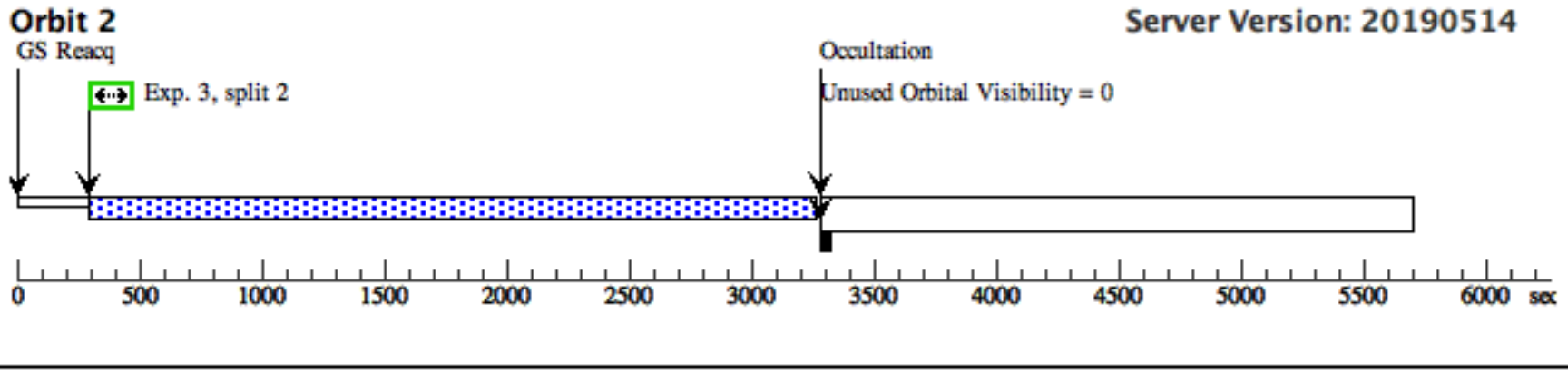
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

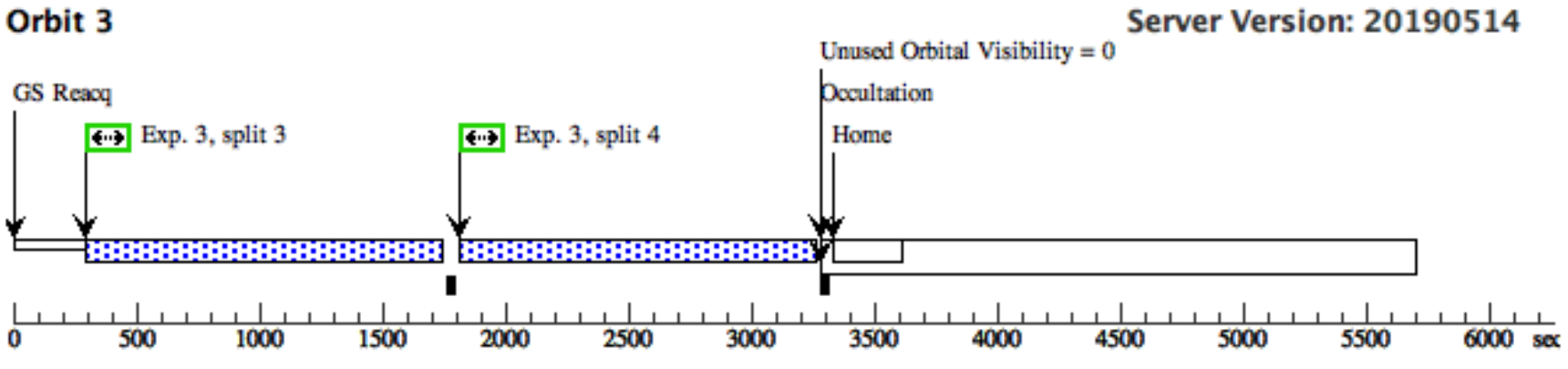
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			30 Secs (30 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAKD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			30 Secs (30 Secs) *[==>]*	 ***[1]***
3	TIME-TAG (1367985)	(2) HD110058	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=12184			1600 Secs (7588 Secs) *[==>1865.0 Secs (Split 1)]* *[==>2919.0 Secs (Split 2)]* *[==>1402.0 Secs (Split 3)]* *[==>1402.0 Secs (Split 4)]*	 ***[1]*** ***[2]*** ***[3]***

Orbit Structure







Visit

Proposal 15916, COS FUV HD110058 (21), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: AFTER 20 BY 3 D TO 14 D

Comments: COS FUV Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

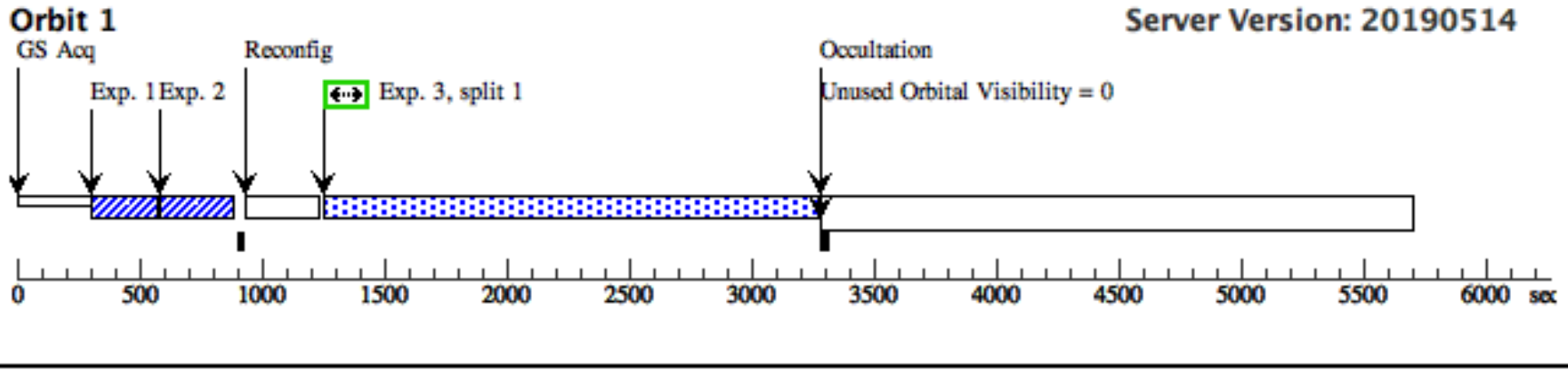
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

