



# 15839 - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

Cycle: 27, Proposal Category: GO

(UV Initiative, JWST Initiative)

(Availability Mode: SUPPORTED)

## INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Dr. Odette Fabiola Toloza Castillo (PI) (Contact )</b>	<b>Universidad Tecnica Federico Santa Maria</b>	<b>odette.toloza@usm.cl</b>
Dr. Michael Montgomery (CoI) (AdminUSPI)	University of Texas at Austin	mikemon@astro.as.utexas.edu
Prof. Boris T. Gaensicke (CoI) (ESA Member)	The University of Warwick	boris.gaensicke@gmail.com
Prof. Detlev G. Koester (CoI) (ESA Member)	Universitat Kiel	koester@astrophysik.uni-kiel.de
Dr. Franz-Josef Hambsch (CoI) (ESA Member)	Vereniging Voor Sterrenkunde	hambsch@telenet.be
Mr. Berto Monard (CoI)	Klein Karoo Observatory	astroberto13m@gmail.com
Dr. David Boyd (CoI) (ESA Member)	British Astronomical Association	davidboyd@orion.me.uk
Mr. Tonny Vanmunster (CoI) (ESA Member)	CBA Belgium Observatory	tonny.vanmunster@gmail.com

## VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) V-ZZ-PSC	COS/FUV	7	31-Aug-2021 17:00:15.0	yes
02	(1) V-ZZ-PSC	COS/FUV	7	31-Aug-2021 17:00:17.0	yes
03	(1) V-ZZ-PSC	COS/FUV	7	31-Aug-2021 17:00:19.0	yes
04	(1) V-ZZ-PSC	COS/FUV	7	31-Aug-2021 17:00:21.0	yes
05	(1) V-ZZ-PSC	COS/FUV	7	31-Aug-2021 17:00:22.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
06	(1) V-ZZ-PSC	COS/FUV	6	31-Aug-2021 17:00:24.0	yes

41 Total Orbits Used

## ABSTRACT

Measuring the bulk composition of exo-planets is crucial for the development of planet formation theories, and currently the only available method is spectroscopy of white dwarfs accreting planetary debris. The photospheric abundances of these white dwarfs reflect the bulk compositions of the accreted parent bodies, entirely analogous to meteorite abundance studies. HST ultraviolet spectroscopy has played a pivotal role in this field, providing abundance measurements of many elements inaccessible from the ground. The bulk compositions measured so far are broadly similar to those found in the solar system, suggesting that planet formation may be a fairly uniform process. The accuracy of the measured bulk compositions relies on the physically correct analysis of the white dwarf spectroscopy. However, all studies have so far used an assumption that remains untested - that the metals are uniformly distributed over the stellar surface. Given accretion proceeds via a geometrically thin disk, the validity of this assumption is far from obvious. We propose deep COS time-series ultraviolet spectroscopy of G29-38, the prototype white dwarf accreting from a debris disk. G29-28 undergoes non-radial pulsations, which heat localized regions on its surface that can briefly dominate the flux of the star. A spectrum obtained during such a heating event reflects the abundances of a small patch on the white dwarf surface. We will analyze a sufficiently large number of pulses to accurately map the distribution of metals across the entire surface of G29-38. Our results will be used to improve the modelling of debris-accreting white dwarfs, and lead to more reliable bulk compositions.

## OBSERVING DESCRIPTION

The goal of this program is to obtain time-tagged UV spectroscopy of the pulsating white dwarf G29-38 simultaneous to the Sector 16 TESS observations (2019, Sept 11 - Oct 7). The pulsations have periods in the range of two to 20 minutes. For the time-domain analysis, we require to pack the HST observations in the longest possible contiguous COS visits, as irregular gaps in between multiple short visits will create a window function that is difficult to deal with. In an ideal world, the observations should be done in a single 35-orbit visit - which may not be feasible.

In this first attempt, we opt for 5 x 7-orbit visits. Grouping the observations in fewer but longer visits would be helpful.

We simulated both imaging and target acquisitions using a white dwarf model spectrum with the appropriate average temperature and surface gravity, scaled to the Gaia distance to the target, and find that the imaging acquisition using MIRROR-A and BOA is the fastest option. These

Proposal 15839 (STScI Edit Number: 2, Created: Tuesday, August 31, 2021 at 4:00:24 PM Eastern Standard Time) - Overview  
average atmospheric parameters were measured from the previous COS/G130M observation of G29-38 (four orbits, data sets LBHK55010 and LBHK05010 ).

We use the 1291A central wavelength because it provides the optimum wavelength coverage, including the broad quasi-molecular features at ~1150A and ~1400A, which is very temperature-sensitive, the Si II lines at 1260,65, the CII lines at 1335, and the OI line at 1152A. Because the star is undergoing pulsations, we use the TIME-TAG mode and switch between FP-POS 3 and 4, and we will re-construct spectra phased on the pulsation modes.

APT warns about inefficient FP-POS movements (4->3) - as we do those during Earth occultation, it does not affect the performance of the program.

2019-Aug-07: following the request of Juila we switched from an imaging acquisition to a spectroscopic acquisition as there is an M-dwarf near our target, and there is the risk it could end up in the second aperture during an imaging acquisition.

2021-Jun-17: the 90 sec overrun in the exposures was removed. And resubmitted. In addition the BETWEEN was modified to 2021-Aug-20 to 2021-Sept-16

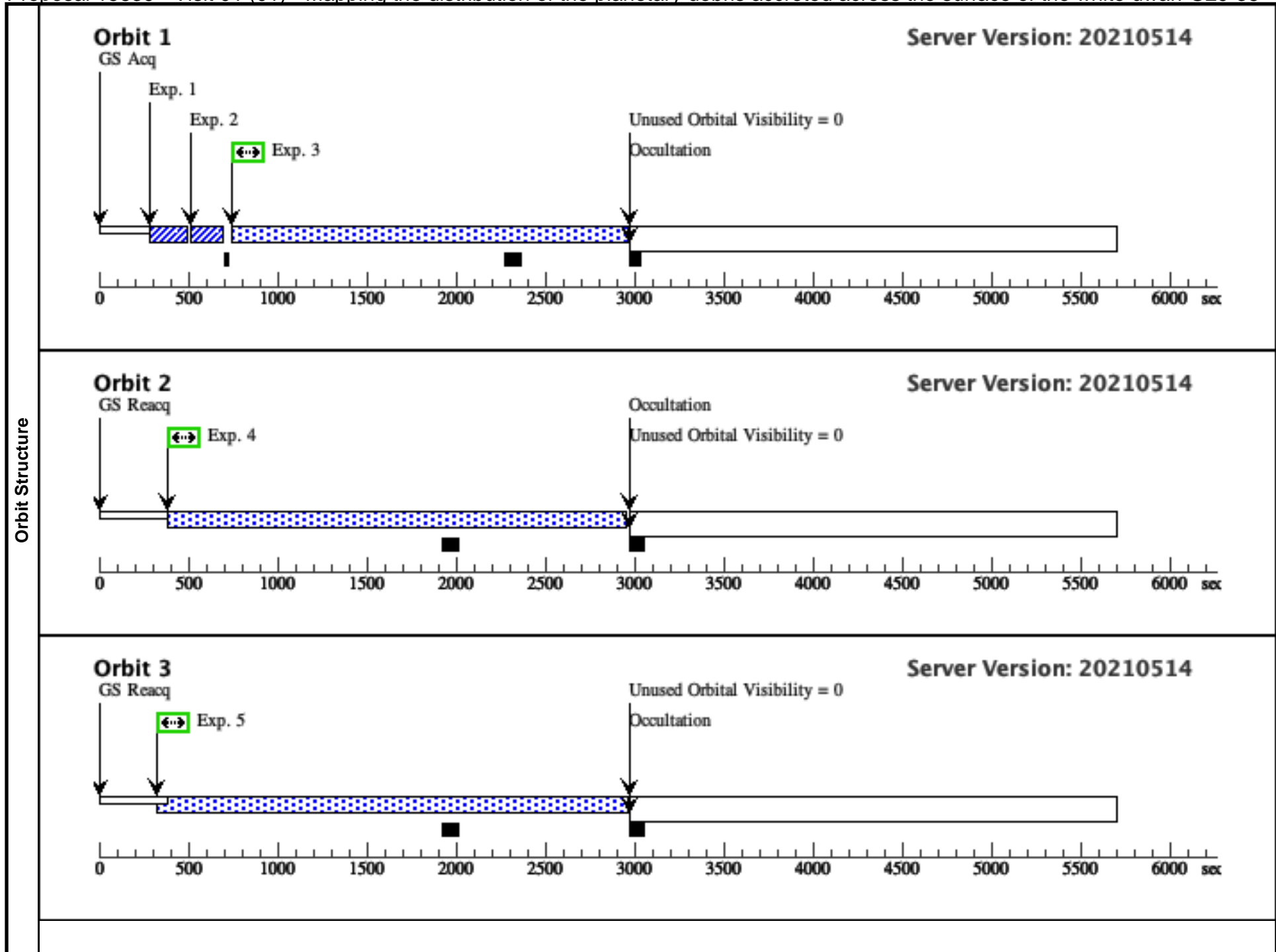
2021-Jun-25: The exposure of each orbit was reduced by 45 sec to accomodate the visibility, as requested.

