15915 - AGN Feedback in Dwarf Galaxies

Cycle: 27, 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) SDSSJ090613.75+561015.5	COS/FUV COS/NUV	2	24-Jan-2020 16:00:15.0	yes
02	(1) SDSSJ090613.75+561015.5	COS/FUV COS/NUV	3	24-Jan-2020 16:00:16.0	yes
03	(2) SDSSJ095418.16+471725.1	COS/FUV COS/NUV	4	24-Jan-2020 16:00:17.0	yes
04	(2) SDSSJ095418.16+471725.1	COS/FUV COS/NUV	3	24-Jan-2020 16:00:18.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
05	(3) SDSSJ100935.66+265648.9	COS/FUV COS/NUV	2	24-Jan-2020 16:00:19.0	yes
06	(3) SDSSJ100935.66+265648.9	COS/FUV COS/NUV	3	24-Jan-2020 16:00:20.0	yes

17 Total Orbits Used

ABSTRACT

Feedback processes play a vital role in the evolution of dwarf galaxies. While the stellar processes are believed to be the dominant source of feedback in dwarf galaxies, it is still under debate whether stellar feedback can reproduce all the properties of the dwarf galaxies we see today. There is growing evidence, both observational and theoretical, that feedback from active galactic nuclei (AGN) may also contribute to the evolution of dwarf galaxies. Indeed, recent Keck optical observations have revealed large-scale (reaching beyond the half-light radii) and fast (broad [OIII] linewidths up to 2000 km/s) outflows in a sample of dwarf galaxies with AGN. Remarkably, only one dwarf galaxy with an AGN (NGC 4395) has been examined so far in the rest-frame far-ultraviolet (FUV). So here we propose to conduct COS/FUV spectroscopy on the three dwarf galaxies with the fastest AGN outflows based on the optical data. The FUV band is rich in spectroscopic diagnostics of the neutral, low-ionization, and high-ionization gas phases. COS will thus allow us to quantify the kinematics, column densities, and energetics of all three gas phases at once. These results will be compared with the optical properties of these outflows, as well as with the vast literature on galactic winds in pure star-forming dwarf galaxies, to help us evaluate the impact of AGN feedback on dwarf galaxies and their environments.

OBSERVING DESCRIPTION

We were allocated 17 orbits to observe 3 targets with COS G160M with cenwave =1533 A. For each of the two brighter targets, the allocated 5 orbits are split into two visits of 2 orbits and 3 orbits respectively. This follows the recommendation by the Cycle 27 Phase II Proposal Instructions that visits of 2 or 3 orbits are easier for scheduling. For the faintest target, the 7 orbits allocated are split into two visits of 3 orbits and 4 orbits respectively. Splitting the 7 orbits into three visits will significantly increase the overheads and is thus not optimal given the faintness of the target.

For each visit, we first use ACQ/IMAGE to obtain a NUV image of the field and center the aperture on the intensity peak. For this procedure, we make use of MIRRORA for all of the targets. All of the targets are safe to observe and there is no BOT warning. The exposure times are generous to make sure that S/N > 20.

The spectroscopic exposures are set with different FP-POS values in each orbit to reduce the fixed pattern noise. We get all four FP-POS settings for all targets. All of the observations are done in TIME-TAG mode. This temporal sampling will allow us to exclude poor quality data and get improved thermal correction and background removal. High-ionization lines from C IV, Si IV, and weaker low-ionization lines from Si II and C II fit within the wavelength coverage of the data. All of the observation set-ups follow the COS 2025 policy (Table 2.1 of COS Handbook). For simplicity and to guard against the (unlikely) possibility that our targets are more than ~50% brighter than expected, we set buffer-time = exposure-time.

To our knowledge, there is no impact from the possible reduced-gyro operations except the scheduling of the observations.

Visit

Proposal 15915, Visit 01, implementation Fri Jan 24 21:00:20 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