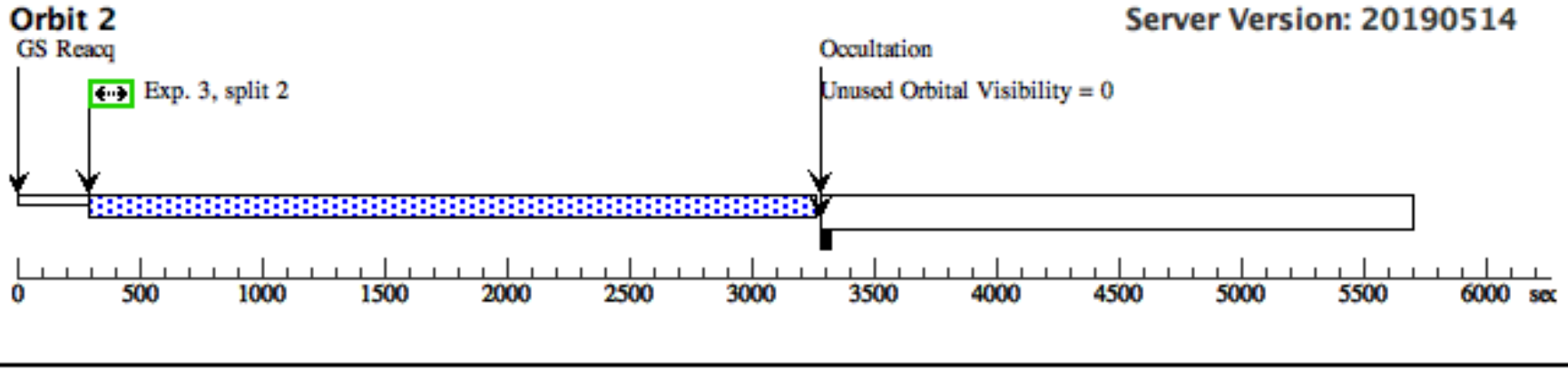
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

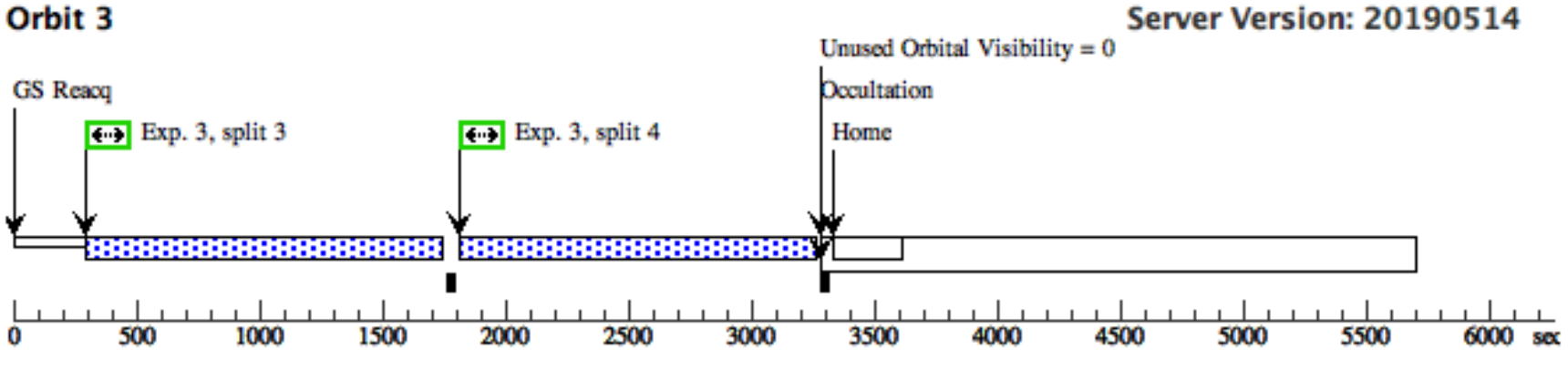
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			30 Secs (30 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAKD (1367982)	(2) HD110058	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			30 Secs (30 Secs) *[==>]*	 ***[1]***
3	TIME-TAG (1367985)	(2) HD110058	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=12184			1600 Secs (7588 Secs) *[==>1865.0 Secs (Split 1)]* *[==>2919.0 Secs (Split 2)]* *[==>1402.0 Secs (Split 3)]* *[==>1402.0 Secs (Split 4)]*	 ***[1]*** ***[2]*** ***[3]***

Orbit Structure







Visit

Proposal 15916, COS FUV HD131488 (05), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: COS FUV Observation of Target HD131488

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -18.154 mas/yr Proper Motion Dec: -22.293 mas/yr Parallax: 0.0064676" Epoch of Position: 2015.5	V=8.012+/-0.013 Johnson U = 8.22+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8750(-160, +170) K, A_V=0.09(-0.05, +0.05), predicted GALEX FUV: 11.9(-0.3, + 0.3) AB mag	Reference Frame: ICRS