Proposal 15839 - Visit 01 (01) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	<b>Proposal 15839, Visit 01 (01), completed</b> <span style="float: right;">Tue Aug 31 21:00:24 GMT 2021</span> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: SCHED 80%; BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00																
	<b>Diagnosics</b> (Visit 01 (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 01 (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 01 (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous											
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS												
Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010. Category=STAR Description=[DA] Extended=NO																	

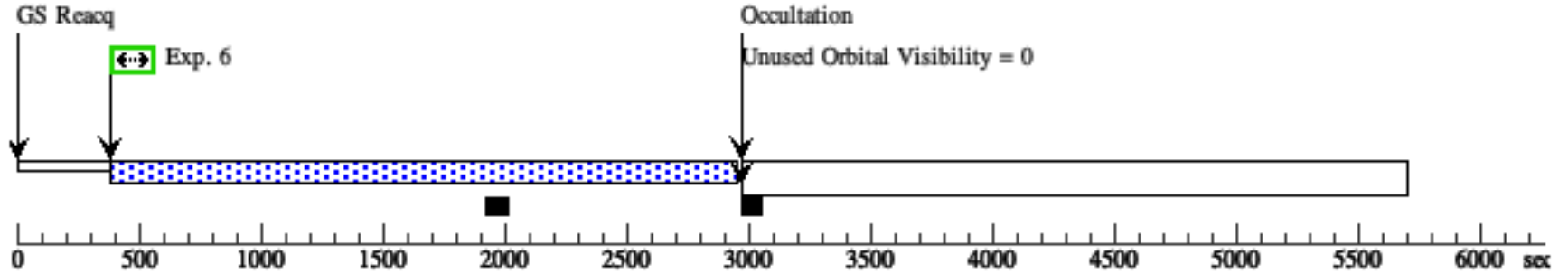
Proposal 15839 - Visit 01 (01) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]
	9	Time-tagged spectroscopy (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[7]