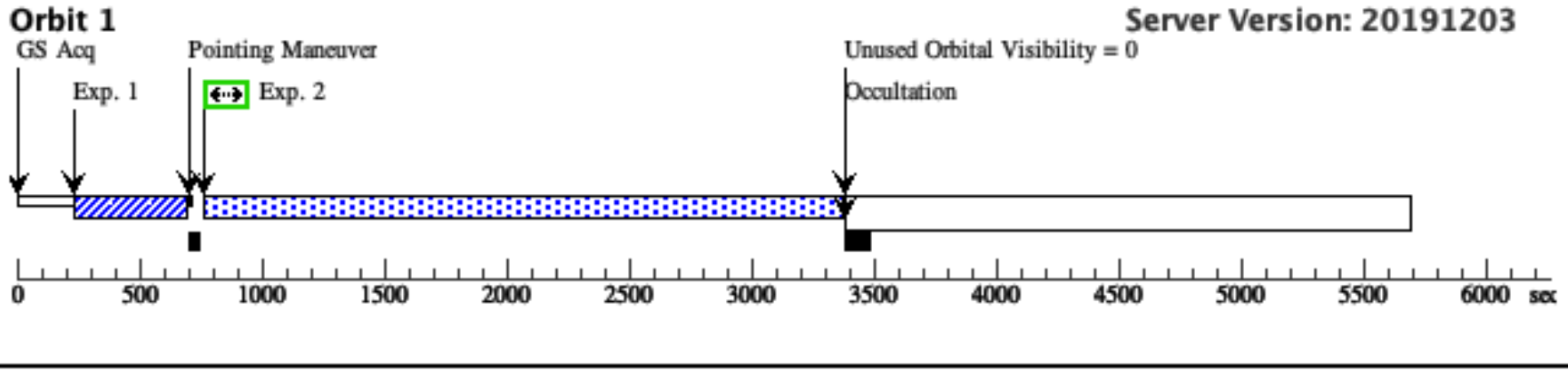
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSSJ090613.75+561015.5	RA: 09 06 13.7661 (136.5573587d) Dec: +56 10 15.23 (56.17090d) Equinox: J2000	Redshift: 0.047	V=17.67 m(FUV) = 20.01 (AB)	Reference Frame: ICRS

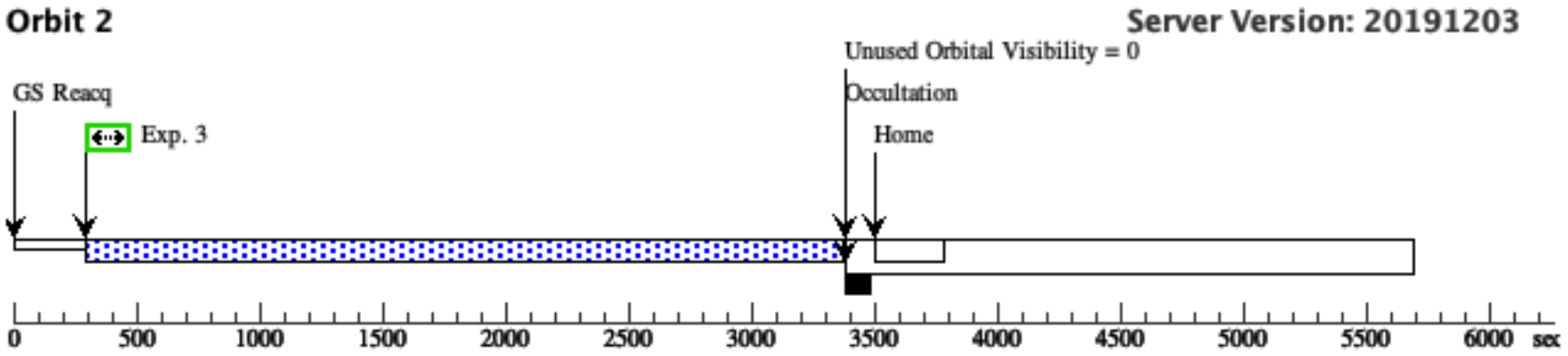
Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1364549)	(1) SDSSJ090613.75+561015.5	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				120 Secs (120 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1367084)	(1) SDSSJ090613.75+561015.5	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2391; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2391 Secs (2391 Secs) *[==>]*	 ***[1]***
3	(COS.sp.1367084)	(1) SDSSJ090613.75+561015.5	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=3023; FLASH=YES; FP-POS=2; SEGMENT=BOTH			3023 Secs (3023 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 15915, Visit 02, implementation Fri Jan 24 21:00:20 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

