16070 - Exploring evolved planetary systems: three new debris discsHST

Cycle: 27, Proposal Category: GO

(UV Initiative, JWST Initative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Nicola Gentile Fusillo (PI) (ESA Member) (Contact)	**The University of Warwick**	**nicola.gentilefusillo@eso.org**
Prof. Boris T. Gaensicke (CoI) (ESA Member)	The University of Warwick	boris.gaensicke@warwick.ac.uk
Prof. Detlev G. Koester (CoI) (ESA Member)	Universitat Kiel	koester@astrophysik.uni-kiel.de
Dr. Odette Fabiola Toloza Castillo (CoI) (ESA Member)	The University of Warwick	odette.toloza@warwick.ac.uk
Dr. Christopher James Manser (CoI) (ESA Member)	The University of Warwick	c.j.manser92@googlemail.com
Dr. Erik Dennihy (CoI) (AdminUSPI)	Gemini Observatory, Southern Operations	edennihy@live.unc.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) WDJ034736.69+162409.73	COS/FUV COS/NUV	2	06-Apr-2020 14:00:19.0	yes
02	(1) WDJ034736.69+162409.73	COS/FUV COS/NUV	2	06-Apr-2020 14:00:20.0	yes
03	(2) WDJ045030.91-284602.29	COS/FUV COS/NUV	2	06-Apr-2020 14:00:21.0	yes
04	(2) WDJ045030.91-284602.29	COS/FUV COS/NUV	3	06-Apr-2020 14:00:22.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
05	(3) WDJ193036.05-112948.72	COS/FUV COS/NUV	1	06-Apr-2020 14:00:23.0	yes
06	(3) WDJ193036.05-112948.72	COS/FUV COS/NUV	2	06-Apr-2020 14:00:24.0	yes

12 Total Orbits Used

ABSTRACT

It is now established that planets survive the evolution of their host star into a white dwarf. Planetary remnants around a number of these ancient stars are revealed by compact debris disks, formed from the tidal disruption of planetesimals, which are detectable as IR flux excess. Accretion from these disks results in metal pollution of the otherwise pristine H or He white dwarf atmospheres, and the analysis of adequate optical and UV spectroscopy of these systems allows to reconstruct the bulk composition of the disrupted planetesimals.

Quantitative insight into the structure, formation and evolution of the parent bodies arises from mineralogical studies of the dusty disks, but requires sensitive IR spectroscopy which is currently available only for one single system. Even though the imminent launch of JWST will greatly improve the IR spectroscopic capabilities, the analysis will remain subject to degeneracies due to the relatively flat and broad features of different dust components. However, with the elemental abundances of the dust in hand, established from HST/COS observations of the same systems, these degeneracies can be broken, and will dramatically augment our knowledge of the composition and structure of rocky exo-planets.

We have identified three new debris disks, and request here a modest amount of COS mid-cycle spectroscopy to fully characterise the elemental abundances of the dust in time for JWST Cycle 2 proposals. Cycle 28 observations will, at best, leave little time for the required analysis, but more likely slip beyond the JWST Cycle 2 deadline.

OBSERVING DESCRIPTION

The goal of these observations is to obtain high signal-to-noise far-ultraviolet spectra of three white dwarfs which are accreting planetary debris from circumstellar debris disks. The planned COS spectroscopy will be used to measure the abundances of that material from the sharp photospheric metal lines.

We use the G130M grating with two central wavelengths to maximise the wavelength covered by these observations, and to achieve gap-less coverage. We make use of all permitted FP-POS positions, i.e. 3 & 4 for @1291A, and 1,2,3,4 @ 1222A. The @1291A and @1222A observations are split into two separate visits to facilitate the scheduling.

This program should not be affected in case that HST moves to a 2-gyro mode.

Visit

Proposal 16070, WDJ0347 @ 1291 (01), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: Only two FP-POS settings allowed for the 1291A central wavelength.