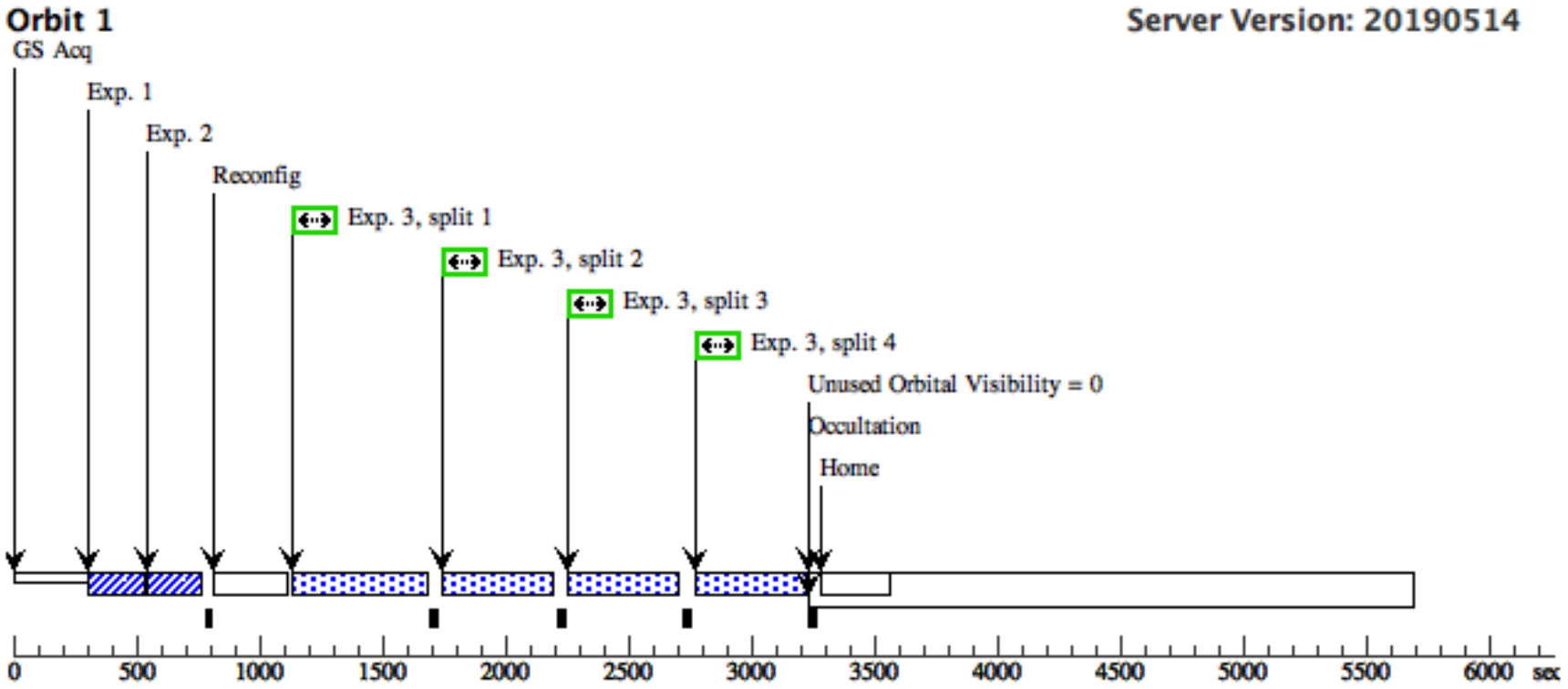
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8750 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8750 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			15 Secs (15 Secs) *[==>]*	*[1]*
2	ACQ/PEAKD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			15 Secs (15 Secs) *[==>]*	*[1]*
3	TIME-TAG (1368206)	(1) HD131488	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=3225			425 Secs (1593 Secs) *[==>398.0 Secs (Split 1)]* *[==>398.0 Secs (Split 2)]* *[==>398.0 Secs (Split 3)]* *[==>399.0 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15916, COS FUV HD131488 (22), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: AFTER 05 BY 3 D TO 14 D

Comments: COS FUV Observation of Target HD131488

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -18.154 mas/yr Proper Motion Dec: -22.293 mas/yr Parallax: 0.0064676" Epoch of Position: 2015.5	V=8.012+/-0.013 Johnson U = 8.22+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8750(-160, +170) K, A_V=0.09(-0.05, +0.05), predicted GALEX FUV: 11.9(-0.3, + 0.3) AB mag	Reference Frame: ICRS

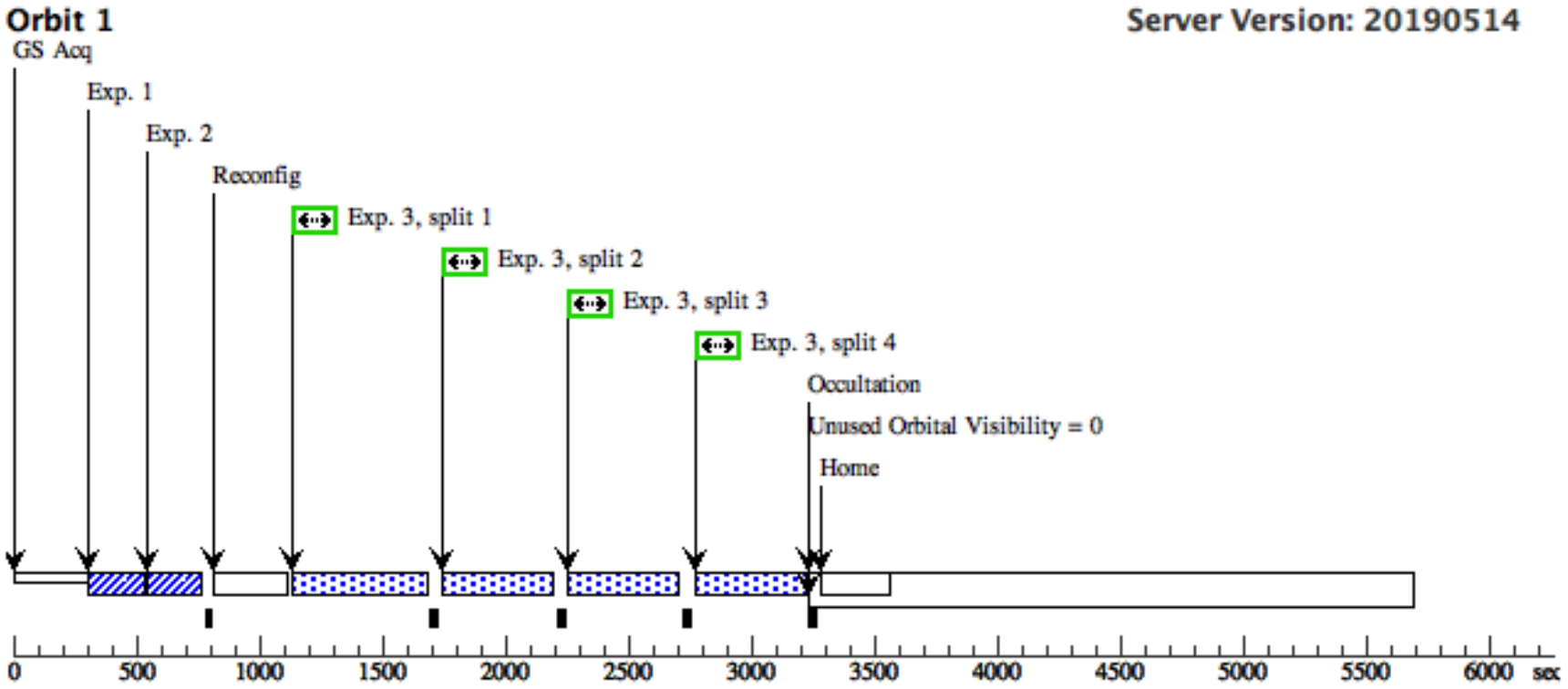
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8750 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8750 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			15 Secs (15 Secs) *[==>]*	*[1]*
2	ACQ/PEAKD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			15 Secs (15 Secs) *[==>]*	*[1]*
3	TIME-TAG (1368206)	(1) HD131488	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=3225			425 Secs (1593 Secs) *[==>398.0 Secs (Split 1)]* *[==>398.0 Secs (Split 2)]* *[==>398.0 Secs (Split 3)]* *[==>399.0 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15916, COS FUV HD131488 (23), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: AFTER 22 BY 3 D TO 14 D