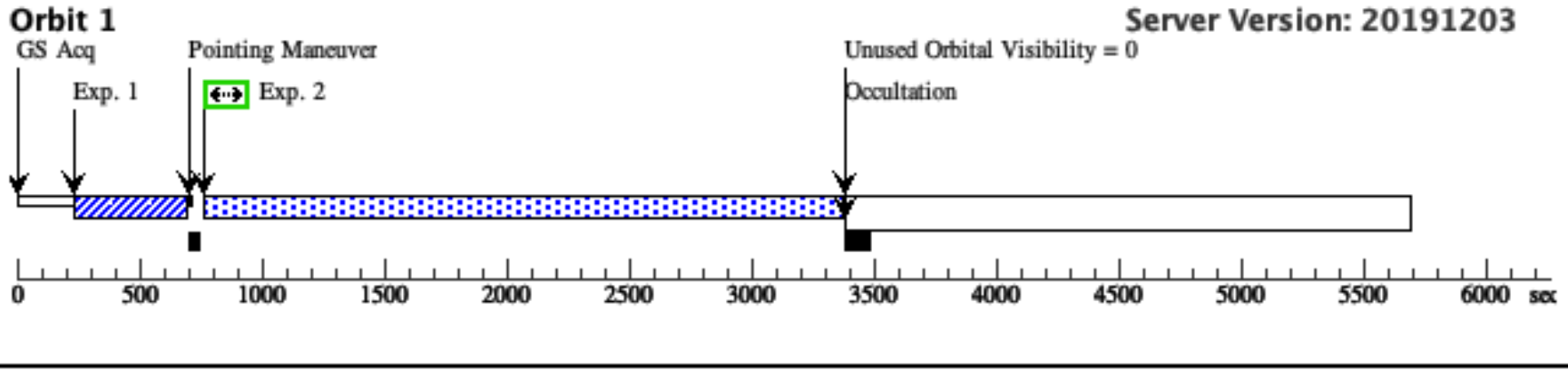
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSSJ090613.75+561015.5	RA: 09 06 13.7661 (136.5573587d) Dec: +56 10 15.23 (56.17090d) Equinox: J2000	Redshift: 0.047	V=17.67 m(FUV) = 20.01 (AB)	Reference Frame: ICRS

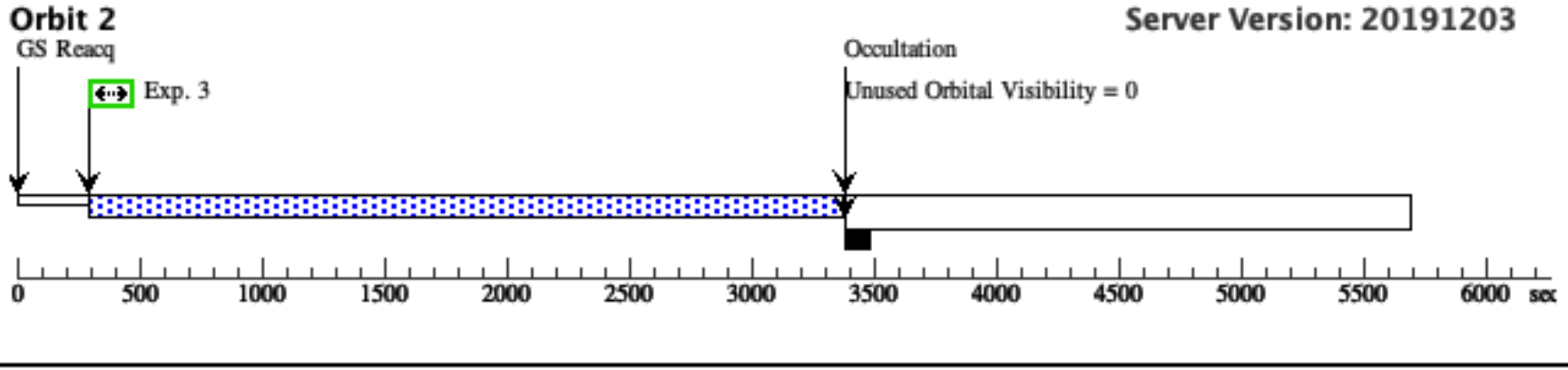
Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
Extended=NO