Fixed Targets

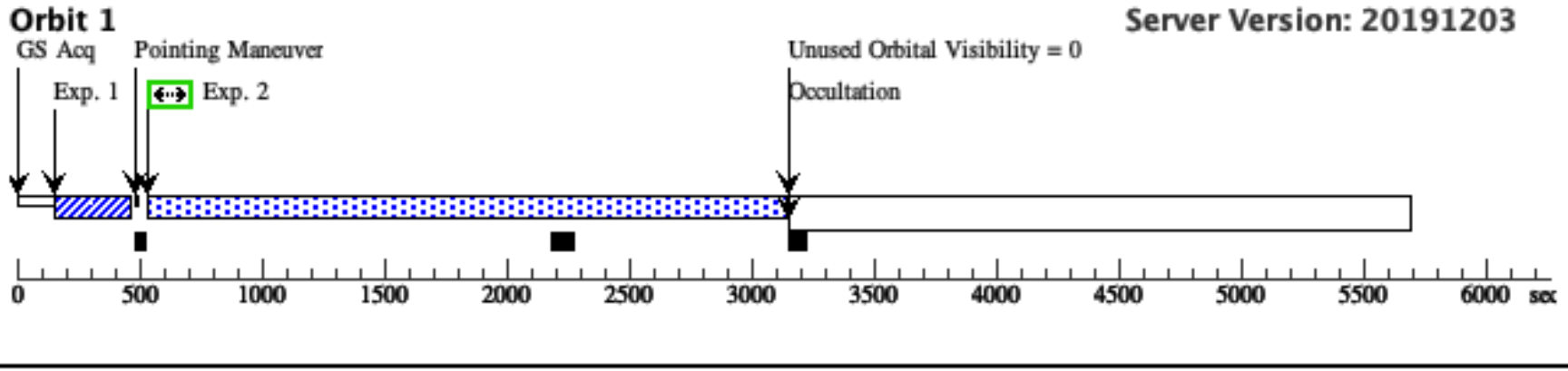
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WDJ034736.69+162409.73	RA: 03 47 36.7000 (56.9029167d) Dec: +16 24 8.76 (16.40243d) Equinox: J2000	Proper Motion RA: 5.680 mas/yr Proper Motion Dec: -62.903 mas/yr Epoch of Position: 2015.5	V=16.65+/-0.1 GALEX FUV=16.0415 GALEX NUV=16.4401	Reference Frame: ICRS

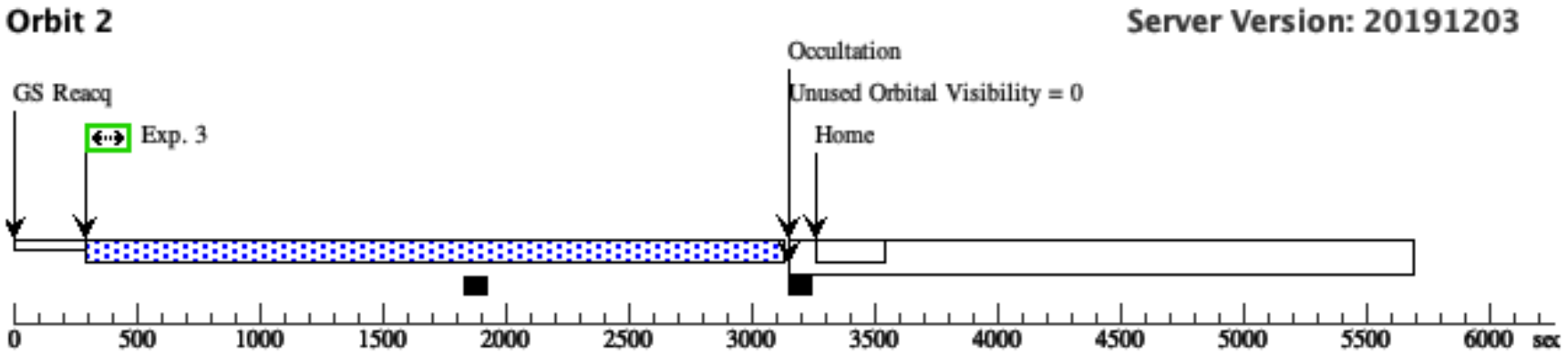
Comments:
Category=STAR
Description=[DA]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1432616)	(1) WDJ034736.69+162409.73	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				7 Secs (7 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1432620)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=3			2437 Secs (2437 Secs) *[==>]*	 ***[1]***
3	(COS.sp.1432620)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=4			2790 Secs (2790 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 16070, WDJ0347 @ 1222 (02), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

