



15105 - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Cycle: 25, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) SDSS-J132921.43+372450.4	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:01:54.0	yes
07	(1) SDSS-J132921.43+372450.4	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:01:56.0	yes
02	(2) SDSS-J151923.14+203233.6	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:01:57.0	yes
03	(3) SDSS-J120049.26+152704.3	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:01:59.0	yes
04	(4) SDSS-J210349.17-063006.5	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:02:00.0	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>
05	(5) SDSS-J212427.54+112506.6	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:02:02.0	yes
06	(6) SDSS-J232332.63+131538.3	WFC3/IR WFC3/UVIS	2	04-Jun-2018 18:02:03.0	yes

14 Total Orbits Used

ABSTRACT

The role of dust in shaping the spectral energy distributions of low mass disk galaxies remains poorly understood. Recent results from the Herschel Space Observatory imply that dwarf galaxies contain large amounts of cool ($T \sim 20\text{K}$) dust, coupled with very modest optical extinctions. These seemingly contradictory conclusions may be resolved if dwarfs harbor a variety of dust geometries, e.g., dust at larger galactocentric radii or in quiescent dark clumps.

We propose HST observations of six truly occulting dwarf galaxies drawn from the Galaxy Zoo catalog of silhouetted galaxy pairs. Confirmed, true occulting dwarfs are rare as most low-mass disks in overlap are either close satellites or do not have a confirmed redshift. Dwarf occulters are the key to determining the spatial extent of dust, the small scale structure introduced by turbulence, and the prevailing dust attenuation law. The recent spectroscopic confirmation of bona-fide low mass occulting dwarfs offers an opportunity to map dust in these with HST. What is the role of dust in the SED of these dwarf disk galaxies? With shorter feedback scales, how does star-formation affect their morphology and dust composition, as revealed from their attenuation curve?

The resolution of HST allows us to map the dust disks down to the fine scale structure of molecular clouds and multi-wavelength imaging maps the attenuation curve and hence dust composition in these disks. We therefore ask for 2 orbits on each of 6 dwarf galaxies in F275W, F475W, F606W, F814W and F125W to map dust from UV to NIR to constrain the attenuation curve.

OBSERVING DESCRIPTION

The observations are two orbit, WFC3/UVIS & IR observations of each pair in the F275W, F475W, F606W, F814W and F125W filters, crsplit to remove cosmics. Roll angle is not constrained as each pair fits comfortably in the WFC3 field-of-view.

Filter Choices

Our choice of filters reflects the need to sample the attenuation curve in the ultra-violet through near-infrared (see Fig. 4). The F275W maximizes leverage on the attenuation in the ultra-violet combined with excellent throughput and sensitivity for short exposures. The F475W (Johnson B), F606W (Johnson V) and F814W (Johnson I) filters are to ensure coverage in the optical for compatibility with other observations and F125W (J-band) to ensure maximum wavelength leverage. With five filters, the attenuation curve is sufficiently sampled to distinguish between the different ones observed in local galaxies: Milky Way (Cardelli et al., 1989), Magellanic Clouds or star-forming (Calzetti et al., 1994).

Exposure time

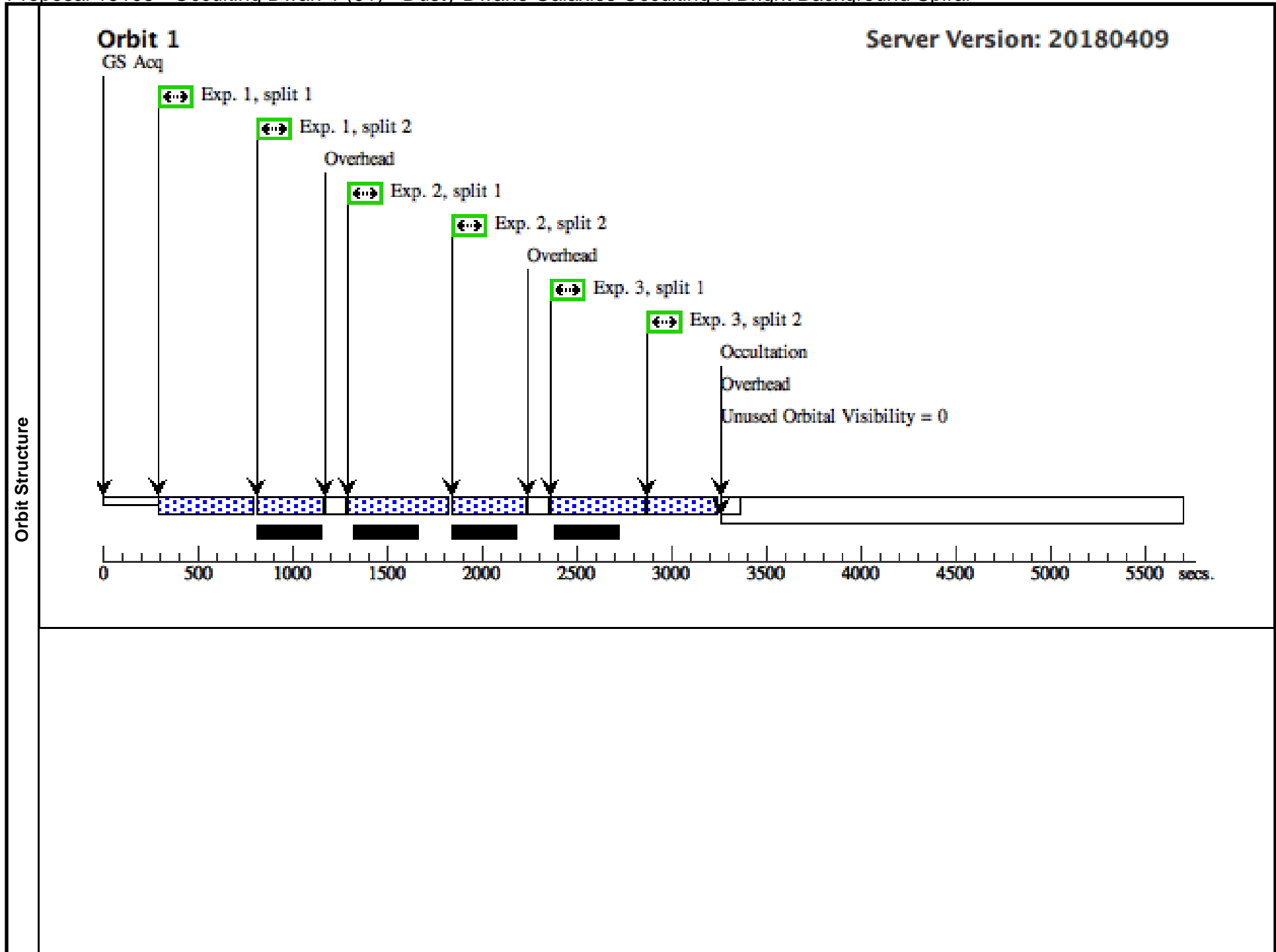
According to the HST/WFC3 ETC, a typical short 700 sec. exposure in F606W results in $s/n > 7$ at the RPetrosian radius of both galaxies, ensuring sufficient overlap region for a measurement. Once exposures reach a depth where nonsymmetric structures in galaxies dominate (small-scale in the outer disk), total time is better spent on more galaxies rather than going deeper since asymmetry is what sets errors for each system. Short exposures in each of the WFC3 filters fit in two orbits per target, resulting in 12 orbits for our full sample.