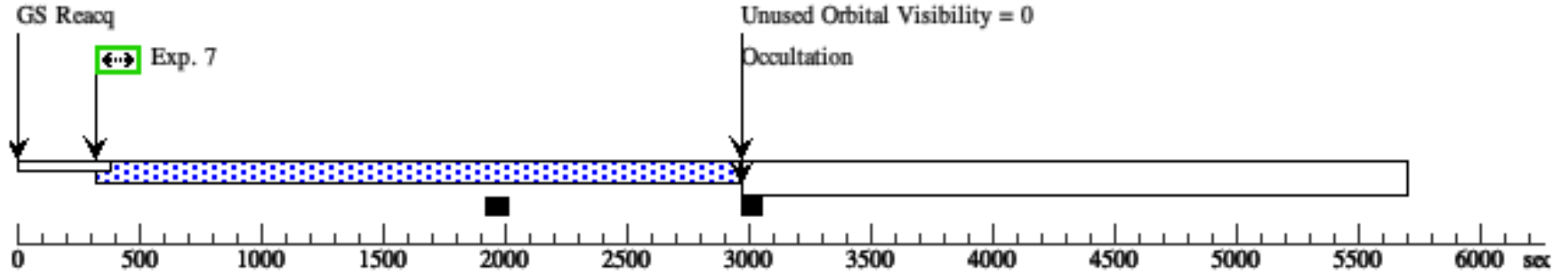
### Orbit 4

Server Version: 20210514



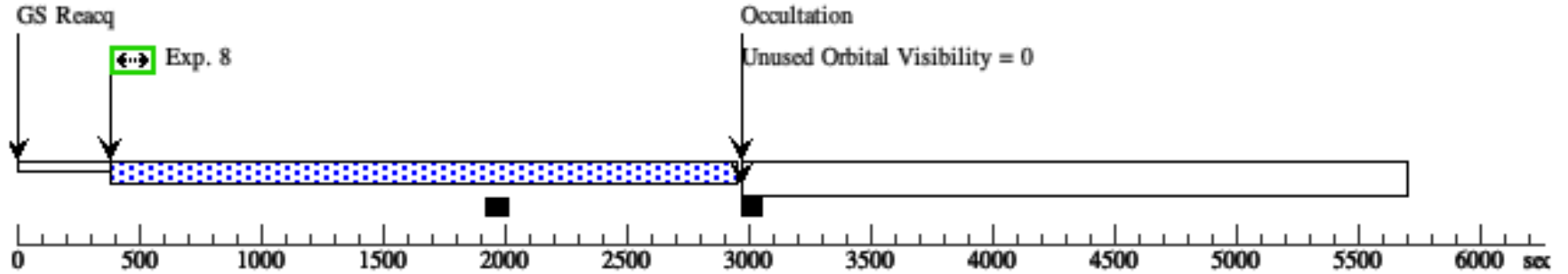
### Orbit 5

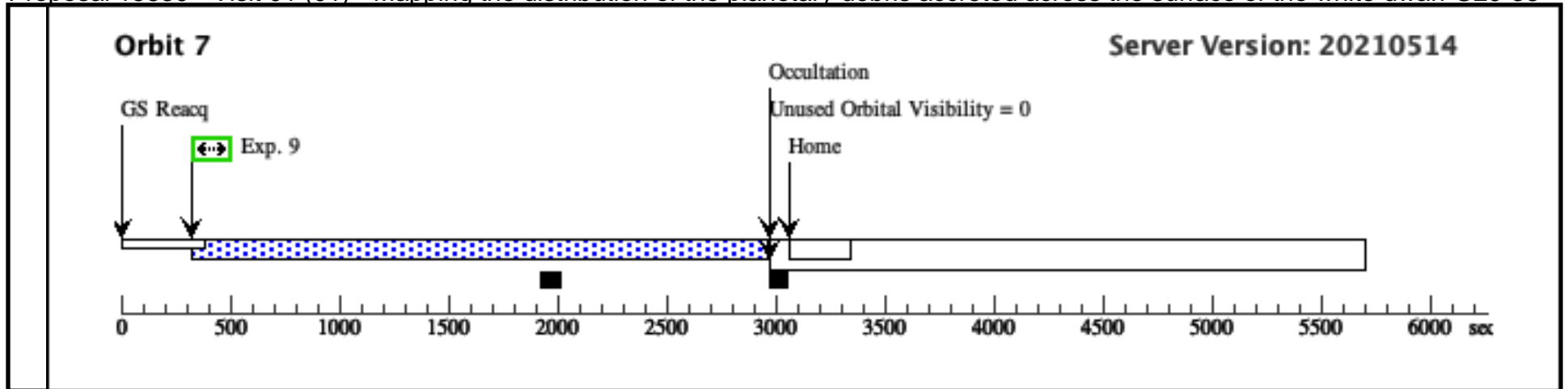
Server Version: 20210514



### Orbit 6

Server Version: 20210514



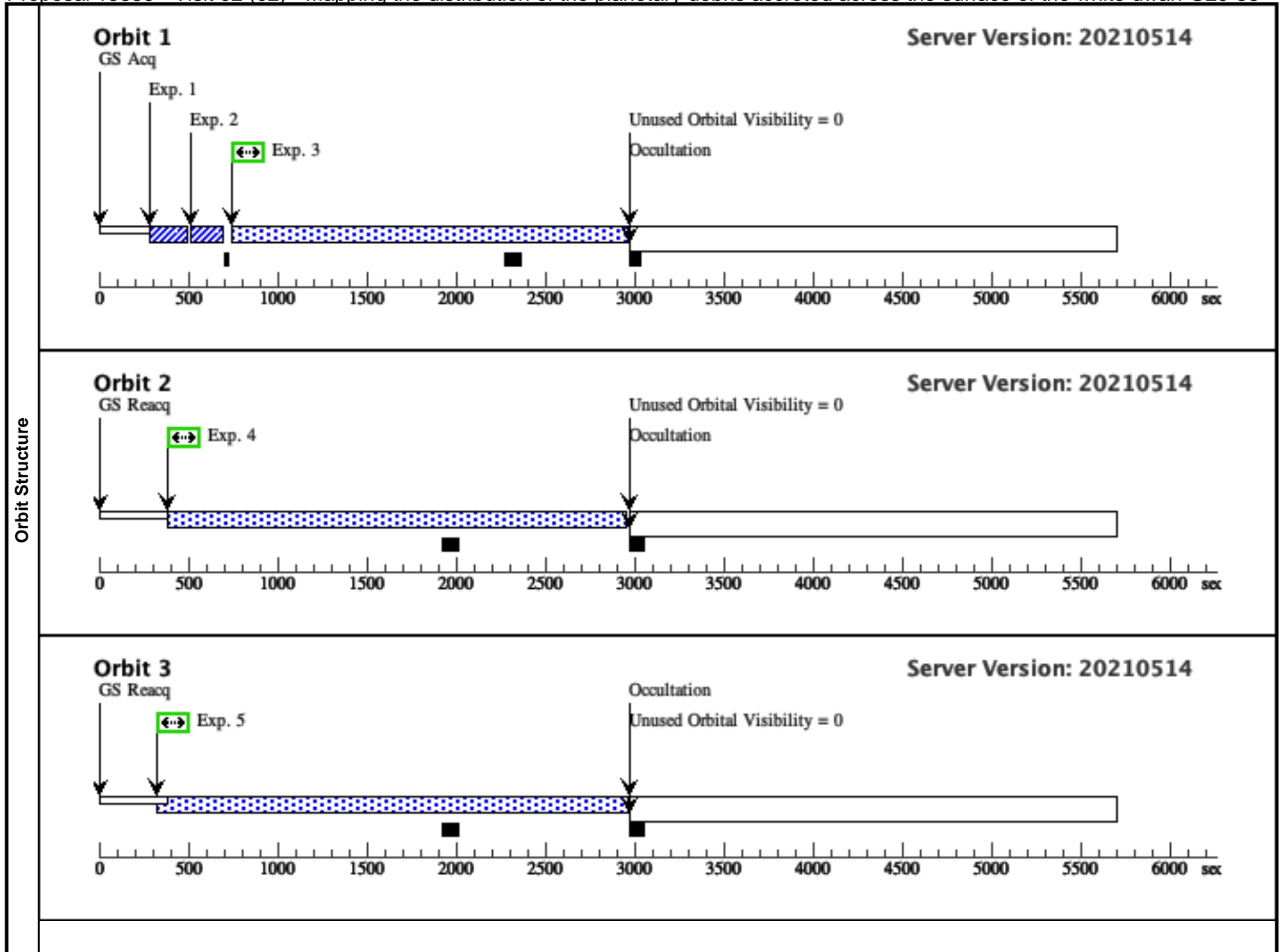


Proposal 15839 - Visit 02 (02) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	<b>Proposal 15839, Visit 02 (02), completed</b> <span style="float: right;">Tue Aug 31 21:00:25 GMT 2021</span> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: SCHED 80%; BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00																
	<b>Diagnosics</b> (Visit 02 (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 02 (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 02 (02)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous											
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS												
Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010. Category=STAR Description=[DA] Extended=NO																	

Proposal 15839 - Visit 02 (02) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

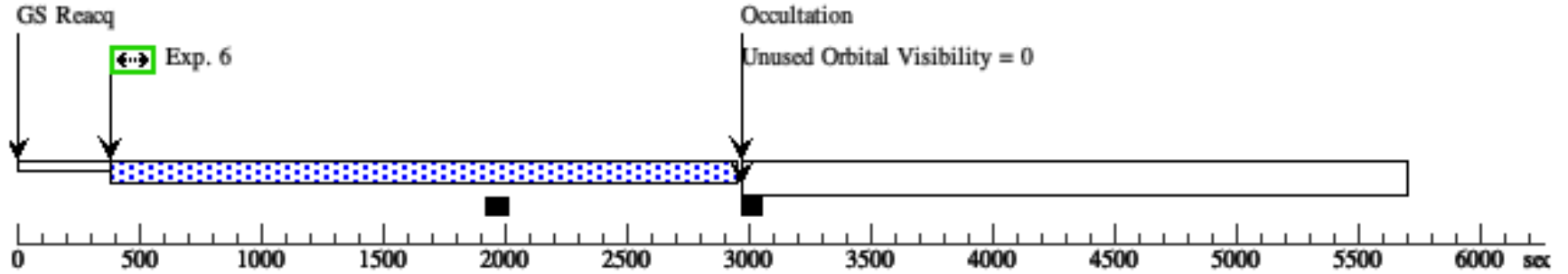
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]
	9	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[7]