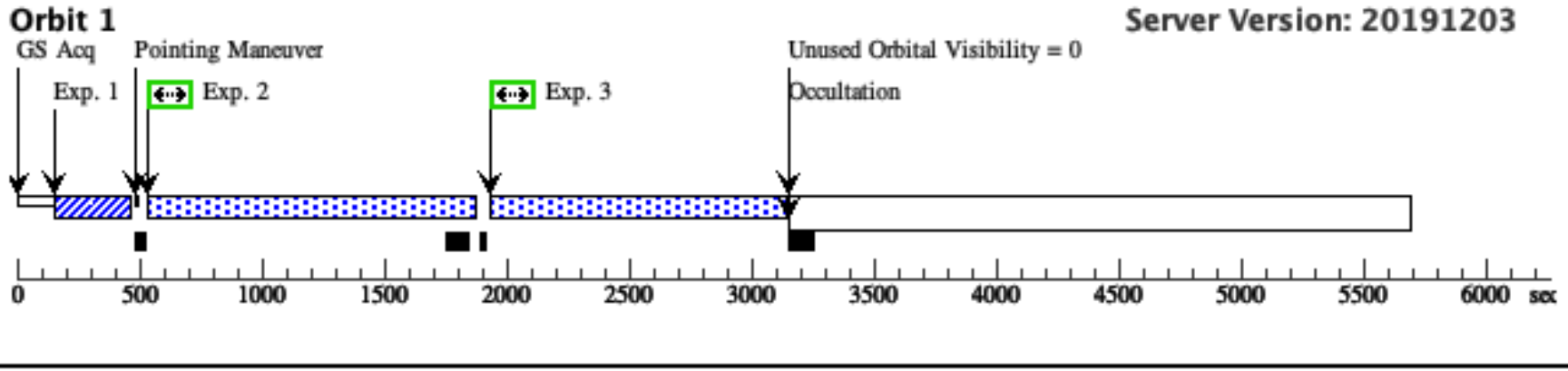
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WDJ034736.69+162409.73	RA: 03 47 36.7000 (56.9029167d) Dec: +16 24 8.76 (16.40243d) Equinox: J2000	Proper Motion RA: 5.680 mas/yr Proper Motion Dec: -62.903 mas/yr Epoch of Position: 2015.5	V=16.65+/-0.1 GALEX FUV=16.0415 GALEX NUV=16.4401	Reference Frame: ICRS

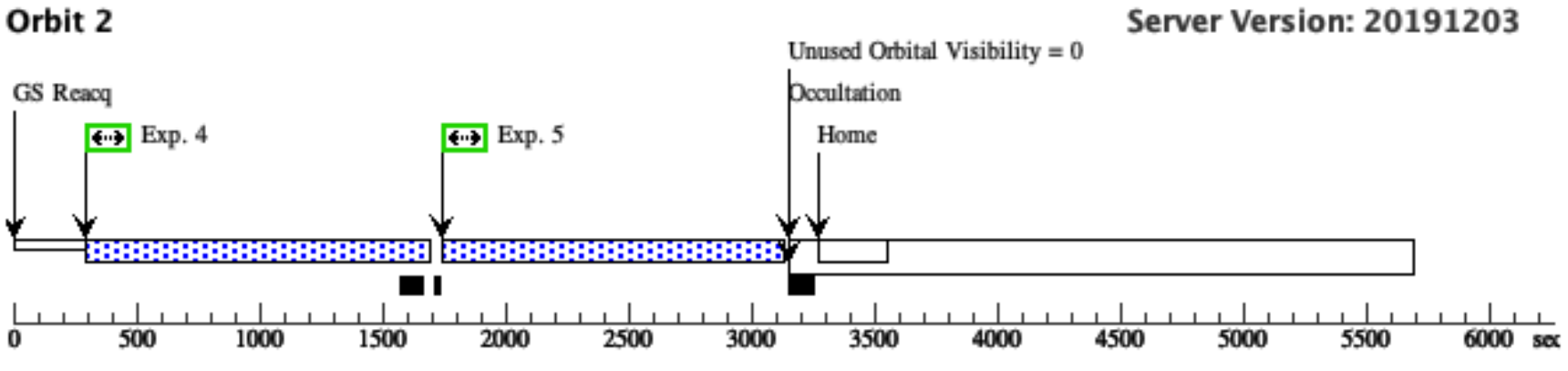
Comments:
Category=STAR
Description=[DA]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1432616)	(1) WDJ034736.69+162409.73	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				7 Secs (7 Secs) *[==>]*	***[1]***
2	(COS.sp.1432621)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1048; FP-POS=1			1158 Secs (1158 Secs) *[==>]*	***[1]***
3	(COS.sp.1432621)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1159; FP-POS=2			1159 Secs (1159 Secs) *[==>]*	***[1]***
4	(COS.sp.1432621)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1235; FP-POS=3			1345 Secs (1345 Secs) *[==>]*	***[2]***
5	(COS.sp.1432621)	(1) WDJ034736.69+162409.73	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1340; FP-POS=4			1340 Secs (1340 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 16070, WDJ0450 @ 1291 (03), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: Only two FP-POS settings allowed for the 1291A central wavelength.