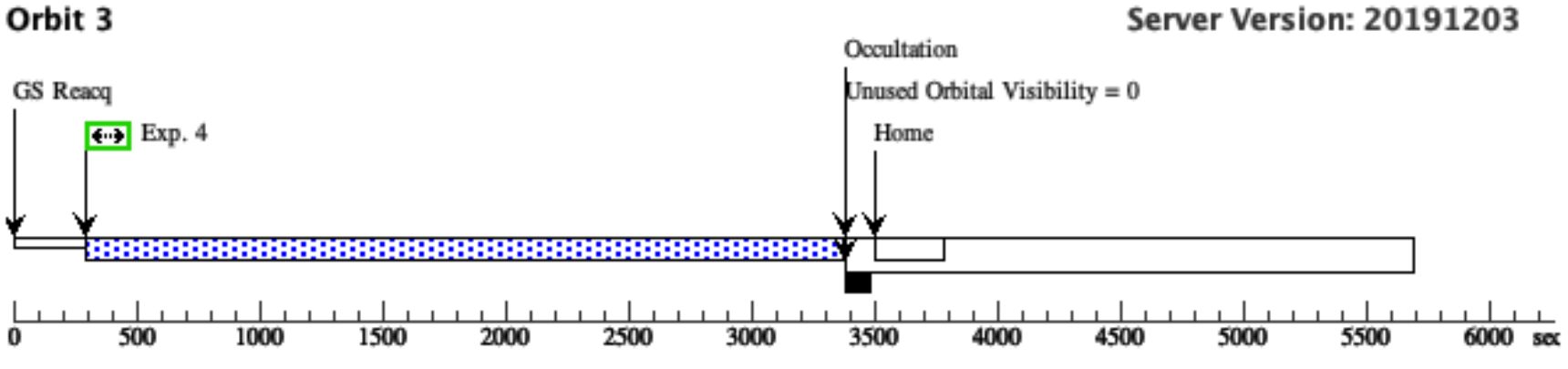
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1364549)	(1) SDSSJ090613.75+561015.5	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				120 Secs (120 Secs) *[==>]*	***[1]***
2	(COS.sp.1367084)	(1) SDSSJ090613.75+561015.5	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2391; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2391 Secs (2391 Secs) *[==>]*	***[1]***
3	(COS.sp.1367084)	(1) SDSSJ090613.75+561015.5	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=3023; FLASH=YES; FP-POS=3; SEGMENT=BOTH			3023 Secs (3023 Secs) *[==>]*	***[2]***
4	(COS.sp.1367084)	(1) SDSSJ090613.75+561015.5	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=3023; FLASH=YES; FP-POS=4; SEGMENT=BOTH			3023 Secs (3023 Secs) *[==>]*	***[3]***

Orbit Structure







Visit

Proposal 15915, Visit 03, implementation Fri Jan 24 21:00:20 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

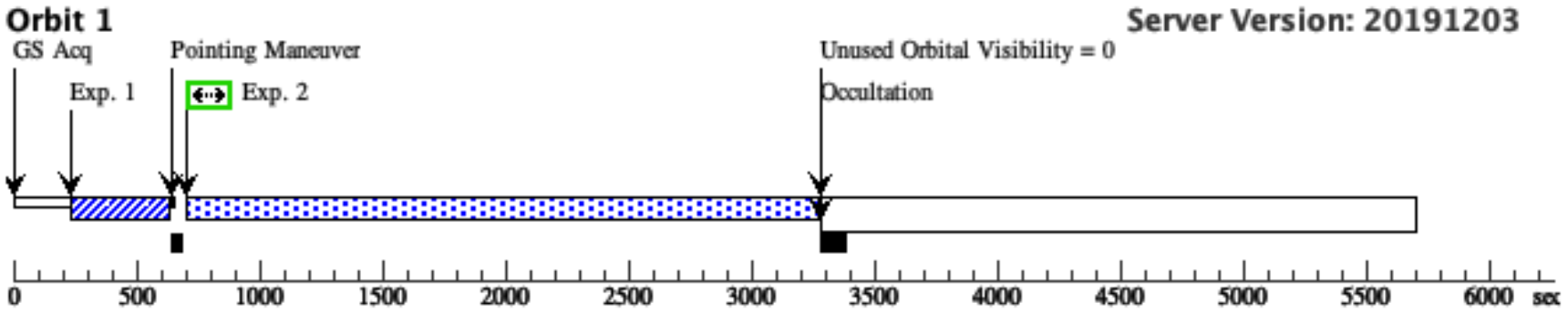
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SDSSJ095418.16+471725.1	RA: 09 54 18.1543 (148.5756429d) Dec: +47 17 25.11 (47.29031d) Equinox: J2000	Redshift: 0.033	V=17.33 m(FUV) = 20.47 (AB)	Reference Frame: ICRS