Orbit Structure

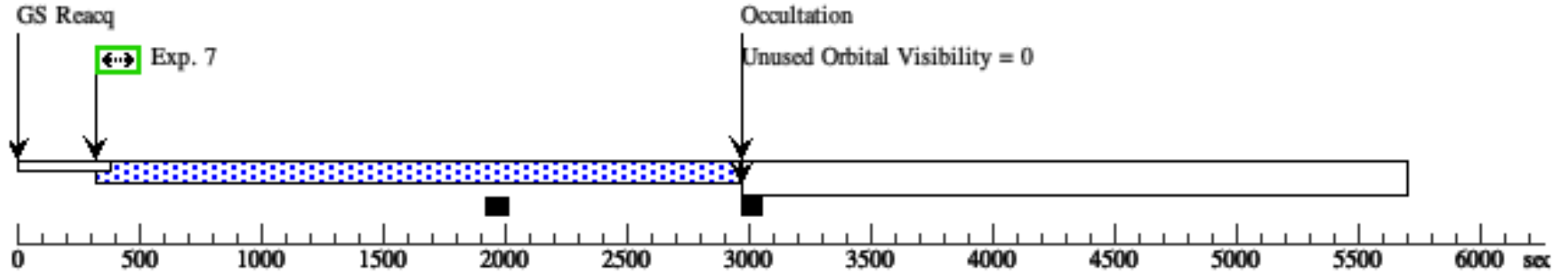
### Orbit 4

Server Version: 20210514



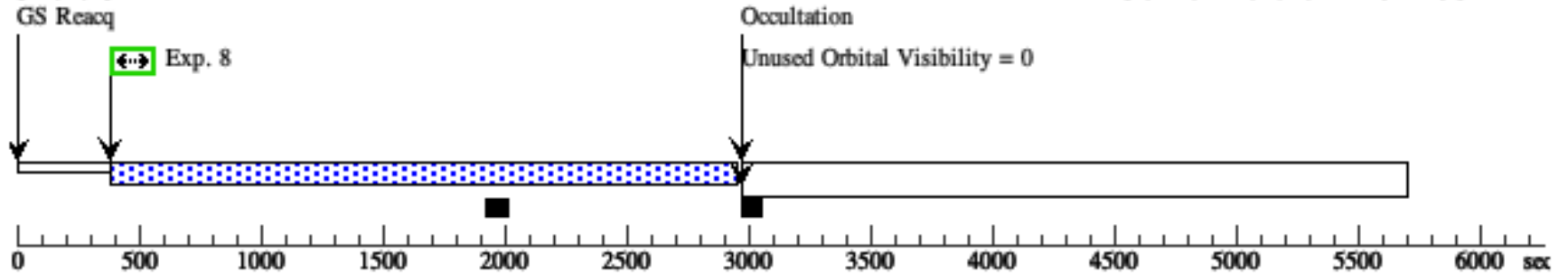
### Orbit 5

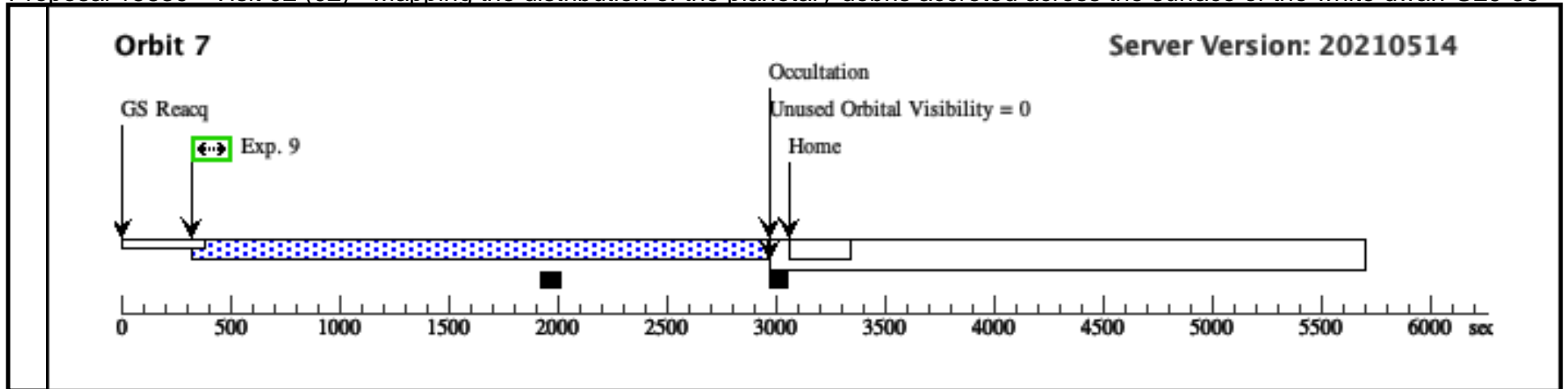
Server Version: 20210514



### Orbit 6

Server Version: 20210514



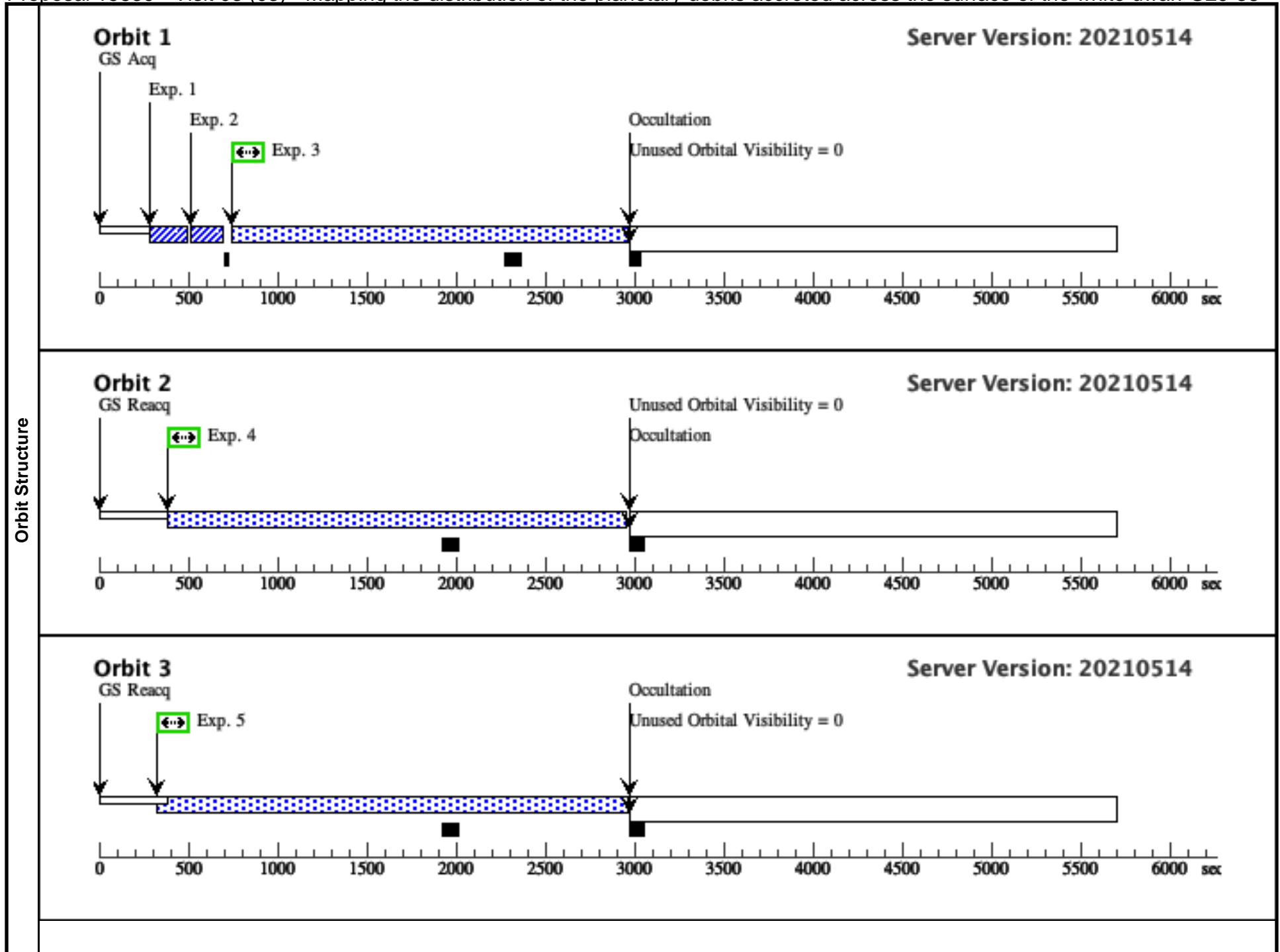


Proposal 15839 - Visit 03 (03) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	<b>Proposal 15839, Visit 03 (03), completed</b> <span style="float: right;">Tue Aug 31 21:00:25 GMT 2021</span> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: SCHED 80%; BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00																
	<b>Diagnosics</b> (Visit 03 (03)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 03 (03)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 03 (03)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous											
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS												
Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010. Category=STAR Description=[DA] Extended=NO																	

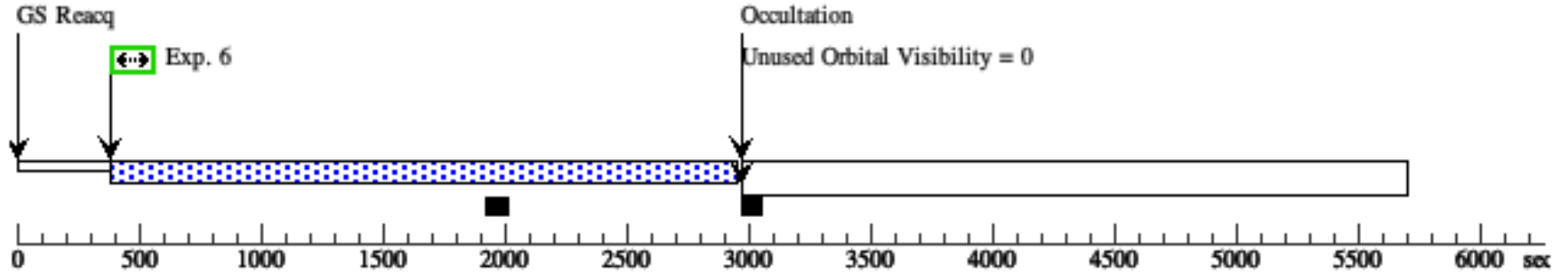
Proposal 15839 - Visit 03 (03) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]
	9	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[7]