Fixed Targets

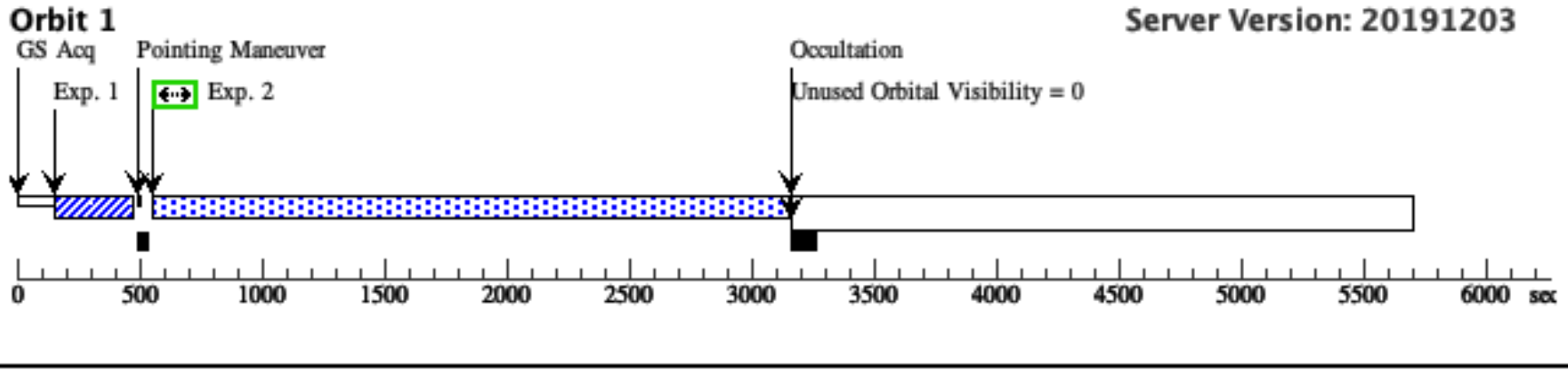
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	WDJ045030.91-284602.29	RA: 04 50 30.9600 (72.6290000d) Dec: -28 46 2.22 (-28.76728d) Equinox: J2000	Proper Motion RA: 47.680 mas/yr Proper Motion Dec: 4.081 mas/yr Epoch of Position: 2015.5	V=17.8 GALEX FUV=16.9069 GALEX NUV=17.2377	Reference Frame: ICRS