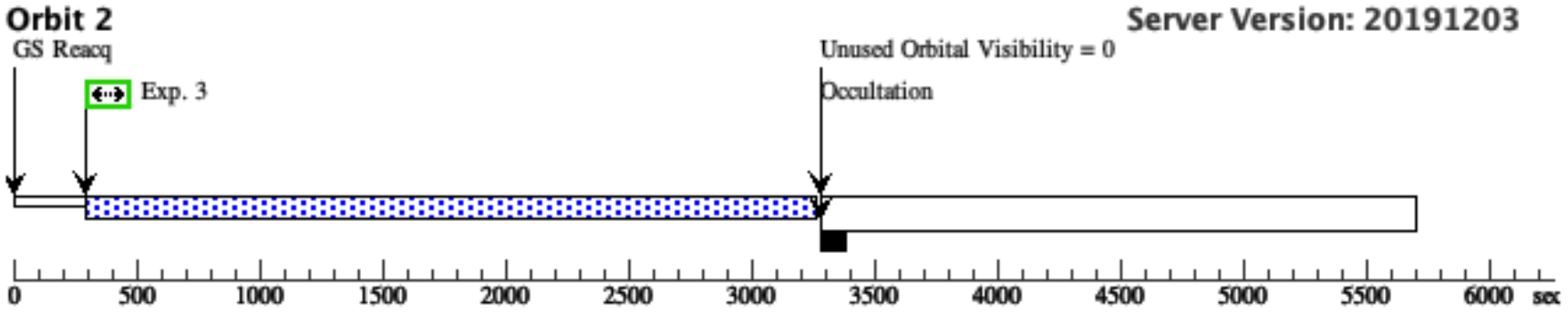
Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
Extended=NO

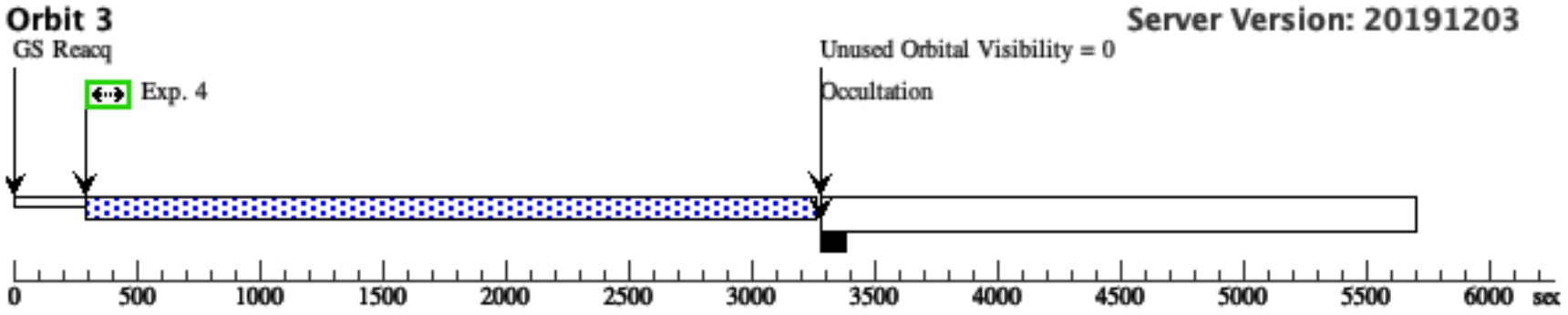
Exposures

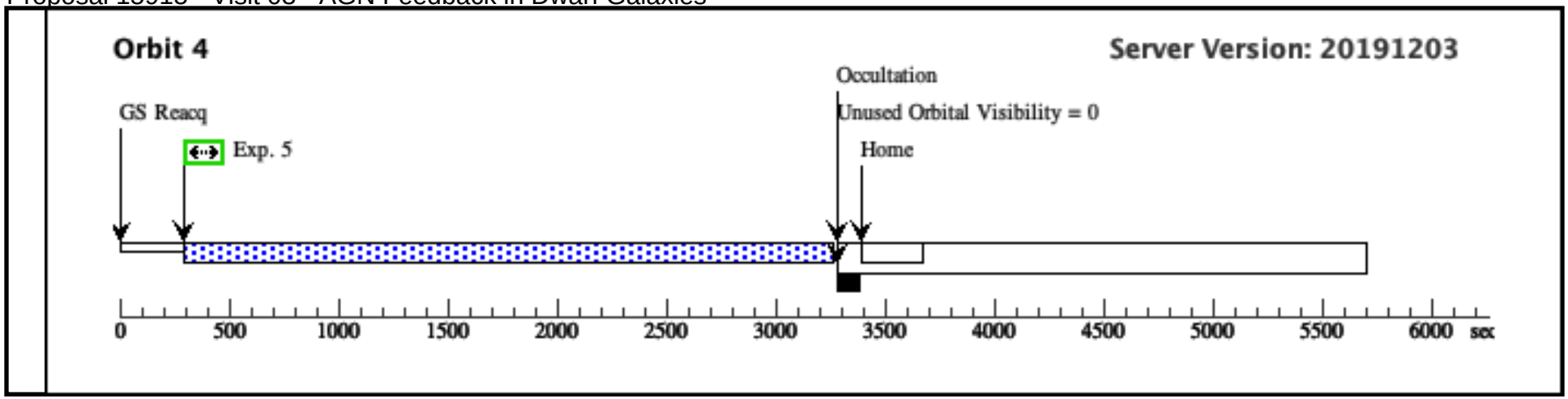
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1367100)	(2) SDSSJ095418.16+471725.1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				90 Secs (90 Secs) *[==>]*	*[1]*
2	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2347; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2347 Secs (2347 Secs) *[==>]*	*[1]*
3	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2919; FLASH=YES; FP-POS=2; SEGMENT=BOTH			2919 Secs (2919 Secs) *[==>]*	*[2]*
4	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2919; FLASH=YES; FP-POS=3; SEGMENT=BOTH			2919 Secs (2919 Secs) *[==>]*	*[3]*
5	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2919; FLASH=YES; FP-POS=4; SEGMENT=BOTH			2919 Secs (2919 Secs) *[==>]*	*[4]*