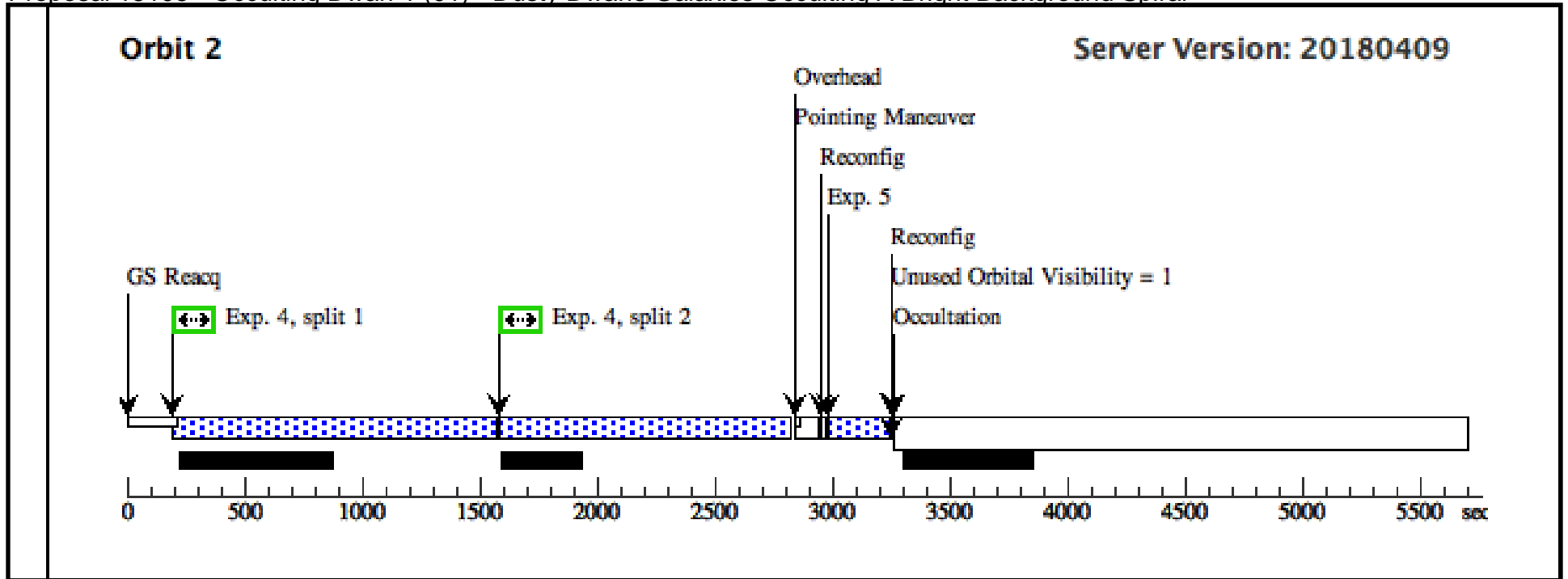
We have scaled the observations in all filters to be as close as practical to $s/n \sim 4$ at the R25, the outer limit for a typical galaxy. This should ensure enough s/n in the background flux of the (most often spiral) background galaxy and image the foreground dwarf in enough detail. The s/n in F225W is lower but we are limited by symmetry effects here rather than flux.

Proposal 15105 - Occulting Dwarf 1 (01) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:04 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 1 (01), failed Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	(Exposure 1 (Occulting Dwarf 1 (01))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SDSS-J132921.43+372450.4	RA: 13 29 21.4300 (202.3392917d) Dec: +37 24 50.40 (37.41400d) Equinox: J2000		V=15.01	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [==>350.0 Secs (Split 1)] [==>350.0 Secs (Split 2)]	[1]
	2		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (780 Secs) [==>390.0 Secs (Split 1)] [==>390.0 Secs (Split 2)]	[1]
	3		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (739 Secs) [==>370.0 Secs (Split 1)] [==>369.0 Secs (Split 2)]	[1]
	4		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2484 Secs) [==>1242.0 Secs (Split 1)] [==>1242.0 Secs (Split 2)]	[2]
	5		(1) SDSS-J132921.4 3+372450.4	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [==>]	[2]