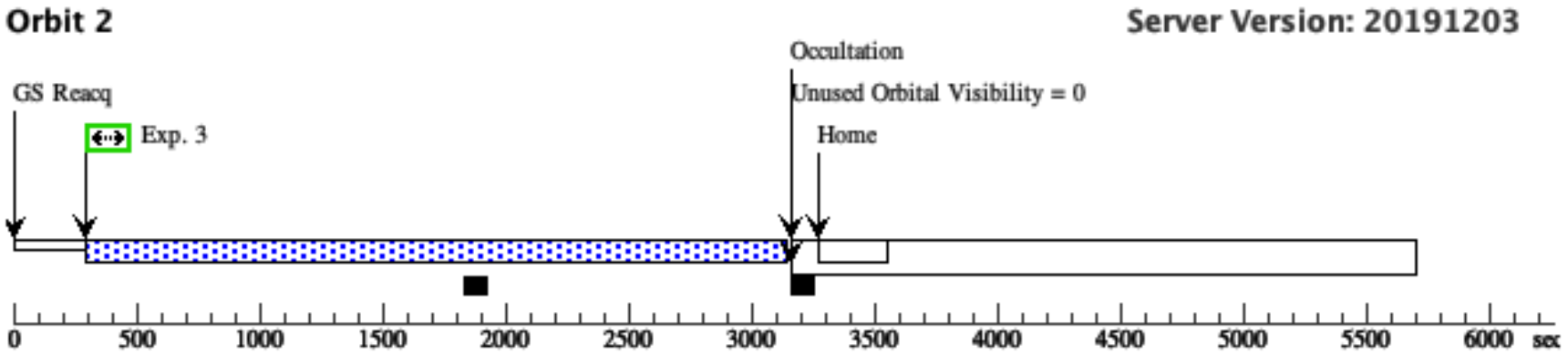
Comments:
Category=STAR
Description=[DA]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1432624)	(2) WDJ045030.91-284602.29	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				14 Secs (14 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1432627)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=2432; FP-POS=3			2432 Secs (2432 Secs) *[==>]*	 ***[1]***
3	(COS.sp.1432627)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1500; FP-POS=4			2799 Secs (2799 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 16070, WDJ0450 @ 1222 (04), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

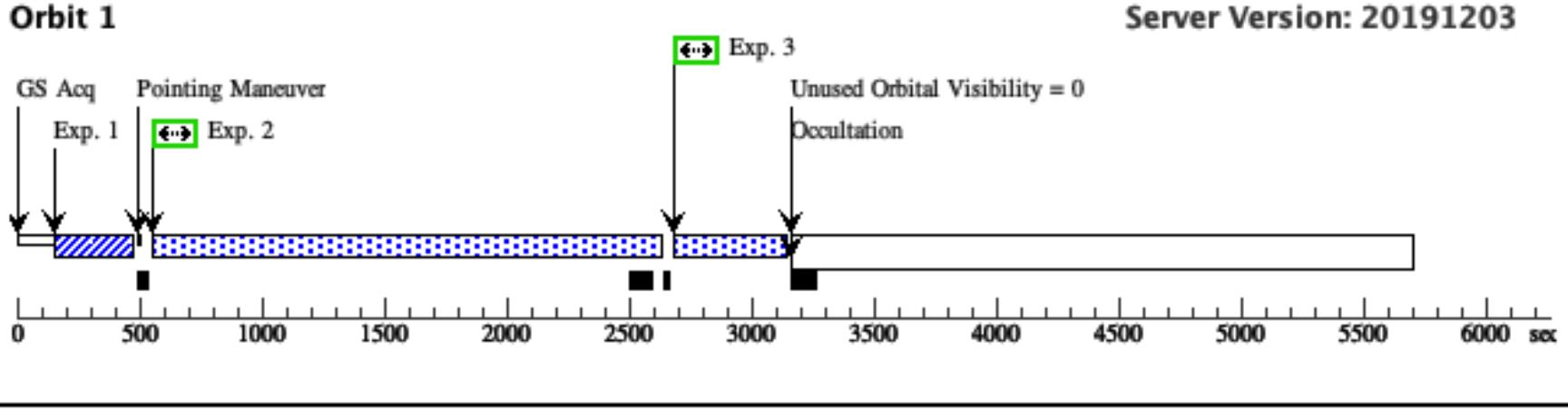
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	WDJ045030.91-284602.29	RA: 04 50 30.9600 (72.6290000d) Dec: -28 46 2.22 (-28.76728d) Equinox: J2000	Proper Motion RA: 47.680 mas/yr Proper Motion Dec: 4.081 mas/yr Epoch of Position: 2015.5	V=17.8 GALEX FUV=16.9069 GALEX NUV=17.2377	Reference Frame: ICRS

