15194 - The Epoch of the First Star Formation in the Closest Metal-Poor Blue Compact Dwarf Galaxy UGC 4483

Cycle: 25, 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) UGC4483 ANY	ACS/WFC WFC3/UVIS	6	28-Nov-2018 16:03:26.0	yes
02	(1) UGC4483 ANY	ACS/WFC WFC3/UVIS	6	28-Nov-2018 16:03:30.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) UGC4483 ANY	ACS/WFC WFC3/UVIS	6	28-Nov-2018 16:03:33.0	yes

18 Total Orbits Used

ABSTRACT

Metal-poor Blue Compact Dwarf (BCD) galaxies have been interpreted as nearby galaxies "in formation". This view has been challenged by HST detection of Red Giant Branch (RGB) stars in all metal-poor BCDs where an RGB tip (TRGB, brightest RGB phase) has been searched for, impling the presence of stars at least ~ 1 Gyr old. Due to the age-metallicity degeneracy, the RGB color provides little insight into the exact star formation history (SFH) beyond 1 Gyr. So, the first SF epoch may have occurred anywhere between ~13 and 1 Gyr ago. To resolve this, it is necessary to reach features in the color-magnitude diagram (CMD) that are much fainter than the TRGB. Here we propose new WFC3/UVIS observations (with ACS/WFC in parallel) of the closest metal-poor BCD, UGC 4483. These data will yield an I vs. V-I CMD that goes ~ 4 mag deeper than the TRGB allowing to detect red clump (RC) and horizontal branch (HB) stars. Variable stars of RR Lyrae type will also be detected. With their mere presence, these variables will indisputably prove the existence of a population at least ~ 10 Gyr old. Apparent mag and width of RC, HB and RGB will independently constrain age and metallicity of the old/evolved stars, the presence of multiple SF episodes, their duration and metallicity spread. This deep crowded-field photometric project is only possible with HST. Due to UGC 4483 location in CVZ, it can be done in half the number of orbits that it would otherwise take. Since UGC 4483 is so close, it may be the only BCD for which these questions can be answered in the near future. It provides our best chance for learning about the true cosmological age and evolutionary state of these enigmatic galaxies.

OBSERVING DESCRIPTION

1. OBSERVATIONAL SETUP

At a distance D ~ 3.4 Mpc, corresponding to a distance modulus of (m-M)_0 ~ 27.6 mag, the search for an old HB/RC resolved stellar population in UGC 4483 can only be performed with HST. This project requires a reasonable number of orbits with WFC3/UVIS given that the galaxy can be observed efficiently in the Continuous Viewing Zone (CVZ). The target (100" x 50") will be centered on the WFC3/UVIS detector. This will yield a resolution of 0.04 per pixel and a field of view (FOV) of 162" x 162". The broad-band filters F606W (broad V) and F814W (broad I) will be used to construct CMDs that will reveal the HB/RC. The F606W filter is preferred over the F555W because of an exposure time that is a factor of ~ 2 lower.

We expect that gas contamination will not be a major problem in achieving the main goal of our project, namely the detection of HB/RC stars. Due probably to selection effects more than to real spatial segregation, the older stellar populations are typically detected in areas of the galaxy quite well separated from the most recent star formation (see, e.g., I Zw 18 or NGC 1705; Aloisi et al. 1999; Tosi et al. 2001), thus their photometry is less affected by recently formed dust or gaseous emission. However, gas contamination can be an issue for the detection and correct photometry of the younger stellar populations located closer to or inside the star-forming regions. We therefore require also narrow-band imaging in F656N to correct the wide F606W filter for nebular (Halpha) contamination. This correction will be achieved recursively by scaling and subtracting the narrow-band image to the V image until no residual nebular contamination remains (Cannon et al. 2002).

WFC3/UVIS is preferred over ACS/WFC despite the smaller FOV because of a slightly higher resolution that will help us in the most crowded central regions of the galaxy. ACS/ WFC will instead be used for coordinated parallel observations in the same F606W, F814W, and F658N filters targeting an external halo field. The larger FOV of ACS/WFC will help us in detecting more stars in such lower density environment. The ACS observations will be used to characterize the radial population gradients and stellar streams in the halo.

2. SIGNAL-TO-NOISE EXPECTATIONS

At a distance of 3.4 Mpc for UGC 4483, the HB (M_I ~ 0 mag) is expected to be at _(IHB,0) ~ 27.6 mag in the Johnson-Cousins photometric system. Taking into account a Galactic extinction of E(B-V) = 0.034 (the intrinsic extinction should be negligible in the outskirts of UGC 4483 where we will detect the oldest stars), this implies a correction of A_I ~ 0.06 mag to the HB magnitude, thus I_HB ~ 27.7 mag. We want to detect stars at the HB with a photometric error < 0.1 mag (S/N > 10) in both F606W and F814W: this is a conservative request in order to clearly detect the presence of HB/RC stars. Based on the WFC3 ETC, and taking into account our needs for light curve analysis (see below), this implies 48,000 sec in F814W and 35,000 sec in F606W. With the conservative assumption of 80 minutes of visibility time per orbit in the CVZ (overheads have already been excluded), these numbers imply 10 orbits in F814W and 7 orbits in F606W. The exposure times have been calculated to detect a red giant star with an effective temperature of ~ 4400 K (V-I ~ 1.4) and magnitude of I ~ 27.7 mag with a signal-to-noise ratio of > 10 in an aperture of 0.2" (5 pixels) in diameter. This is the requirement for a reliable, robust detection of stars at the HB/RC magnitude and a measurement of their stellar magnitude in a crowded field with an uncertainty of < 0.1 mag via PSF-fitting photometry. With ACS/WFC in parallel we will be able to study all the same features with a somewhat higher S/N. The single exposures of about 1,200 sec per filter will be executed with a dithering pattern of an integer+fraction of pixels in order to get rid of cosmic rays, remove hot/bad pixels and improve the PSF sampling.