Comments: COS FUV Observation of Target HD131488

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -18.154 mas/yr Proper Motion Dec: -22.293 mas/yr Parallax: 0.0064676" Epoch of Position: 2015.5	V=8.012+/-0.013 Johnson U = 8.22+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8750(-160, +170) K, A_V=0.09(-0.05, +0.05), predicted GALEX FUV: 11.9(-0.3, + 0.3) AB mag	Reference Frame: ICRS

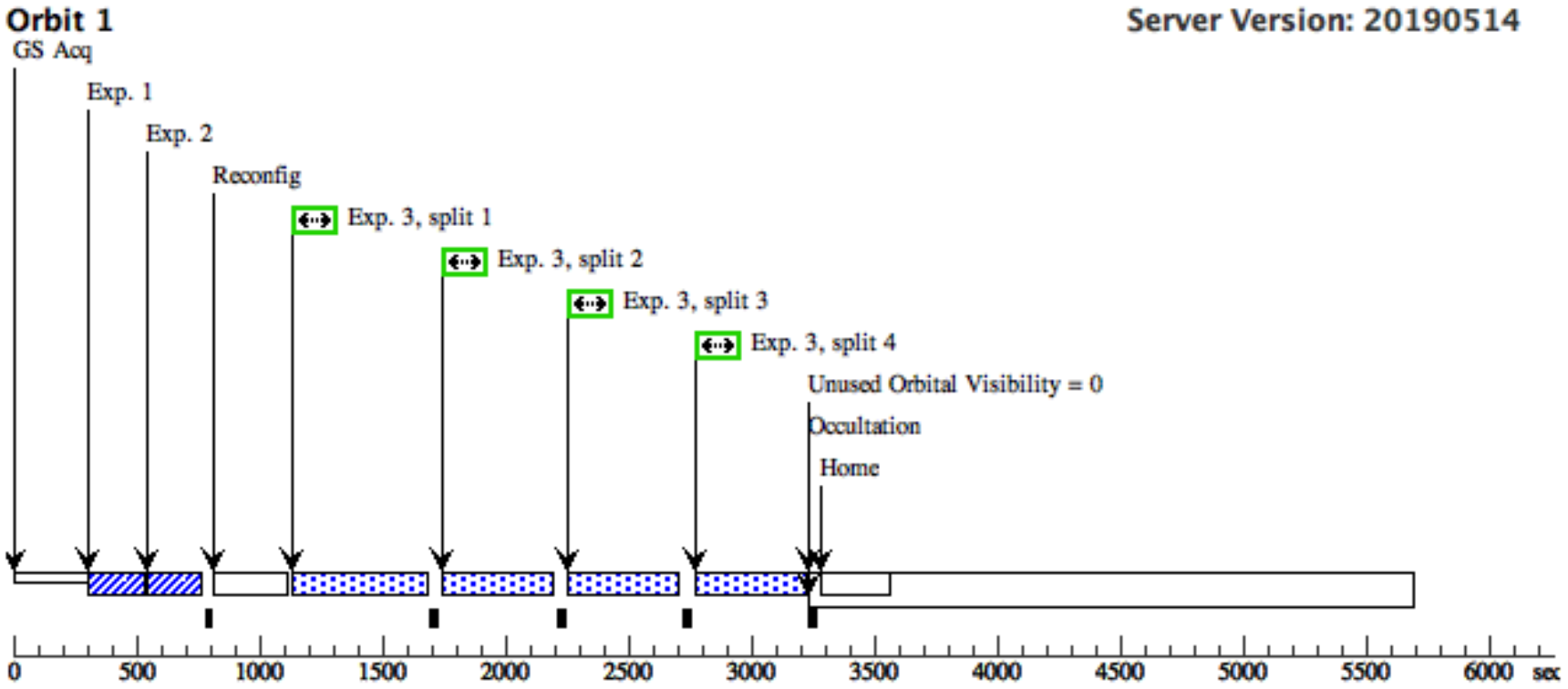
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8750 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8750 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/PEAKXD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKXD, PSA	G130M 1327 A	SEGMENT=A			15 Secs (15 Secs) *[==>]*	*[1]*
2	ACQ/PEAKD (1368212)	(1) HD131488	COS/FUV, ACQ/PEAKD, PSA	G130M 1327 A	SEGMENT=A; STEP-SIZE=0.9; NUM-POS=5; CENTER=FLUX-WT-FLR			15 Secs (15 Secs) *[==>]*	*[1]*
3	TIME-TAG (1368206)	(1) HD131488	COS/FUV, TIME-TAG, PSA	G130M 1222 A	SEGMENT=BOTH; FLASH=YES; FP-POS=ALL; BUFFER-TIME=3225			425 Secs (1593 Secs) *[==>398.0 Secs (Split 1)]* *[==>398.0 Secs (Split 2)]* *[==>398.0 Secs (Split 3)]* *[==>399.0 Secs (Split 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15916, STIS FUV HD110058 (08), implementation Thu Oct 03 20:01:02 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Comments: STIS FUV Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