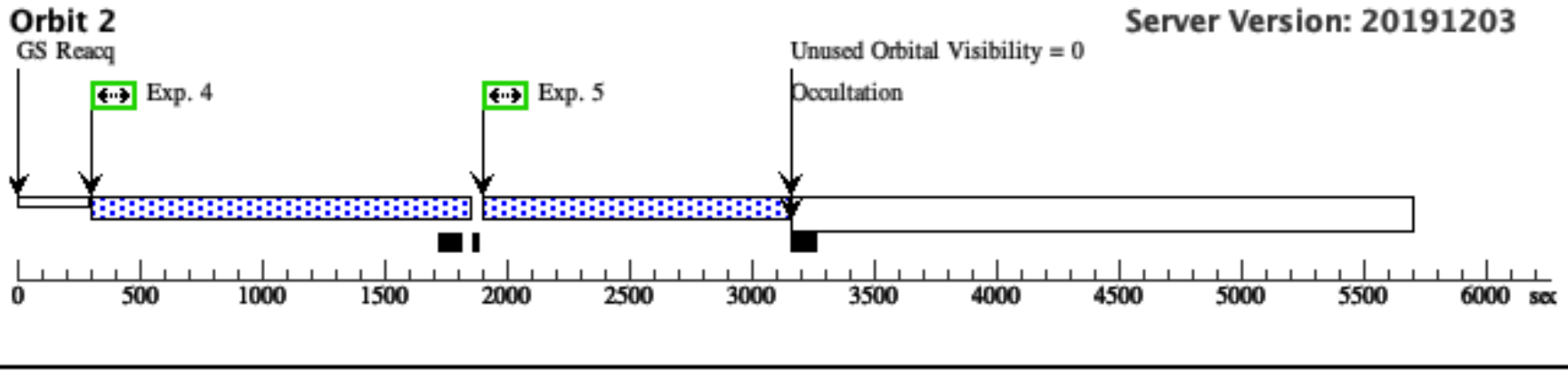
Comments:
Category=STAR
Description=[DA]
Extended=NO

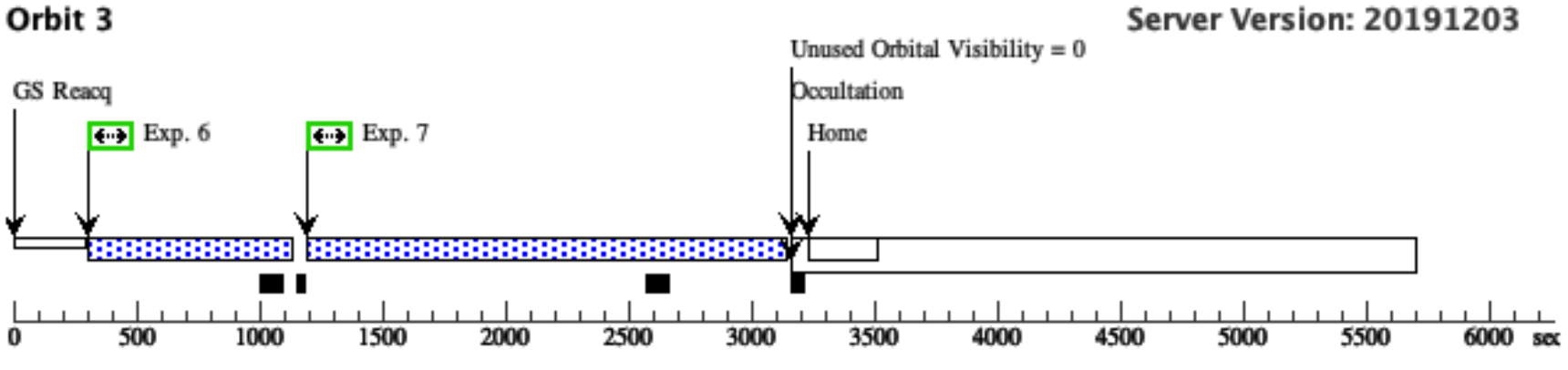
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1432624)	(2) WDJ045030.91-284602.29	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				14 Secs (14 Secs) *[==>]*	*[1]*
2	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1790; FP-POS=1			1900 Secs (1900 Secs) *[==>]*	*[1]*
3	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=412; FP-POS=2			412 Secs (412 Secs) *[==>]*	*[1]*
4	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1390; FP-POS=2			1500 Secs (1500 Secs) *[==>]*	*[2]*
5	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1194; FP-POS=3			1194 Secs (1194 Secs) *[==>]*	*[2]*
6	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=674; FP-POS=3			784 Secs (784 Secs) *[==>]*	*[3]*
7	(COS.sp.1432628)	(2) WDJ045030.91-284602.29	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1340; FP-POS=4			1900 Secs (1900 Secs) *[==>]*	*[3]*

Orbit Structure







Visit

Proposal 16070, WDJ1930 @ 1291 (05), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: Only two FP-POS settings allowed for the 1291A central wavelength.