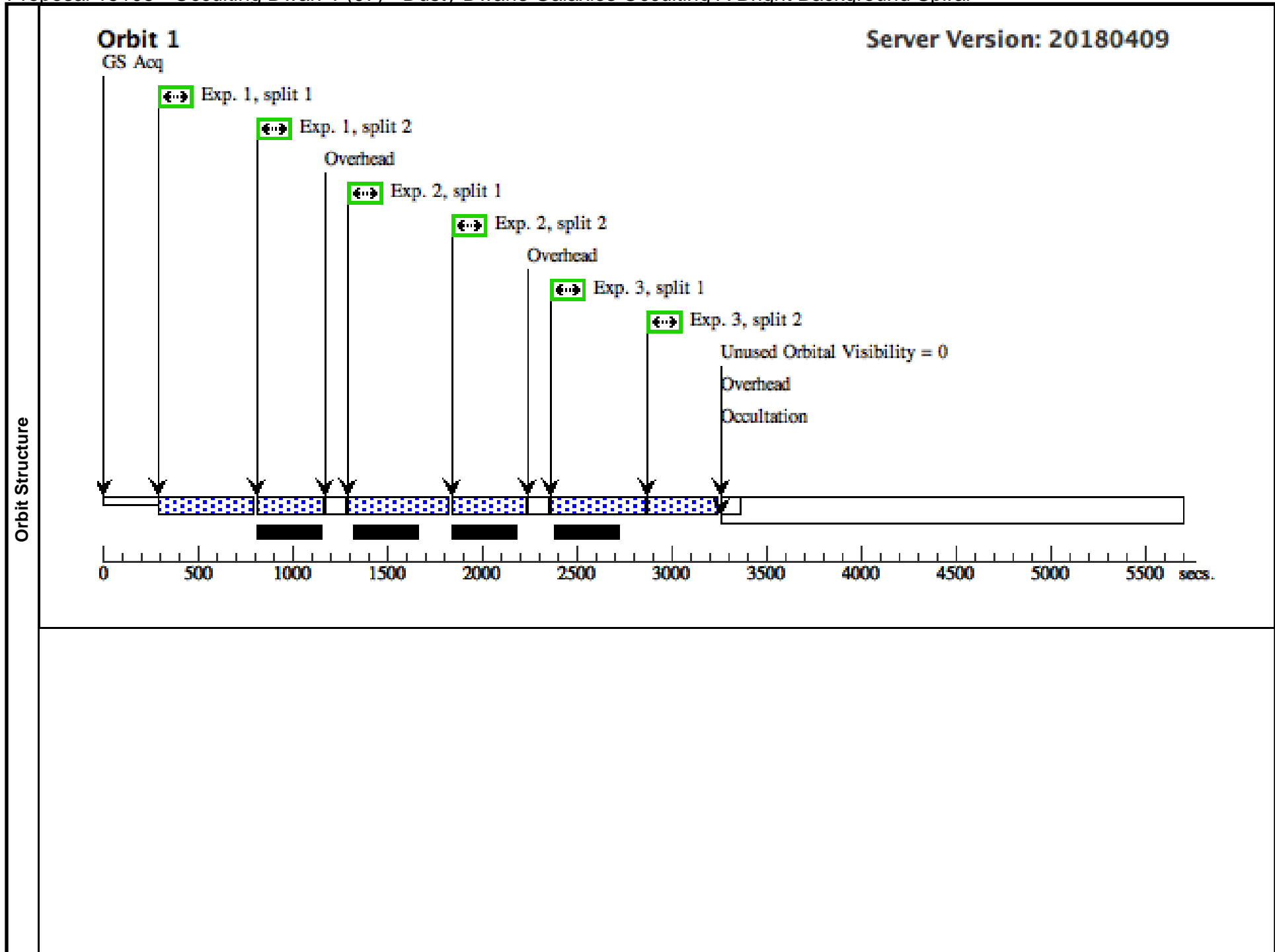


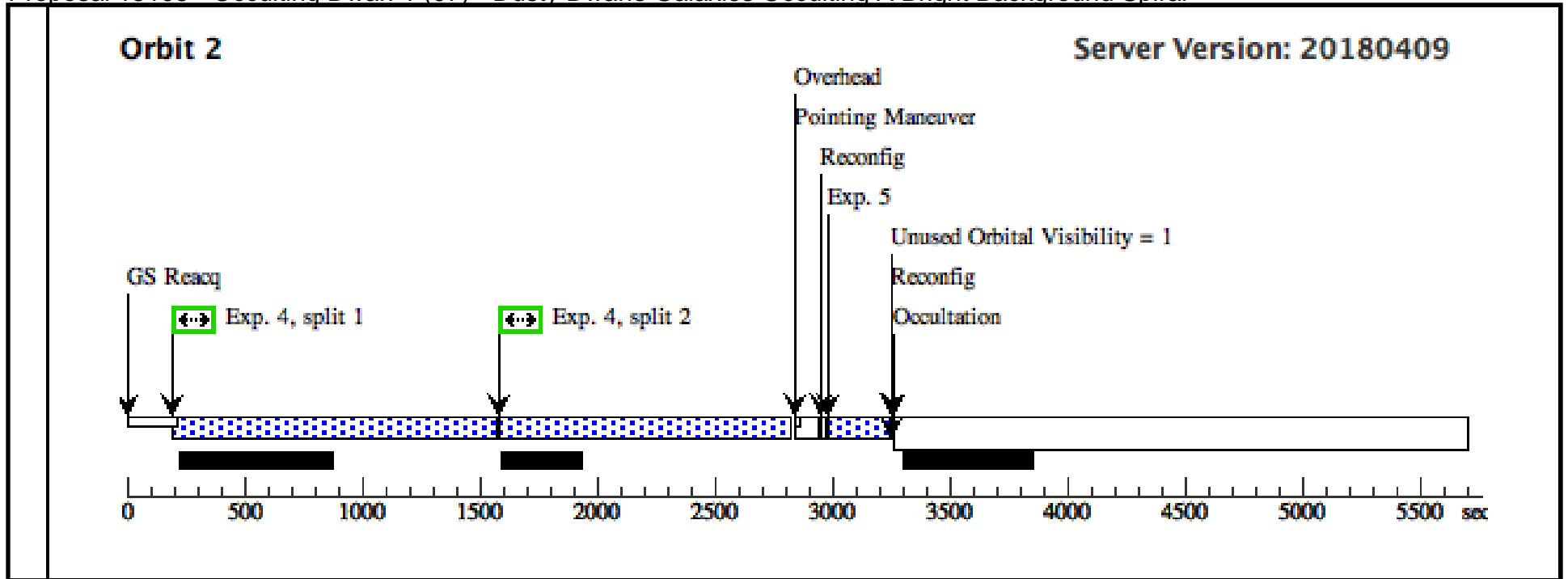


Proposal 15105 - Occulting Dwarf 1 (07) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 1 (07) Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SDSS-J132921.43+372450.4	RA: 13 29 21.4300 (202.3392917d) Dec: +37 24 50.40 (37.41400d) Equinox: J2000		V=15.01	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [=>>350.0 Secs (Split 1)] [=>>350.0 Secs (Split 2)]	[1]
	2		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (780 Secs) [=>>390.0 Secs (Split 1)] [=>>390.0 Secs (Split 2)]	[1]
	3		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (739 Secs) [=>>370.0 Secs (Split 1)] [=>>369.0 Secs (Split 2)]	[1]
	4		(1) SDSS-J132921.4 3+372450.4	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2484 Secs) [=>>1242.0 Secs (Split 1)] [=>>1242.0 Secs (Split 2)]	[2]
	5		(1) SDSS-J132921.4 3+372450.4	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [=>>]	[2]