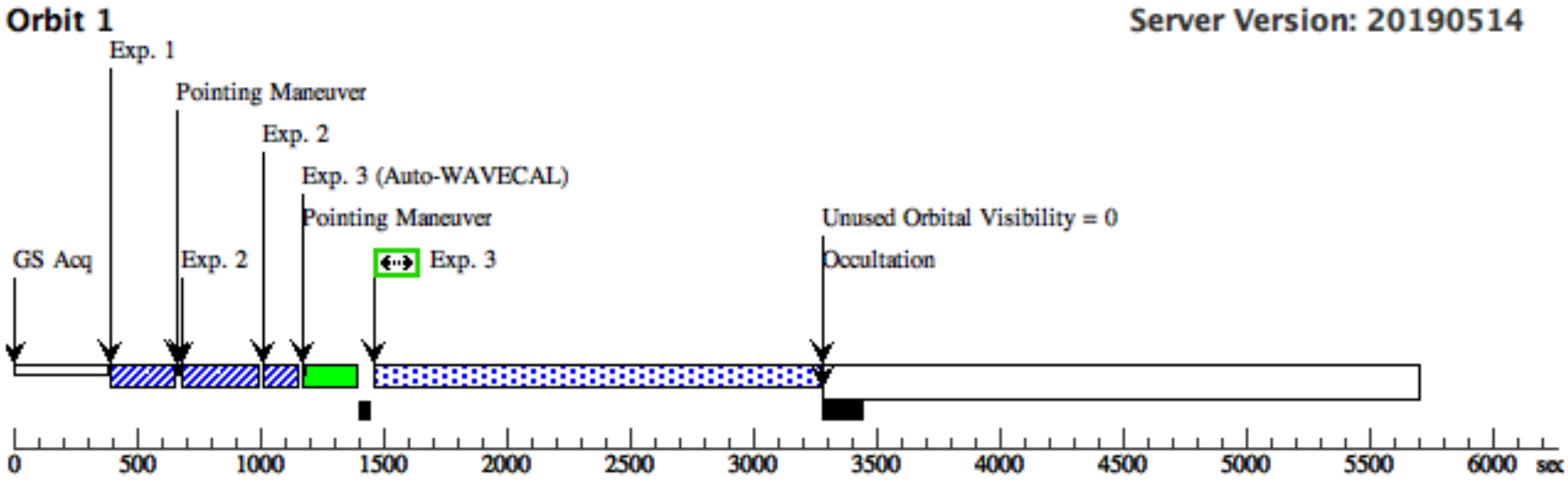
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

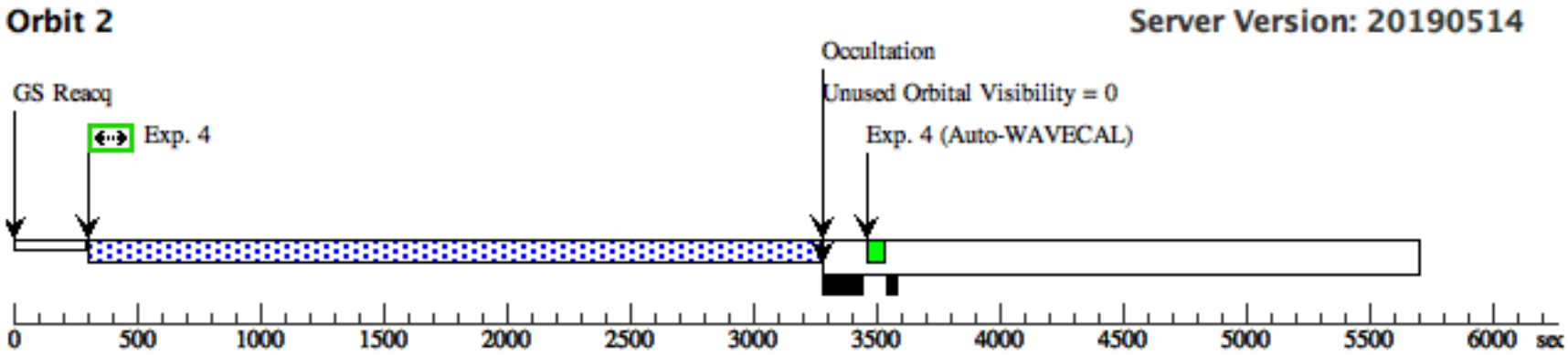
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