Orbit Structure





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sec

Visit

Proposal 15915, Visit 04, implementation Fri Jan 24 21:00:21 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

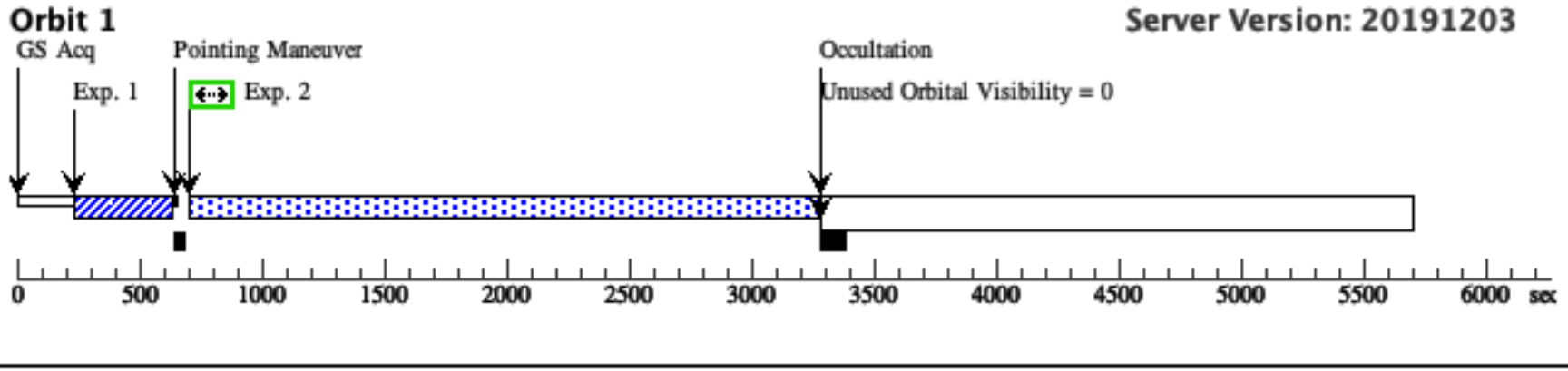
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SDSSJ095418.16+471725.1	RA: 09 54 18.1543 (148.5756429d) Dec: +47 17 25.11 (47.29031d) Equinox: J2000	Redshift: 0.033	V=17.33 m(FUV) = 20.47 (AB)	Reference Frame: ICRS

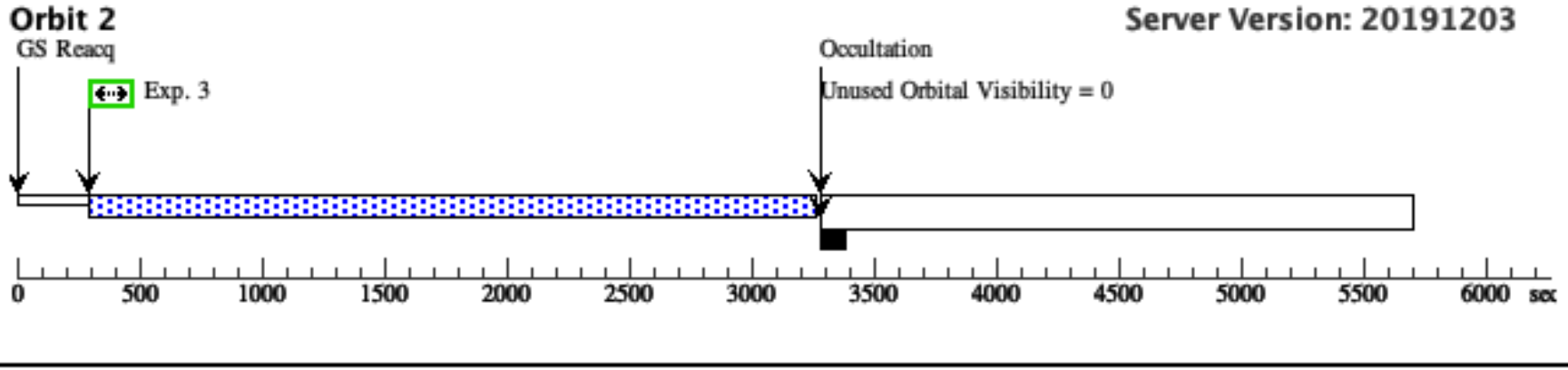
Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
Extended=NO