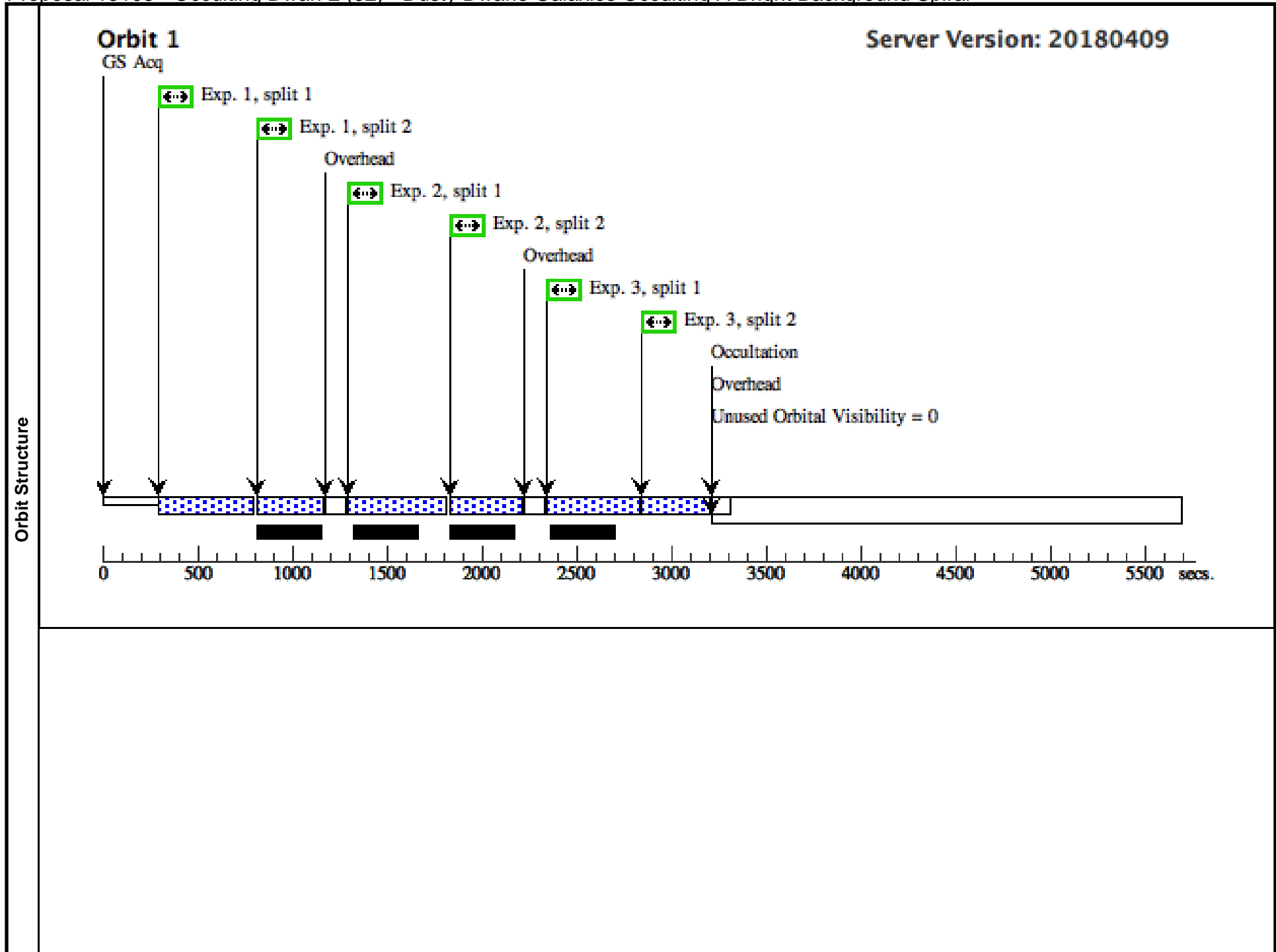


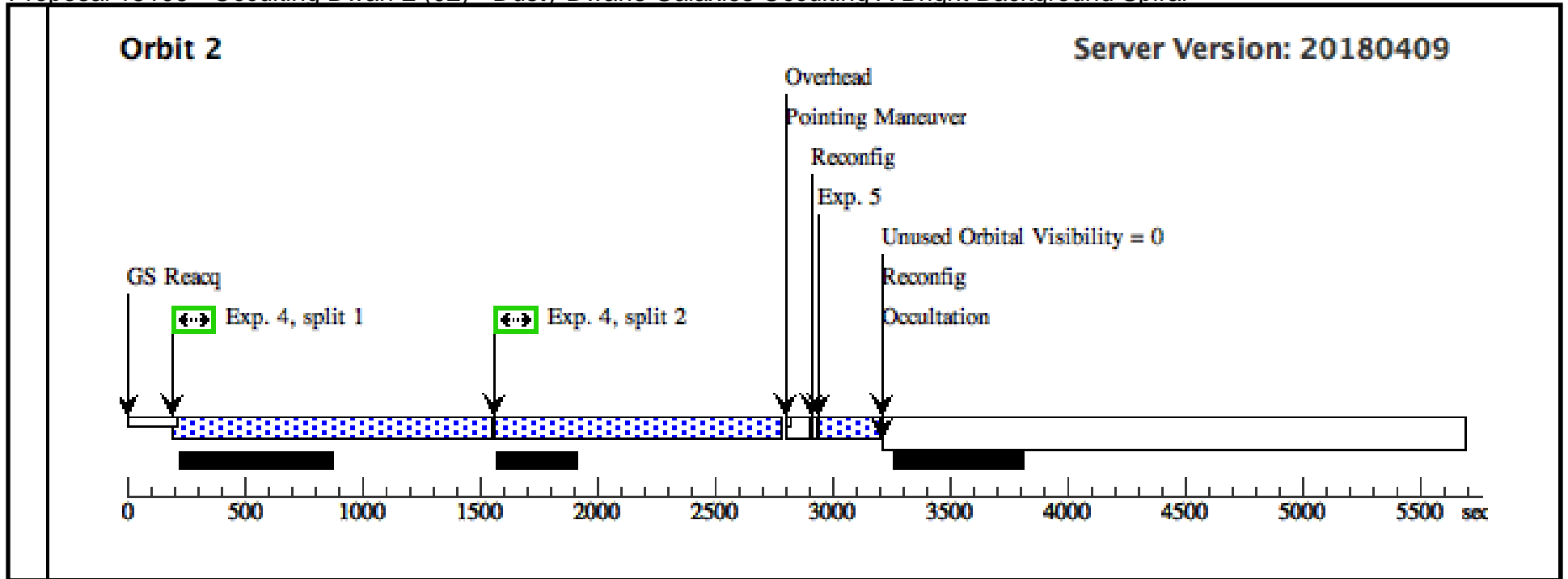


Proposal 15105 - Occulting Dwarf 2 (02) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 2 (02), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	(Exposure 1 (Occulting Dwarf 2 (02))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	SDSS-J151923.14+203233.6	RA: 15 19 23.1400 (229.8464167d) Dec: +20 32 33.60 (20.54267d) Equinox: J2000		V=15.57	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) SDSS-J151923.1 4+203233.6	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [=>350 Secs (Split 1)] [=>350 Secs (Split 2)]	[1]
	2		(2) SDSS-J151923.1 4+203233.6	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (756 Secs) [=>378.0 Secs (Split 1)] [=>378.0 Secs (Split 2)]	[1]
	3		(2) SDSS-J151923.1 4+203233.6	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (720 Secs) [=>360.0 Secs (Split 1)] [=>360.0 Secs (Split 2)]	[1]
	4		(2) SDSS-J151923.1 4+203233.6	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2442 Secs) [=>1221.0 Secs (Split 1)] [=>1221.0 Secs (Split 2)]	[2]
	5		(2) SDSS-J151923.1 4+203233.6	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [=>]	[2]