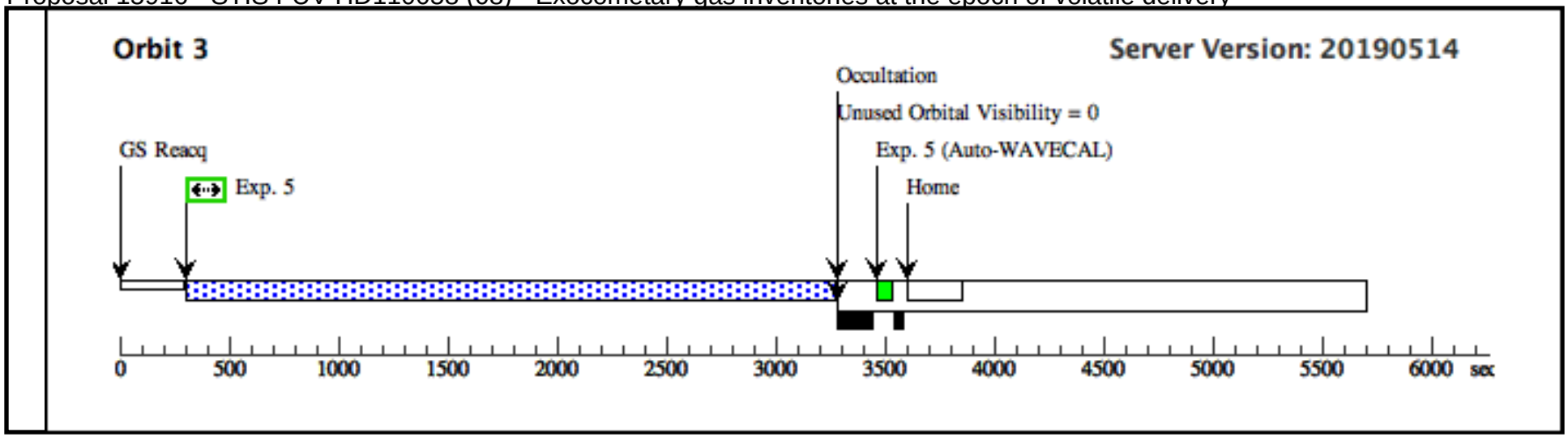
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (1368238)	(2) HD110058	STIS/CCD, ACQ, F28X50OII	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAK 0.2x0.05ND (1368273)	(2) HD110058	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
3	TIME-TAG (1368389)	(2) HD110058	STIS/FUV-MAMA, TIME-TAG, 0.2X0.09	E140H 1562 A	BUFFER-TIME=898			1795 Secs (1795 Secs) *[==>]*	 ***[1]***
4	TIME-TAG (1368389)	(2) HD110058	STIS/FUV-MAMA, TIME-TAG, 0.2X0.09	E140H 1562 A	BUFFER-TIME=1477			2953 Secs (2953 Secs) *[==>]*	 ***[2]***
5	TIME-TAG (1368389)	(2) HD110058	STIS/FUV-MAMA, TIME-TAG, 0.2X0.09	E140H 1562 A	BUFFER-TIME=1477			2953 Secs (2953 Secs) *[==>]*	 ***[3]***

Orbit Structure






Orbit 3
Server Version: 20190514
Occultation
Unused Orbital Visibility = 0
GS Reacq
Exp. 5
Exp. 5 (Auto-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15916, STIS FUV+NUV/1763+2463+2912 HD131488 (09), implementation Thu Oct 03 20:01:03 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Comments: STIS FUV and NUV/1763+2463+2912 Observation of Target HD131488

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD131488	RA: 14 55 8.0036 (223.7833483d) Dec: -41 07 13.75 (-41.12049d) Equinox: J2000	Proper Motion RA: -18.154 mas/yr Proper Motion Dec: -22.293 mas/yr Parallax: 0.0064676" Epoch of Position: 2015.5	V=8.012+/-0.013 Johnson U = 8.22+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8750(-160, +170) K, A_V=0.09(-0.05, +0.05), predicted GALEX FUV: 11.9(-0.3, + 0.3) AB mag	Reference Frame: ICRS

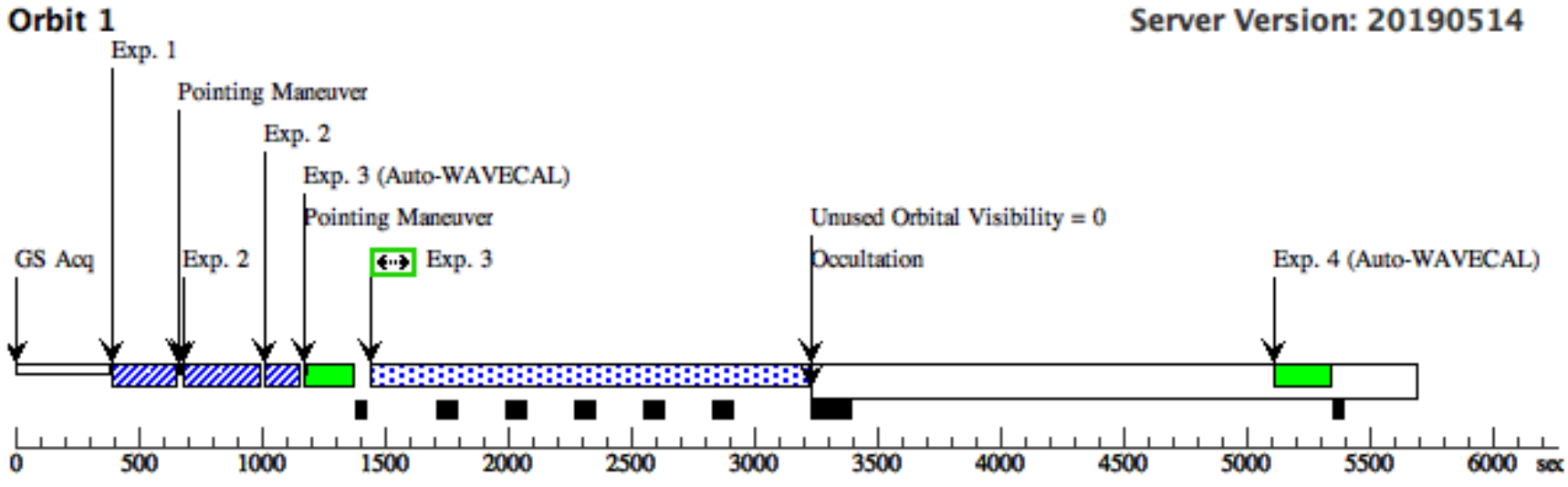
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8750 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