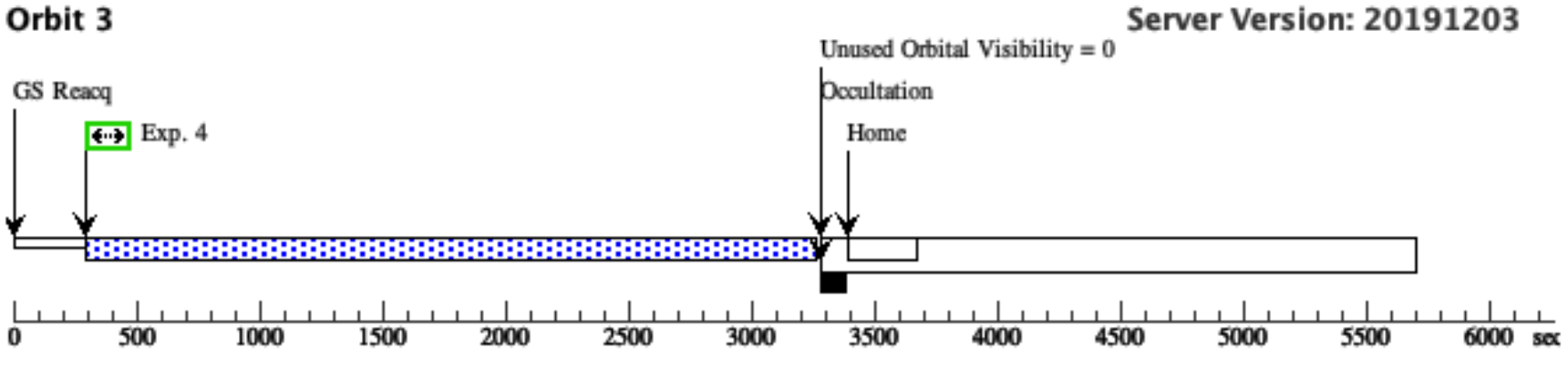
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1367100)	(2) SDSSJ095418.16+471725.1	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				90 Secs (90 Secs) *[==>]*	***[1]***
2	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2347; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2347 Secs (2347 Secs) *[==>]*	***[1]***
3	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2919; FLASH=YES; FP-POS=3; SEGMENT=BOTH			2919 Secs (2919 Secs) *[==>]*	***[2]***
4	(COS.sp.1367147)	(2) SDSSJ095418.16+471725.1	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2919; FLASH=YES; FP-POS=4; SEGMENT=BOTH			2919 Secs (2919 Secs) *[==>]*	***[3]***

Orbit Structure







Visit

Proposal 15915, Visit 05, implementation Fri Jan 24 21:00:21 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

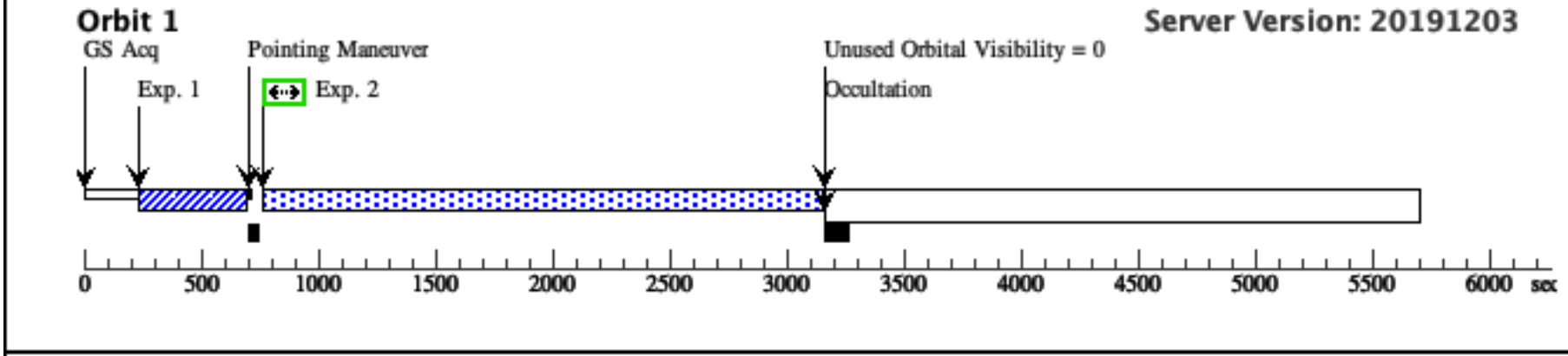
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SDSSJ100935.66+265648.9	RA: 10 09 35.6633 (152.3985971d) Dec: +26 56 48.99 (26.94694d) Equinox: J2000	Redshift: 0.014	V=16.46 m(FUV) = 19.94 (AB)	Reference Frame: ICRS