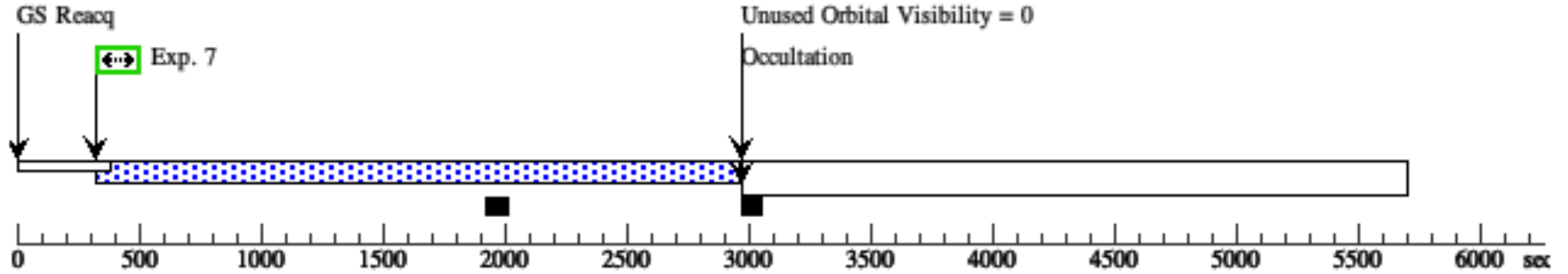
### Orbit 4

Server Version: 20210514



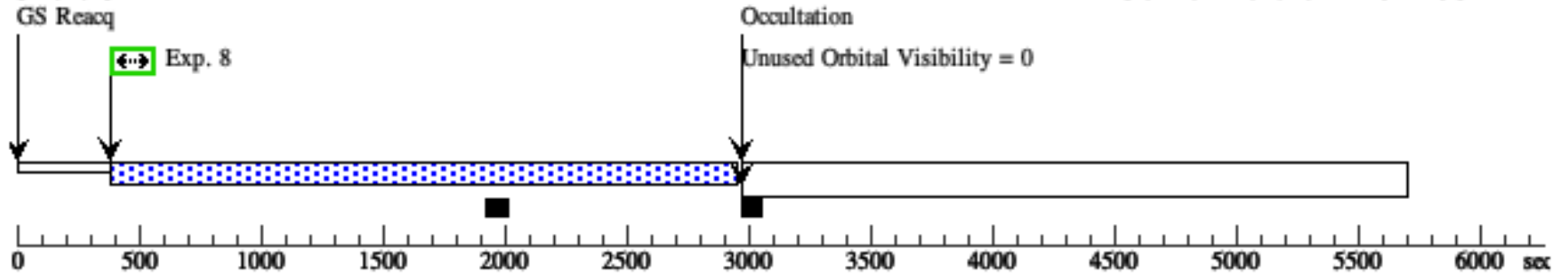
### Orbit 5

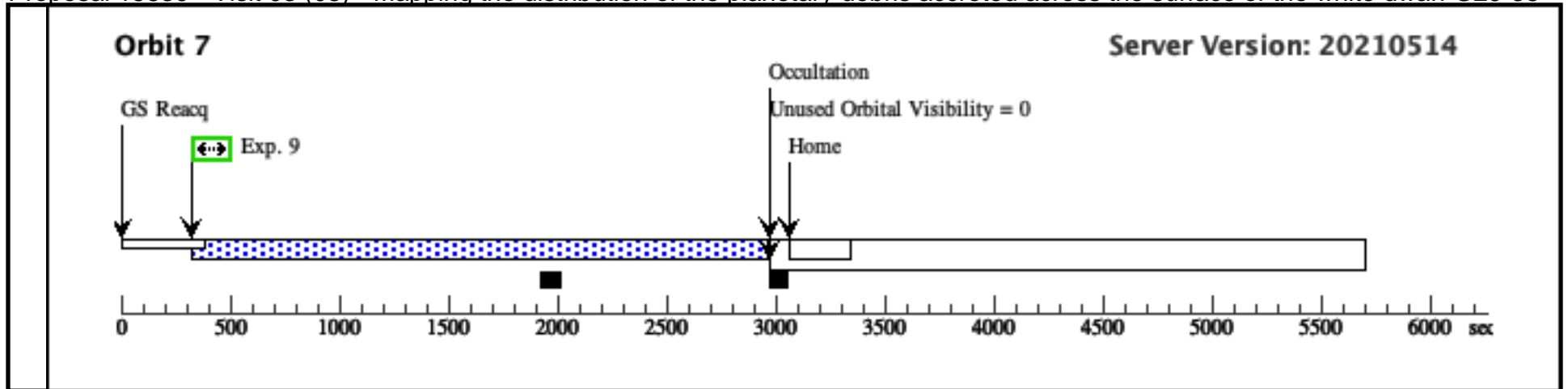
Server Version: 20210514



### Orbit 6

Server Version: 20210514



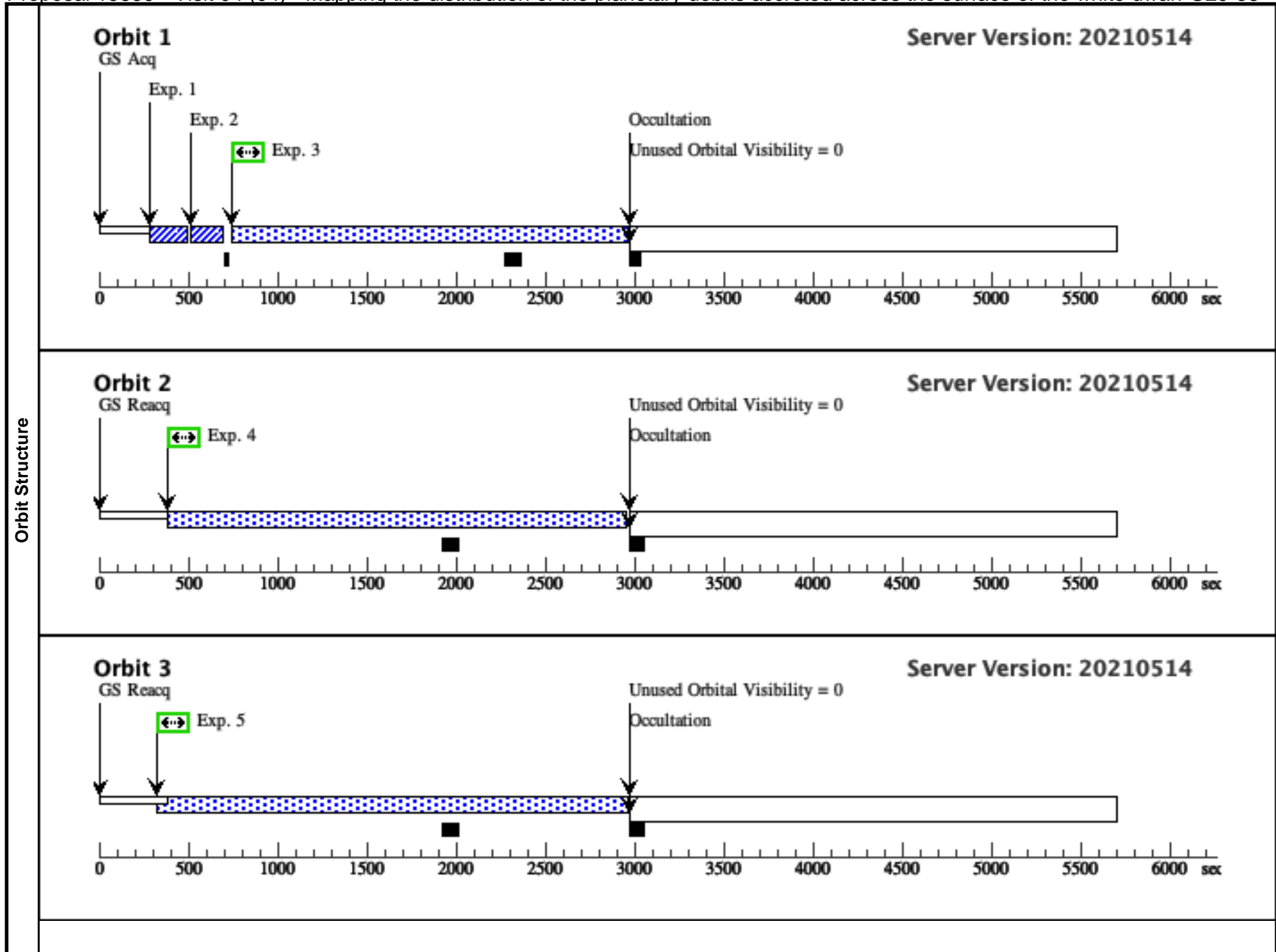


Proposal 15839 - Visit 04 (04) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	Proposal 15839, Visit 04 (04), scheduled <span style="float: right;">Tue Aug 31 21:00:25 GMT 2021</span> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: SCHED 80%: BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00																						
	<b>Diagnostics</b>	(Visit 04 (04)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 04 (04)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 04 (04)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																					
<b>Fixed Targets</b>		<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <i>Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010.</i>                      Category=STAR                      Description=[DA]                      Extended=NO                 </td> </tr> </tbody> </table>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS	<i>Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010.</i> Category=STAR Description=[DA] Extended=NO				
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																	
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS																		
<i>Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010.</i> Category=STAR Description=[DA] Extended=NO																							

Proposal 15839 - Visit 04 (04) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