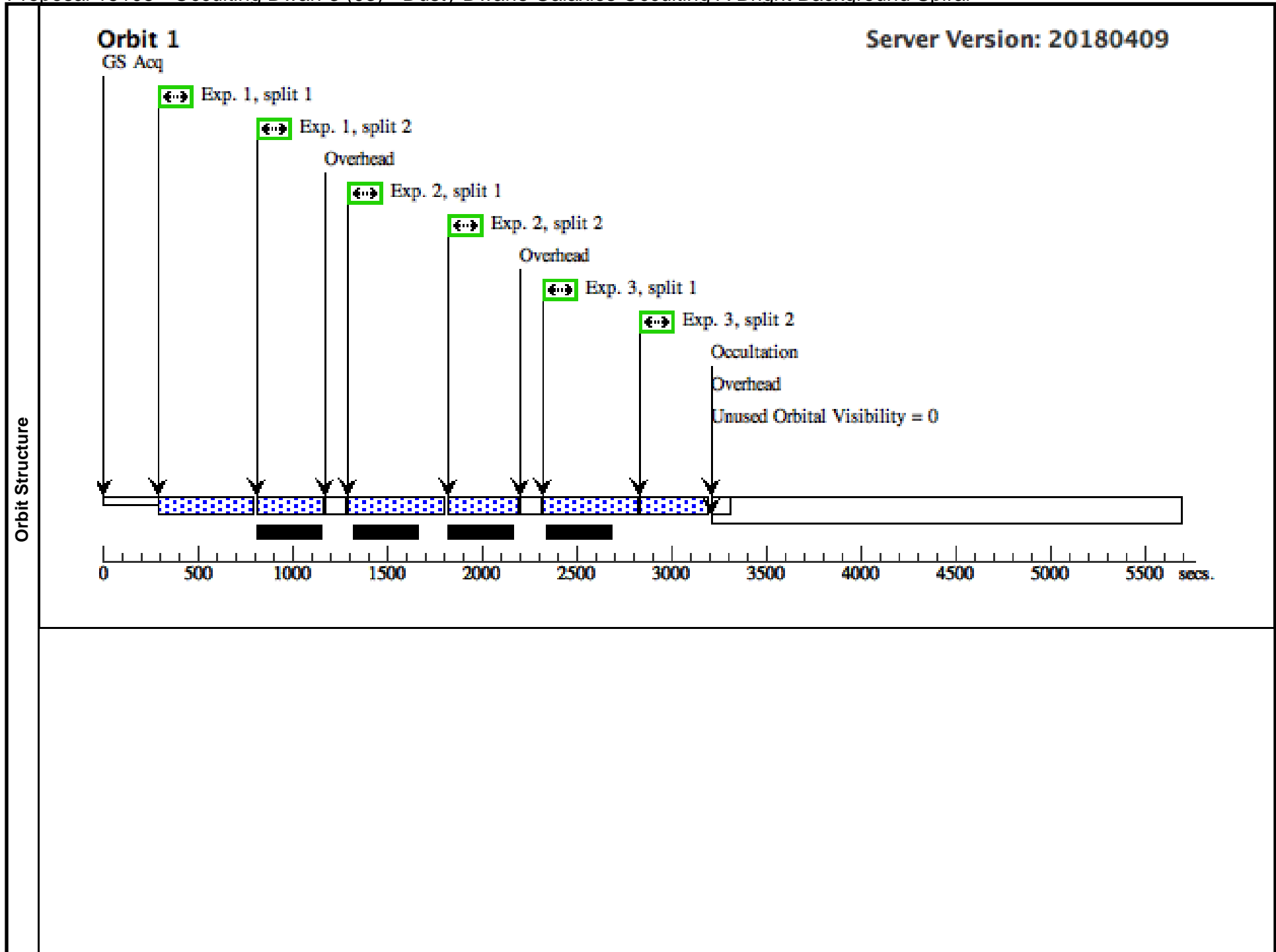


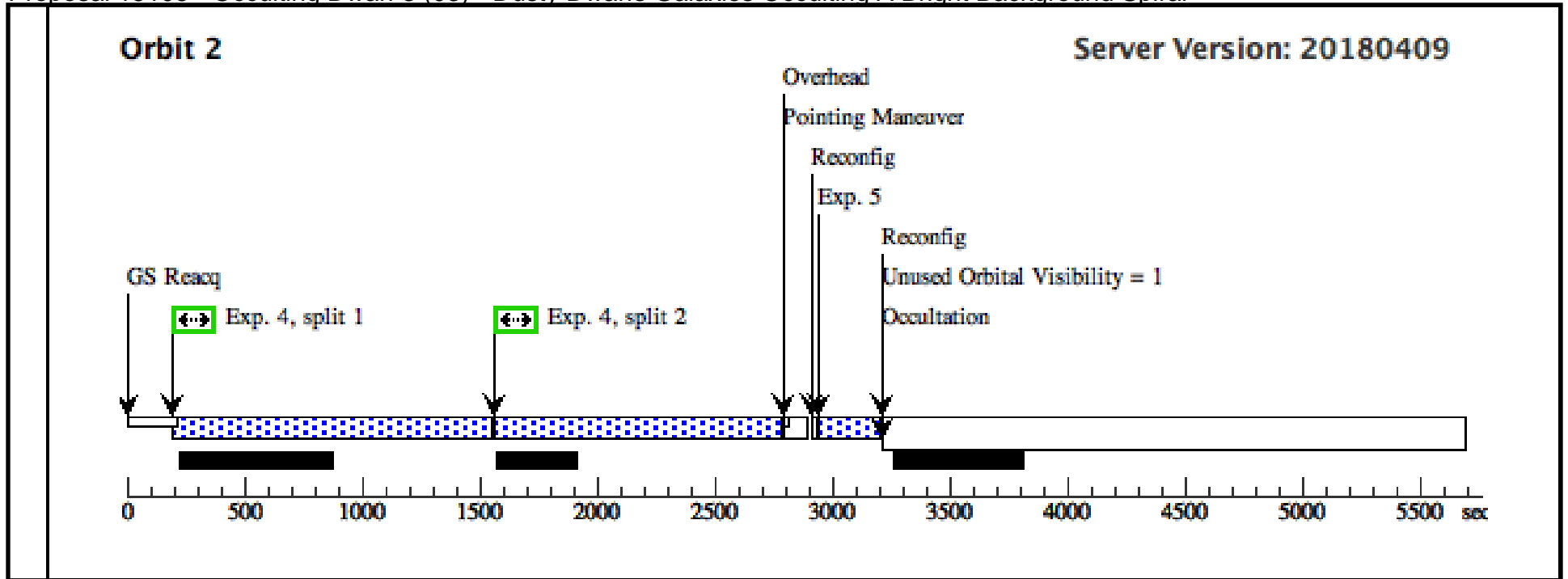


Proposal 15105 - Occulting Dwarf 3 (03) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 3 (03), completed Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	(Exposure 1 (Occulting Dwarf 3 (03))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	SDSS-J120049.26+152704.3	RA: 12 00 49.2600 (180.2052500d) Dec: +15 27 4.30 (15.45119d) Equinox: J2000		V=15.71	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) SDSS-J120049.2 6+152704.3	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [=>>350 Secs (Split 1)] [=>>350 Secs (Split 2)]	[1]
	2		(3) SDSS-J120049.2 6+152704.3	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (740 Secs) [=>>370.0 Secs (Split 1)] [=>>370.0 Secs (Split 2)]	[1]
	3		(3) SDSS-J120049.2 6+152704.3	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (735 Secs) [=>>370.0 Secs (Split 1)] [=>>365.0 Secs (Split 2)]	[1]
	4		(3) SDSS-J120049.2 6+152704.3	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2440 Secs) [=>>1220.0 Secs (Split 1)] [=>>1220.0 Secs (Split 2)]	[2]
	5		(3) SDSS-J120049.2 6+152704.3	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [=>>]	[2]