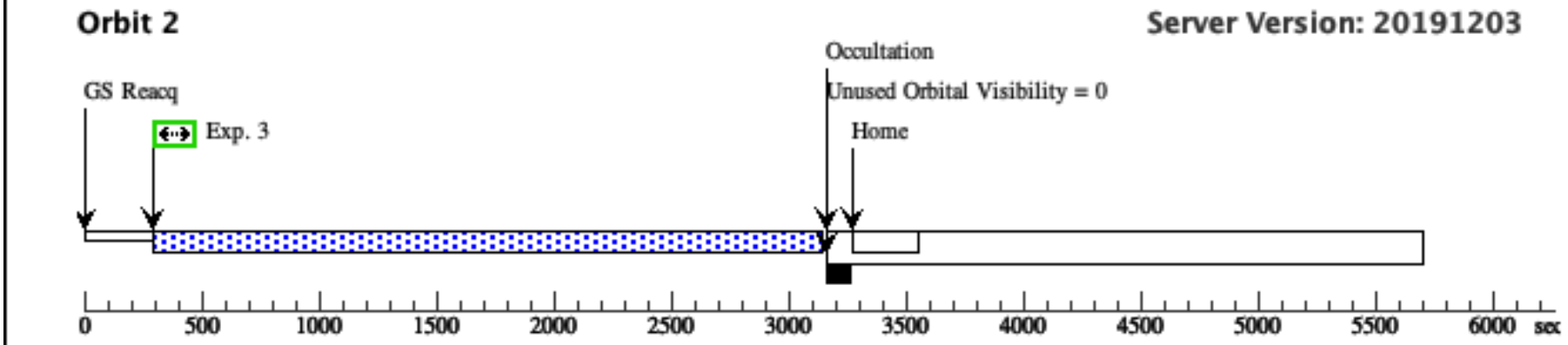
Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1367149)	(3) SDSSJ100935.66+265648.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				120 Secs (120 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1367169)	(3) SDSSJ100935.66+265648.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2167; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2167 Secs (2167 Secs) *[==>]*	 ***[1]***
3	(COS.sp.1367169)	(3) SDSSJ100935.66+265648.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2799; FLASH=YES; FP-POS=2; SEGMENT=BOTH			2799 Secs (2799 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 15915, Visit 06, implementation Fri Jan 24 21:00:21 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)	SDSSJ100935.66+265648.9	RA: 10 09 35.6633 (152.3985971d) Dec: +26 56 48.99 (26.94694d) Equinox: J2000	Redshift: 0.014	V=16.46 m(FUV) = 19.94 (AB)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, WIND]
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.1367149)	(3) SDSSJ100935.66+265648.9	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				120 Secs (120 Secs) *[==>]*	***[1]***
2	(COS.sp.1367169)	(3) SDSSJ100935.66+265648.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2167; FLASH=YES; FP-POS=1; SEGMENT=BOTH			2167 Secs (2167 Secs) *[==>]*	***[1]***
3	(COS.sp.1367169)	(3) SDSSJ100935.66+265648.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2799; FLASH=YES; FP-POS=3; SEGMENT=BOTH			2799 Secs (2799 Secs) *[==>]*	***[2]***
4	(COS.sp.1367169)	(3) SDSSJ100935.66+265648.9	COS/FUV, TIME-TAG, PSA	G160M 1533 A	BUFFER-TIME=2799; FLASH=YES; FP-POS=4; SEGMENT=BOTH			2799 Secs (2799 Secs) *[==>]*	***[3]***

Orbit Structure