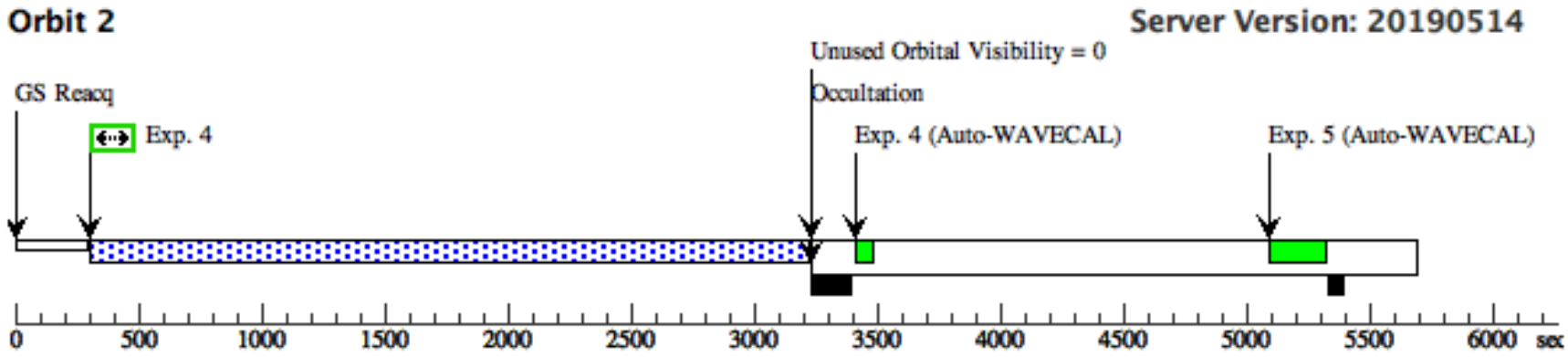
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8750 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

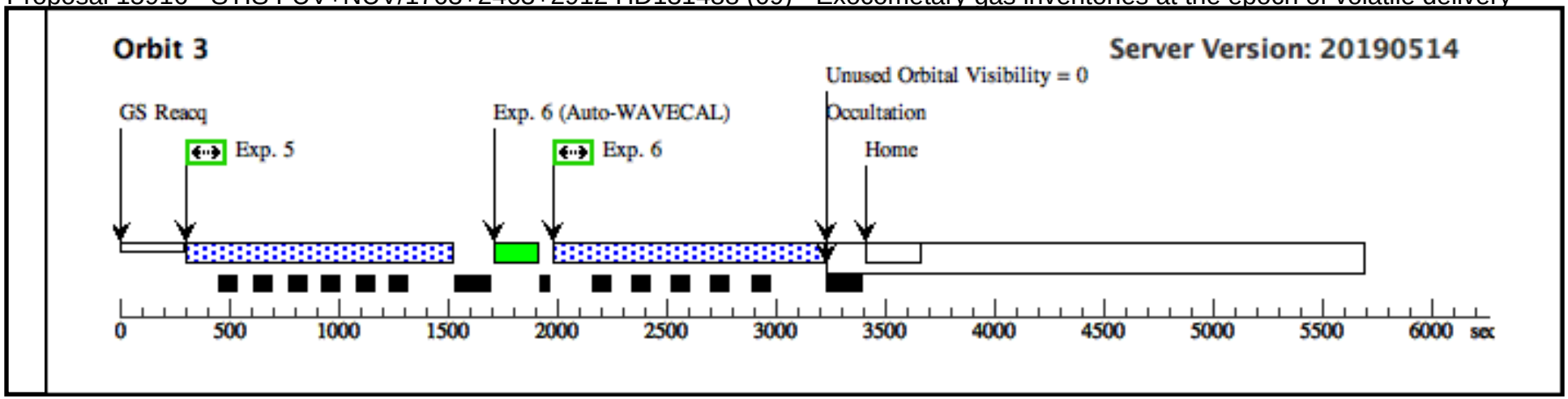
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (1368284)	(1) HD131488	STIS/CCD, ACQ, F28X50OII	MIRROR				1 Secs (1 Secs) *[==>]*	*[1]*
2	ACQ/PEAK 0.2x0.05ND (1368282)	(1) HD131488	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1 Secs (1 Secs) *[==>]*	*[1]*
3	NUV/1763 TIME-TAG (1368386)	(1) HD131488	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 1763 A	BUFFER-TIME=278			1768 Secs (1768 Secs) *[==>]*	*[1]*
4	FUV TIME-TAG (1368385)	(1) HD131488	STIS/FUV-MAMA, TIME-TAG, 0.2X0.09	E140H 1562 A	BUFFER-TIME=1453			2906 Secs (2906 Secs) *[==>]*	*[2]*
5	NUV/2463 TIME-TAG (1368401)	(1) HD131488	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 2463 A	BUFFER-TIME=155			1203 Secs (1203 Secs) *[==>]*	*[3]*
6	NUV/2912 TIME-TAG (1368400)	(1) HD131488	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 2912 A	BUFFER-TIME=181			1226 Secs (1226 Secs) *[==>]*	*[3]*

Orbit Structure






Orbit 3
Server Version: 20190514
Unused Orbital Visibility = 0
GS Reacq
Exp. 5
Exp. 6 (Auto-WAVECAL)
Exp. 6
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 15916, STIS NUV/1763+2463+2912 HD110058 (10), implementation Thu Oct 03 20:01:03 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: (none)

Comments: STIS NUV/1763+2463+2912 Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