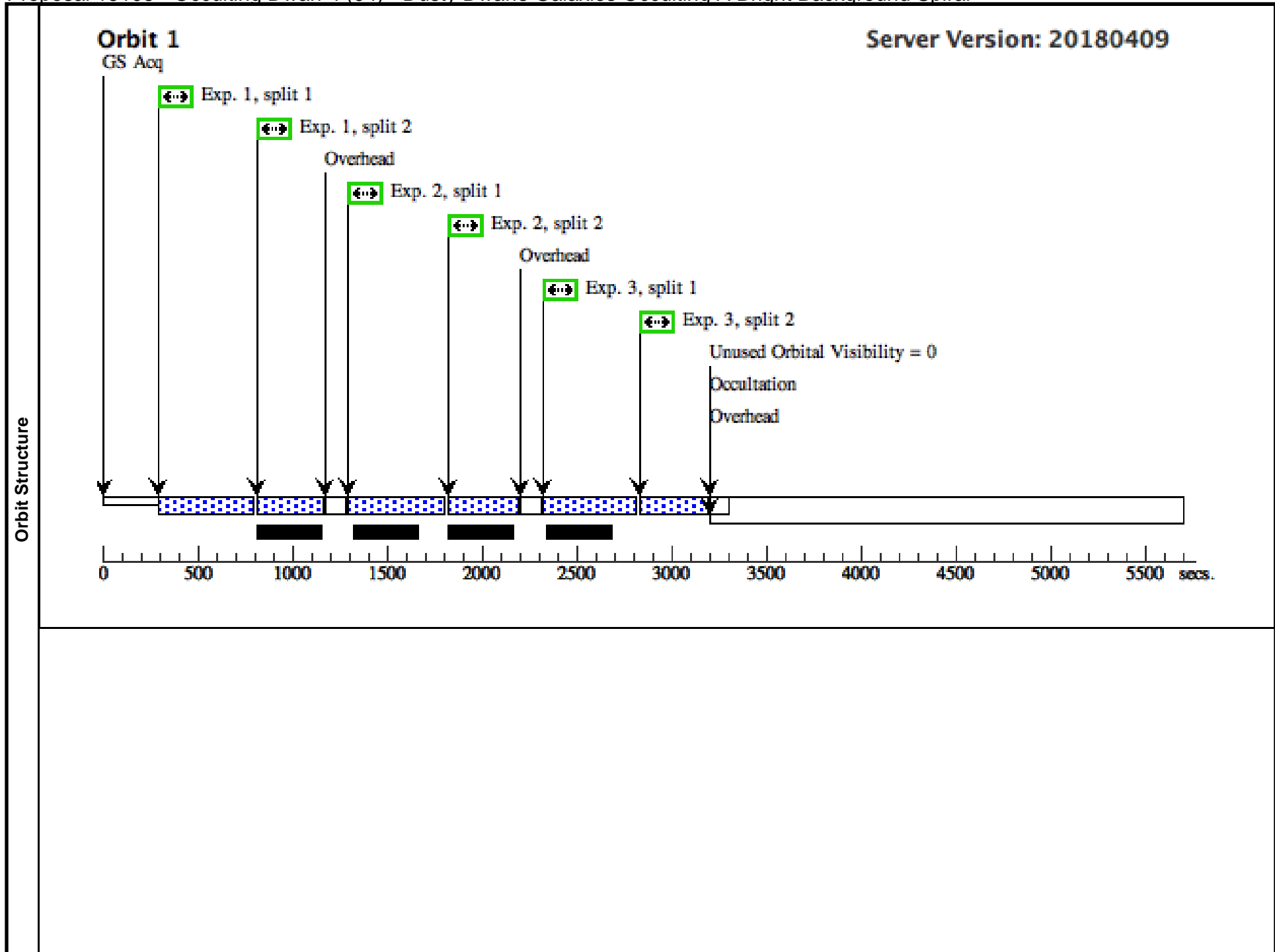


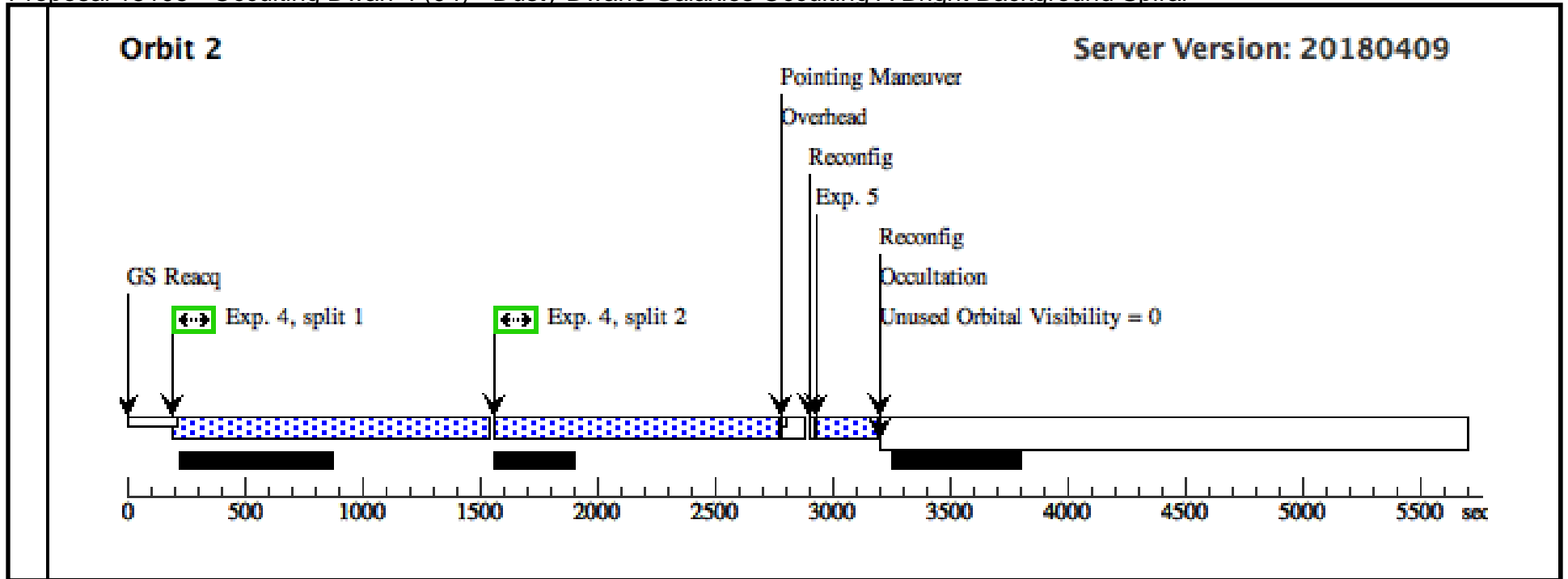


Proposal 15105 - Occulting Dwarf 4 (04) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 4 (04), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(4)	SDSS-J210349.17-063006.5	RA: 21 03 49.1700 (315.9548750d) Dec: -06 30 6.50 (-6.50181d) Equinox: J2000		V=17.49	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(4) SDSS-J210349.17-063006.5	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [==>350 Secs (Split 1)] [==>350 Secs (Split 2)]	[1]
	2		(4) SDSS-J210349.17-063006.5	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (740 Secs) [==>370.0 Secs (Split 1)] [==>370.0 Secs (Split 2)]	[1]
	3		(4) SDSS-J210349.17-063006.5	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (724 Secs) [==>362.0 Secs (Split 1)] [==>362.0 Secs (Split 2)]	[1]
	4		(4) SDSS-J210349.17-063006.5	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2430 Secs) [==>1215.0 Secs (Split 1)] [==>1215.0 Secs (Split 2)]	[2]
	5		(4) SDSS-J210349.17-063006.5	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [==>]	[2]