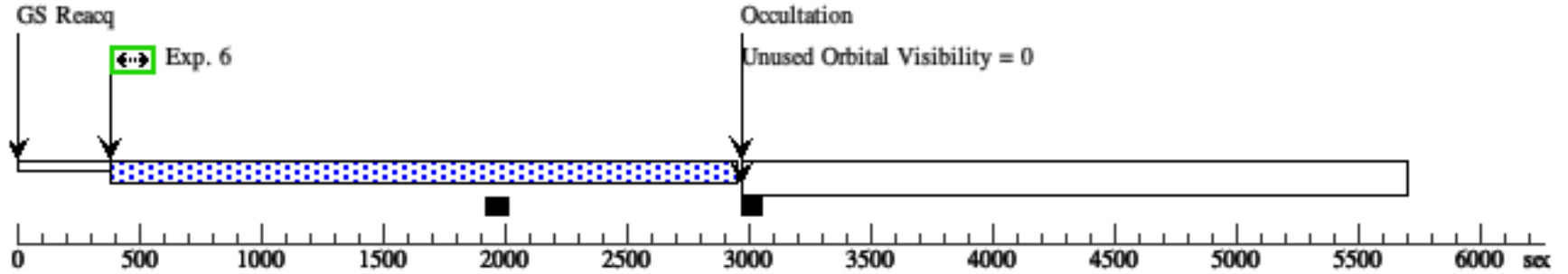
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]
	9	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[7]