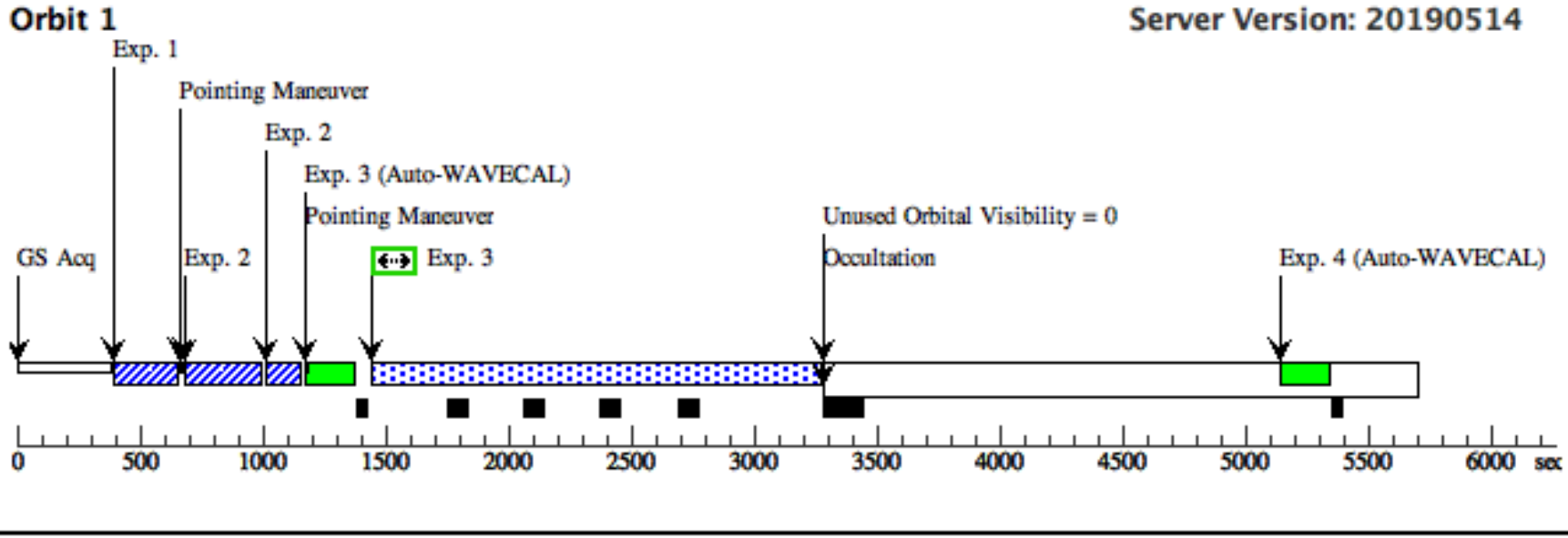
Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

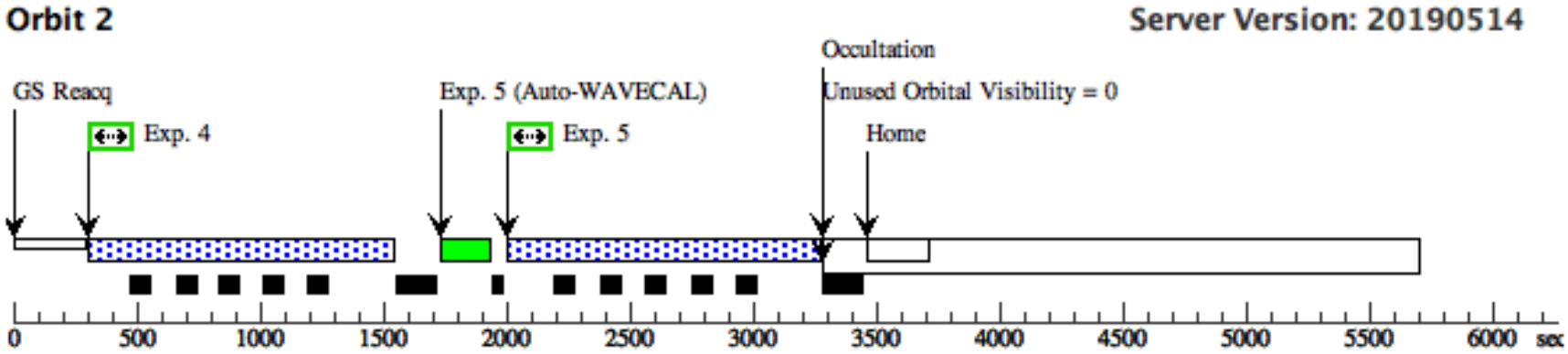
For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (1368238)	(2) HD110058	STIS/CCD, ACQ, F28X50OII	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAK 0.2x0.05ND (1368273)	(2) HD110058	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
3	NUV/1763 TIME-TAG (1368394)	(2) HD110058	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 1763 A	BUFFER-TIME=312			1815 Secs (1815 Secs) *[==>]*	 ***[1]***
4	NUV/2463 TIME-TAG (1368398)	(2) HD110058	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 2463 A	BUFFER-TIME=178			1226 Secs (1226 Secs) *[==>]*	 ***[2]***
5	NUV/2912 TIME-TAG (1368399)	(2) HD110058	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 2912 A	BUFFER-TIME=186			1250 Secs (1250 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 15916, STIS NUV/1763 HD110058 (11), implementation Thu Oct 03 20:01:03 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: AFTER 10 BY 3 D TO 14 D

Comments: STIS NUV/1763 Observation of Target HD110058

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD110058	RA: 12 39 46.1491 (189.9422879d) Dec: -49 11 55.78 (-49.19883d) Equinox: J2000	Proper Motion RA: -29.644 mas/yr Proper Motion Dec: -14.890 mas/yr Parallax: 0.0076932" Epoch of Position: 2015.5	V=7.992+/-0.011 Johnson U = 8.18+-0.02 mag. Model fits to UBV, Gaia G, BP, RP, 2MASS J, H, K yield: Teff = 8330(-200, +510) K, A_V=0.13(-0.07, +0.16), predicted GALEX FUV: 12.8(-0.9, + 0.4) AB mag	Reference Frame: ICRS

Comments: See Proposal Description from how stellar parameters were derived.
For ETC calculations for wavelength settings below ~1800 A, we use the GALEX FUV AB mags predicted by models (reported under 'Other Fluxes' above) and a Castelli and Kurucz ETC spectrum with a Teff of 8250 K.
The ETC calculations attached to this APT proposal assume the median of the predicted GALEX FUV AB mag distribution.
We also ran calculations with the brightest GALEX FUV AB magnitude in the predicted distribution (~10.5), which cleared the ETC with no issues.

For ETC calculations for wavelength settings above ~1800 A, we use the measured U-band magnitude reported here and a Castelli and Kurucz Teff of 8250 K.
Category=STAR
Description=[A0-A3 V-IV, CIRCUMSTELLAR MATTER, DISK]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ (1368238)	(2) HD110058	STIS/CCD, ACQ, F28X50OII	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
2	ACQ/PEAK 0.2x0.05ND (1368273)	(2) HD110058	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
3	NUV/1763 TIME-TAG (1368394)	(2) HD110058	STIS/NUV-MAMA, TIME-TAG, 0.2X0.09	E230H 1763 A	BUFFER-TIME=312			1815 Secs (1815 Secs) *[==>]*	 ***[1]***

Orbit Structure