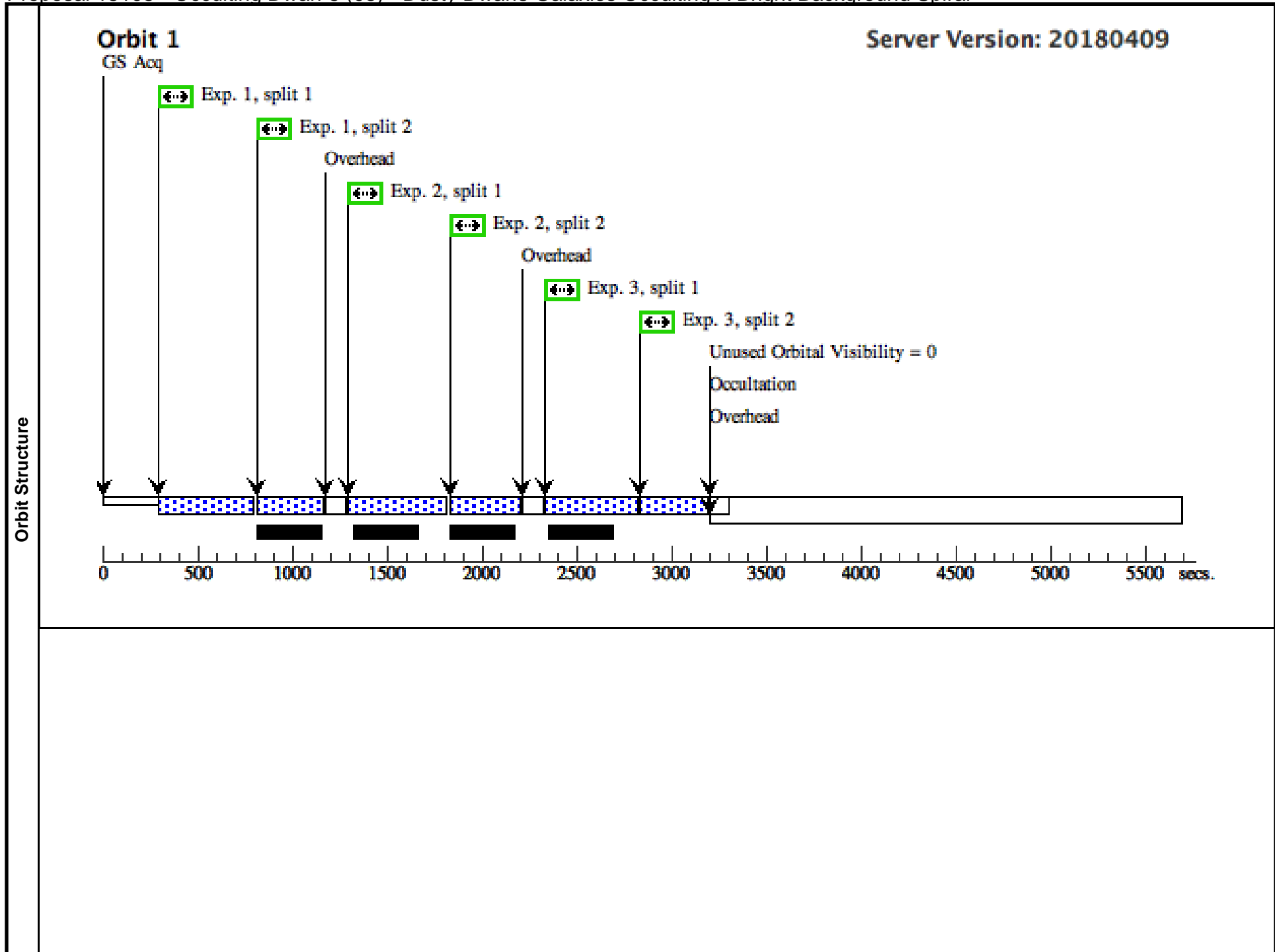


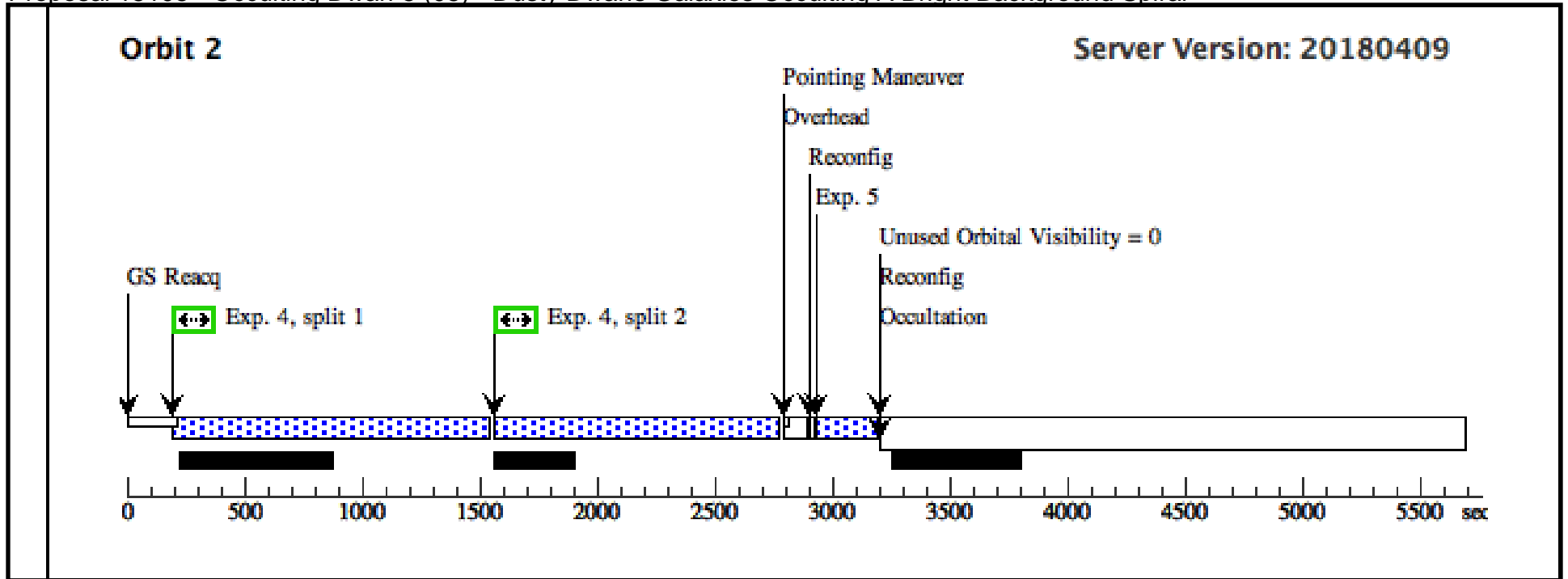


Proposal 15105 - Occulting Dwarf 5 (05) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 5 (05), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	(Exposure 1 (Occulting Dwarf 5 (05))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(5)	SDSS-J212427.54+112506.6	RA: 21 24 27.5400 (321.1147500d) Dec: +11 25 6.60 (11.41850d) Equinox: J2000		V=18.24	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(5) SDSS-J212427.5 4+112506.6	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [=>350 Secs (Split 1)] [=>350 Secs (Split 2)]	[1]
	2		(5) SDSS-J212427.5 4+112506.6	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (748 Secs) [=>378.0 Secs (Split 1)] [=>370.0 Secs (Split 2)]	[1]
	3		(5) SDSS-J212427.5 4+112506.6	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (720 Secs) [=>360.0 Secs (Split 1)] [=>360.0 Secs (Split 2)]	[1]
	4		(5) SDSS-J212427.5 4+112506.6	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2434 Secs) [=>1217.0 Secs (Split 1)] [=>1217.0 Secs (Split 2)]	[2]
	5		(5) SDSS-J212427.5 4+112506.6	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [=>]	[2]





Proposal 15105 - Occulting Dwarf 1 (06) - Dusty Dwarfs Galaxies Occulting A Bright Background Spiral