Fixed Targets

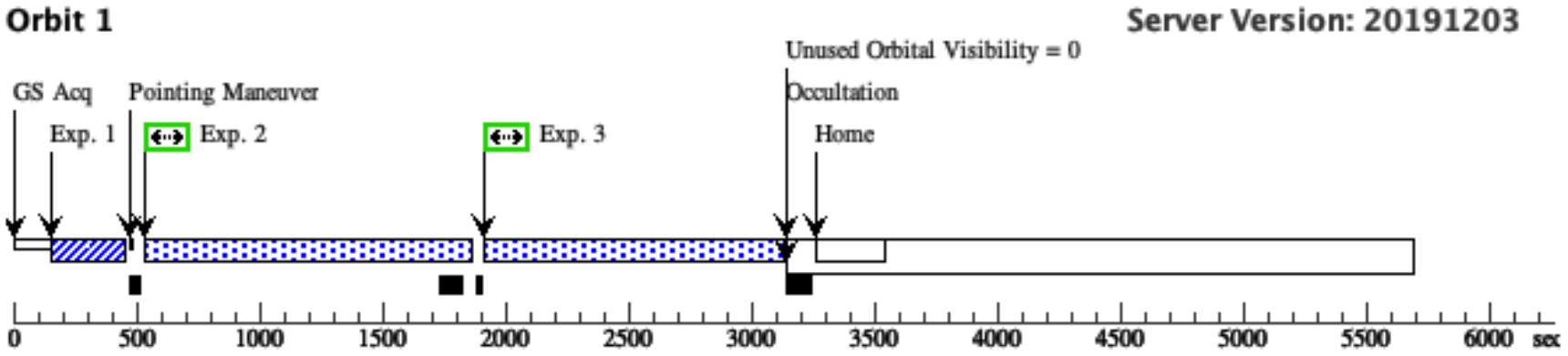
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	WDJ193036.05-112948.72	RA: 19 30 36.1100 (292.6504583d) Dec: -11 29 49.09 (-11.49697d) Equinox: J2000	Proper Motion RA: 48.587 mas/yr Proper Motion Dec: -24.066 mas/yr Epoch of Position: 2015.5	V=16.4+/-0.1 GALEX FUV=15.8816 GALEX NUV=16.1392	Reference Frame: ICRS

Comments:
Category=STAR
Description=[DA]
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.1432629)	(3) WDJ193036.05-112948.72	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				5 Secs (5 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1432632)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1055; FP-POS=3			1165 Secs (1165 Secs) *[==>]*	 ***[1]***
3	(COS.sp.1432632)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=1164; FP-POS=4			1164 Secs (1164 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 16070, WDJ1930 @ 1222 (06), implementation Mon Apr 06 18:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	WDJ193036.05-112948.72	RA: 19 30 36.1100 (292.6504583d) Dec: -11 29 49.09 (-11.49697d) Equinox: J2000	Proper Motion RA: 48.587 mas/yr Proper Motion Dec: -24.066 mas/yr Epoch of Position: 2015.5	V=16.4+/-0.1 GALEX FUV=15.8816 GALEX NUV=16.1392	Reference Frame: ICRS

Comments:
Category=STAR
Description=[DA]
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.1432629)	(3) WDJ193036.05-112948.72	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				5 Secs (5 Secs) *[==>]*	***[1]***
2	(COS.sp.1432634)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1047; FP-POS=1			1157 Secs (1157 Secs) *[==>]*	***[1]***
3	(COS.sp.1432634)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1157; FP-POS=2			1157 Secs (1157 Secs) *[==>]*	***[1]***
4	(COS.sp.1432634)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1229; FP-POS=3			1339 Secs (1339 Secs) *[==>]*	***[2]***
5	(COS.sp.1432634)	(3) WDJ193036.05-112948.72	COS/FUV, TIME-TAG, PSA	G130M 1222 A	BUFFER-TIME=1339; FP-POS=4			1339 Secs (1339 Secs) *[==>]*	***[2]***

Orbit Structure