Orbit Structure

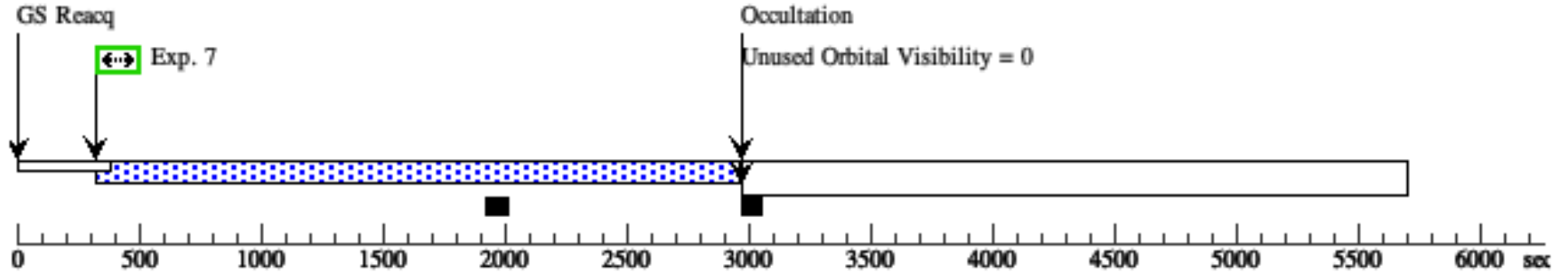
### Orbit 4

Server Version: 20210514



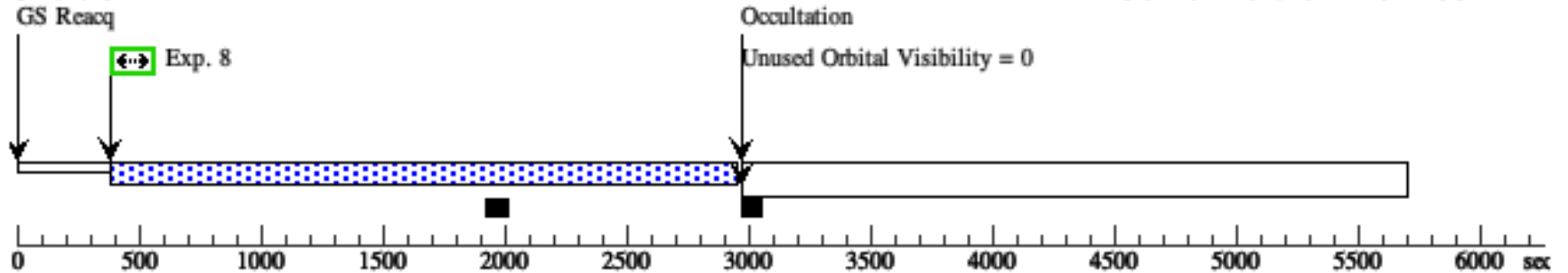
### Orbit 5

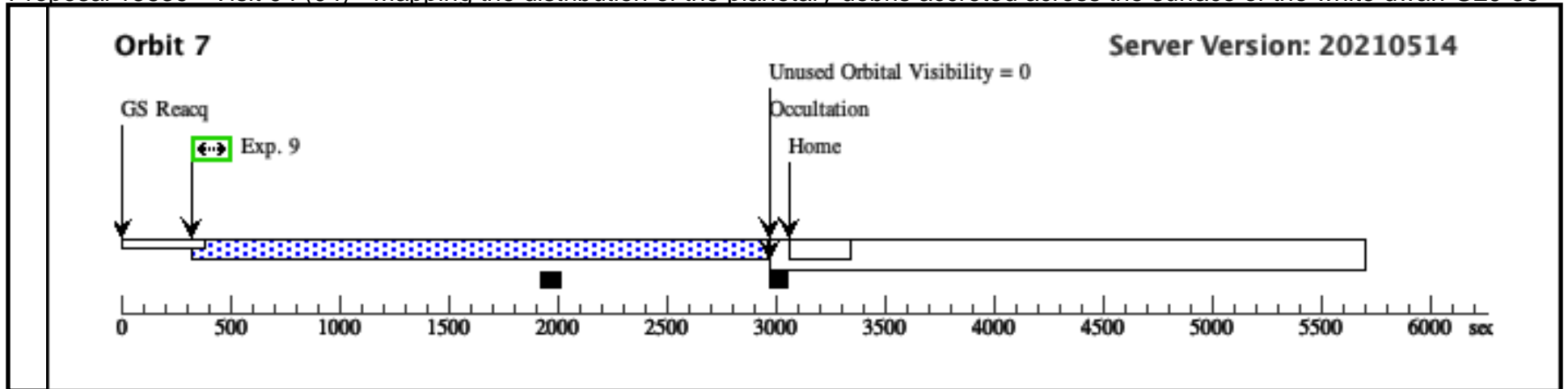
Server Version: 20210514



### Orbit 6

Server Version: 20210514



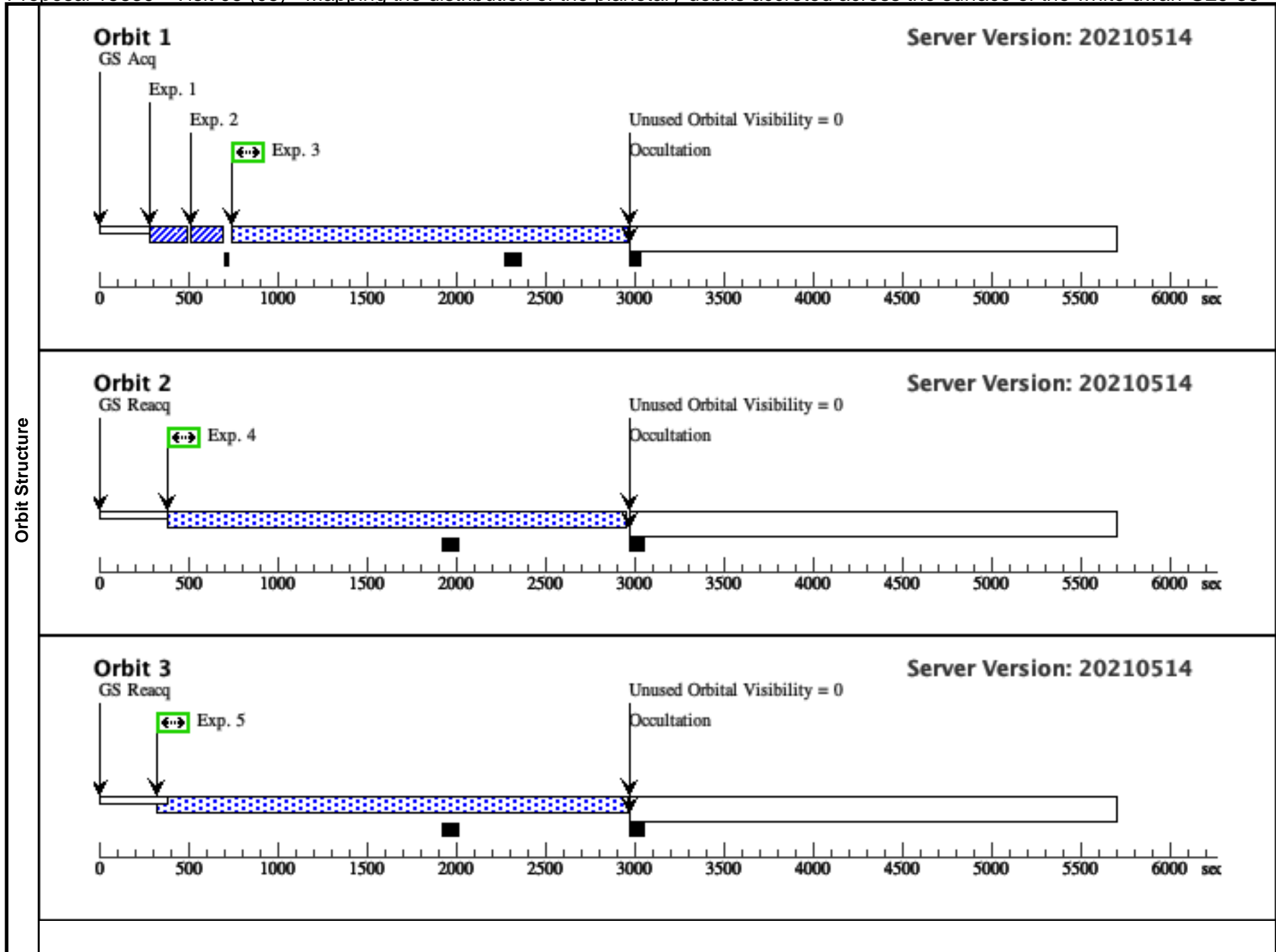


Proposal 15839 - Visit 05 (05) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	Proposal 15839, Visit 05 (05), completed <span style="float: right;">Tue Aug 31 21:00:25 GMT 2021</span> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV Special Requirements: SCHED 80%; BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00																
	<b>Diagnostics</b>	(Visit 05 (05)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 05 (05)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS (Visit 05 (05)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS															
<b>Fixed Targets</b>		<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>					#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous											
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS												
Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010. Category=STAR Description=[DA] Extended=NO																	

Proposal 15839 - Visit 05 (05) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

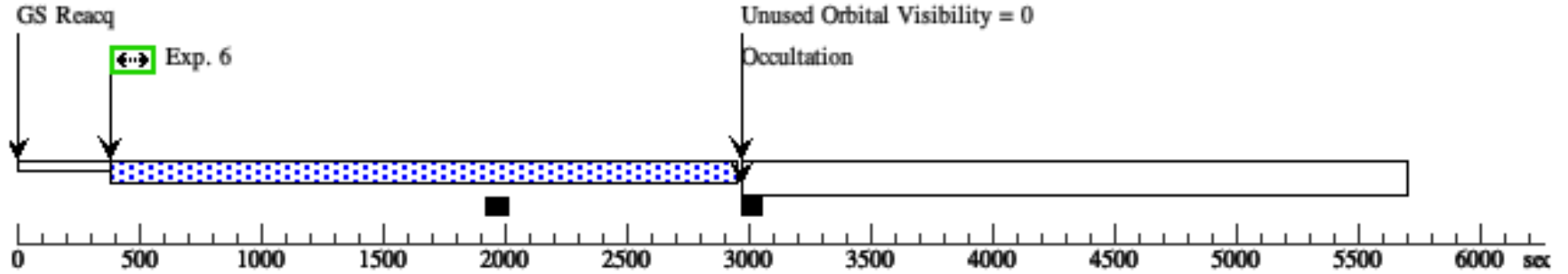
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]
	9	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[7]