Mon Jun 04 22:02:05 GMT 2018

Visit	Proposal 15105, Occulting Dwarf 1 (06), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	(Exposure 1 (Occulting Dwarf 1 (06))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(6)	SDSS-J232332.63+131538.3	RA: 23 23 32.6300 (350.8859583d) Dec: +13 15 38.30 (13.26064d) Equinox: J2000		V=16.58	Reference Frame: ICRS				
Comments: Category=GALAXY Description=[DISK, DUST LANE, DWARF COMPACT, SPIRAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(6) SDSS-J232332.63+131538.3	WFC3/UVIS, ACCUM, UVIS	F275W	FLASH=10; CR-SPLIT=2			700 Secs (700 Secs) [=>350 Secs (Split 1)] [=>350 Secs (Split 2)]	[1]
	2		(6) SDSS-J232332.63+131538.3	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2; FLASH=5			700 Secs (740 Secs) [=>370.0 Secs (Split 1)] [=>370.0 Secs (Split 2)]	[1]
	3		(6) SDSS-J232332.63+131538.3	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=2			700 Secs (728 Secs) [=>364.0 Secs (Split 1)] [=>364.0 Secs (Split 2)]	[1]
	4		(6) SDSS-J232332.63+131538.3	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2			700 Secs (2434 Secs) [=>1217.0 Secs (Split 1)] [=>1217.0 Secs (Split 2)]	[2]
	5		(6) SDSS-J232332.63+131538.3	WFC3/IR, MULTIACCUM, IR	F125W	NSAMP=10; SAMP-SEQ=SPAR S25			227.936926 Secs (227.937 Secs) [=>]	[2]