Orbit Structure

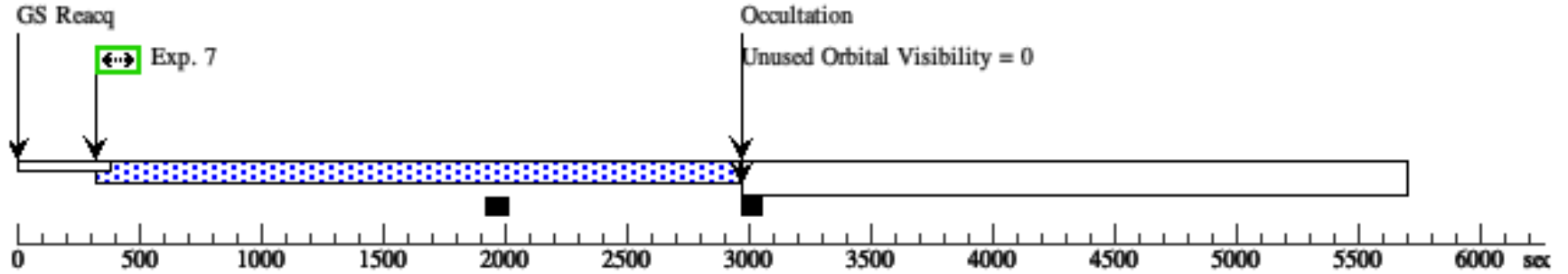
### Orbit 4

Server Version: 20210514



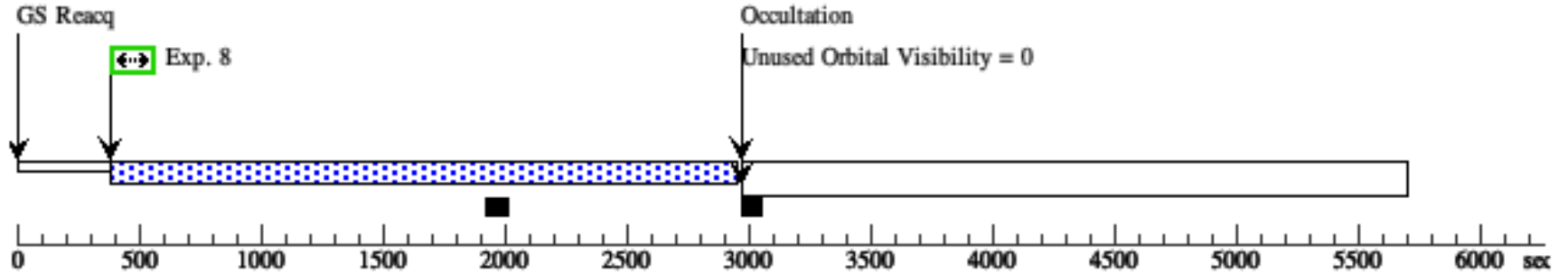
### Orbit 5

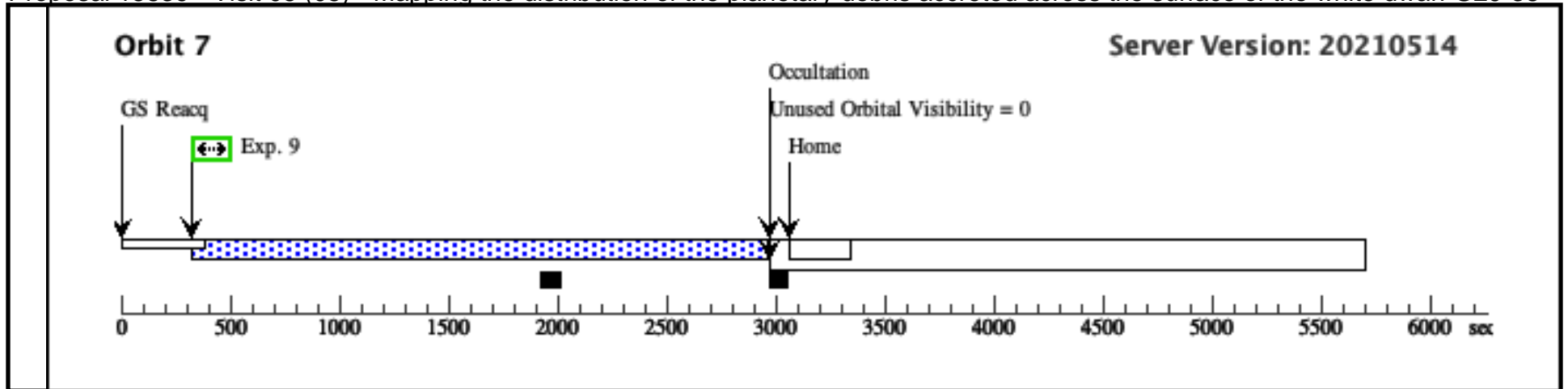
Server Version: 20210514



### Orbit 6

Server Version: 20210514



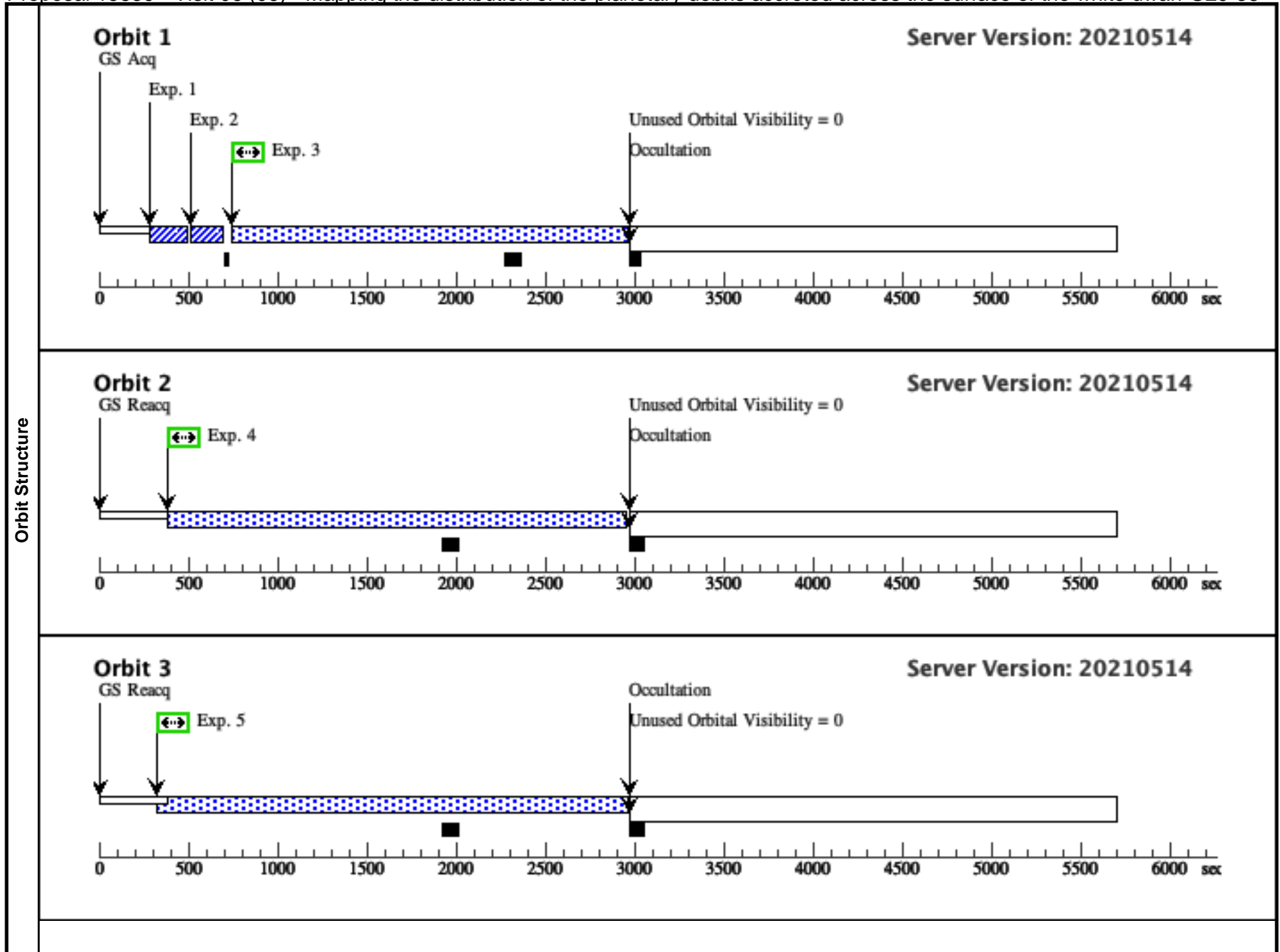


Proposal 15839 - Visit 06 (06) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

<b>Visit</b>	<p><b>Proposal 15839, Visit 06 (06)</b> <span style="float: right;">Tue Aug 31 21:00:25 GMT 2021</span></p> <p><b>Diagnostic Status: Warning</b></p> <p>Scientific Instruments: COS/FUV</p> <p>Special Requirements: SCHED 80%; BETWEEN 20-AUG-2021:00:00:00 AND 16-SEP-2021:00:00:00</p> <p><i>Comments: repeat of 6 orbits approved. HOPR 92082 for HST program 15839 on August 31, 2021.</i></p>																	
	<p>(Visit 06 (06)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS</p> <p>(Visit 06 (06)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS</p>																	
<b>Diagnosics</b>																		
<b>Fixed Targets</b>	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>V-ZZ-PSC</td> <td>RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000</td> <td>Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000</td> <td>V=13.03</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS					
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous												
(1)	V-ZZ-PSC	RA: 23 28 47.6365 (352.1984854d) Dec: +05 14 54.23 (5.24840d) Equinox: J2000	Proper Motion RA: -398.197 mas/yr Proper Motion Dec: -266.738 mas/yr Epoch of Position: 2000	V=13.03	Reference Frame: ICRS													
<p><i>Comments: This target was observed with COS/G130M as part of HST program 12290, data set LBHK55010.</i></p> <p>Category=STAR Description=[DA] Extended=NO</p>																		

Proposal 15839 - Visit 06 (06) - Mapping the distribution of the planetary debris accreted across the surface of the white dwarf G29-38

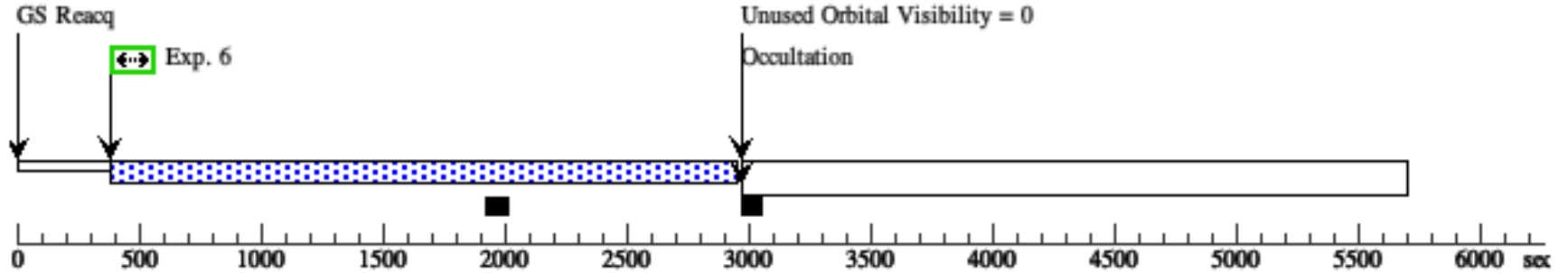
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ/PEAK XD (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					5 Secs (5 Secs) [==>]	[1]
	2	ACQ/PEAK D (COS.sa.137 3900)	(1) V-ZZ-PSC	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	STEP-SIZE=0.9; NUM-POS=5; CENTER=DEF				5 Secs (5 Secs) [==>]	[1]
	3	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2169 Secs (2169 Secs) [==>]	[1]
	4	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[2]
	5	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[3]
	6	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[4]
	7	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=3; FLASH=YES				2518 Secs (2518 Secs) [==>]	[5]
	8	Time-tagged spectroscop y (COS.sp.136 5098)	(1) V-ZZ-PSC	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=15 00; FP-POS=4; FLASH=YES				2518 Secs (2518 Secs) [==>]	[6]



Orbit Structure

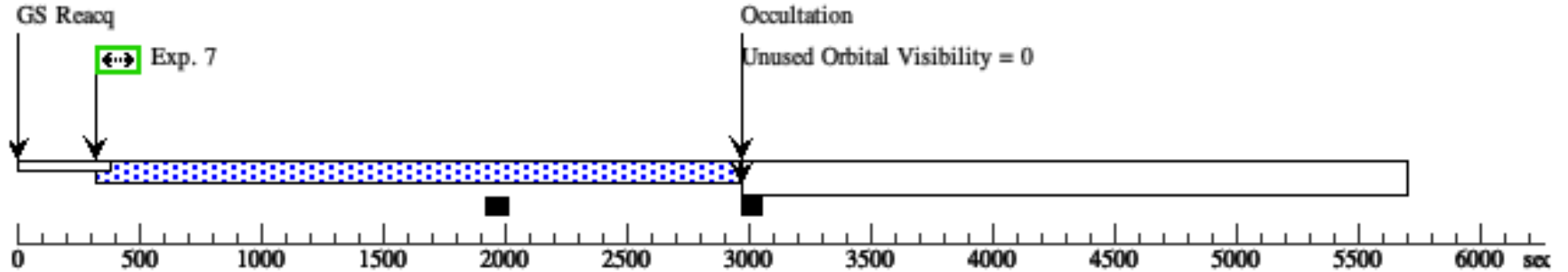
**Orbit 4**

Server Version: 20210514



**Orbit 5**

Server Version: 20210514



**Orbit 6**

Server Version: 20210514