From the spectra published by Izotov, Thuan, & Lipovetsky (1994), we derive typical integrated nebular fluxes for Halpha of ~ 10^(-15) erg/sec

cm^2 A^(-1) arcsec^(-2). With a total of 4,800 sec of exposure time in F656N divided into multiple exposures, we will be able to achieve a flux which is 100 times fainter with a S/N > 5 within a square aperture of 2 x 2 pixels as calculated with the ETC. The exposure in F656N will be taken in an additional CVZ orbit compared to the broad-band filters.

Stellar crowding could be of some concern at such faint magnitudes. However, a similar project on the halo of the elliptical galaxy NGC 5128 located at a further distance of 3.8 Mpc compared to the 3.4 Mpc of UGC 4483, demonstrates that crowding should not be an issue (Rejkuba et al. 2005). Another concern might be contamination by Galactic foreground stars. For this reason we have considered the field star densities predicted in different directions by a two-component (disk+spheroid) Galaxy model (Bahcall & Soneira 1980). The prediction is ~ 2 x 10^4 stars brighter than I ~ 27.7 mag (the HB magnitude) per square degree at the position of UGC 4483. This translates into about 40 Galactic stars within the WFC3/UVIS field of view, and only 15 stars within an area corresponding to the body of our target.

Summarizing, we require 7 CVZ orbits in F606W, 10 CVZ orbits in F814W and 1 CVZ orbit in F656N in order to investigate the resolved stellar population of UGC 4483. This makes a total of 18 CVZ orbits.

3. VARIABLE STAR SEARCH

Variables will be identified using a number of different methods which include (1) the image subtraction techniques and the package ISIS2.1 (Alard 2000), which is extremely efficient in identifying even low amplitude variables (dm <0.1 mag) in crowded fields, (2) the Welch & Stetson (1993) variability index, and (3) the chi^2 map (see Fiorentino et al. 2010). We will classify the variables by deriving periods, average luminosities, amplitudes, period/amplitudes and period/luminosity relationships. Our team has developed an extensive theoretical scenario for RR Lyrae and Anomalous Cepheids stars, that will allow us to better interpret the observed pulsation properties. We will study the current spatial distribution of the different types of variables and this will provide information on the current spatial distribution and time confinement of the bursts of their parent populations. The mean period of the ab-type RR Lyraes and its dispersion will provide a rough estimate of the metallicity of the old (> 10 Gyr) stellar populations. Once calibrated (we will use a new calibration based on Gaia parallaxes of Galactic RRLyraes), the average luminosity of the RR Lyraes will provide information on the distance and the 3D structure from the corresponding dispersions.

Detection of the variable stars and definition of the period will be performed in the F606W since amplitudes are larger in V than in I. From a study of the RR Lyrae stars in the M31 globular clusters based on our Cycle 15 WFPC2 project, we know that 14-15 data points in one photometric band, obtained as continuous sequence over 15-25 consecutive hours will allow the detection of the RR Lyrae variables, the complete sampling of their

light curves, and the derivation of their periods with accuracy of 2-3 decimal places (Clementini et al. 2009). The characteristics of the present program optimized for reaching HB/RC stars in UGC 4483 will be equally well suited for variable star studies. The target is in CVZ, so longer continuous observations will be possible. These will be interrupted only due to the fact that individual visits cannot exceed ~ 6 CVZ orbits. On the other hand, the total time baseline will be somewhat shorter than for the M31 globular clusters. Also, the M31 RRLs are (apparently) brighter than the more distant ones in UGC 4483. However, they were observed with WFPC2, which has much lower efficiency than WFC3 or ACS. That ACS (and similarly WFC3) is well-suited for variable star characterization, is also illustrated by our detection of Cepheids in I Zw 18 at 18 Mpc (Aloisi et al. 2007; Fiorentino et al. 2010).

Taking into account the RR Lyrae average magnitudes and colors and the typical amplitudes and periods (A ~0.4-0.5 and 0.8-1 mag, P ~ 0.3-1 day, for first overtone (FO) and fundamental (F) pulsators, respectively) we find that the observations will yield sufficient S/N at I ~ 27.7 mag to allow photometry over ~ 40 minute time spans (even at the light curve minimum), as necessary to avoid excessive smearing of the light curve. All other variables (e.g the ACs) we are interested in are brighter. Our time sequence will be as follows: (first visit) 6 orbits in F606W; (second visit) 1 orbit in F606W + 1 orbit in F658N + 4 orbits in F814W; and (third visit) 6 orbits in F814W. This observing strategy will also be optimal to allow the sampling of the light curves of the longer period variables such as the ACs.

Visit

Proposal 15194, visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01), implementation Wed Nov 28 21:03:34 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: CVZ; ORIENT 205D TO 215 D

Comments: Visit 1 needs to be between 100 degrees and 250 degrees to avoid effects of a bright star outside of the field. The window now available for scheduling of this visit is Jan 6, 2019 and the orientation will be 209 degrees. This has been included more tightly in the orienation requirements below (205-215 degrees).

Diagnostics

(Primary visit1_3exposures_F606W_2_WFC3 (01.003) special requirements) Warning (Form): Be very careful mixing POS TARG and Center_Pattern = Yes

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG		(1-2), (3-4)
	Purpose=MOSAIC	Pattern Orientation=85.759		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=2.414	Center Pattern=true		
	Line Spacing=			
(2)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG		(11-12)
	Purpose=MOSAIC	Pattern Orientation=85.759		
	Number Of Points=2	Angle Between Sides=		
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	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGC4483	RA: 08 37 3.0000 (129.2625000d)		V=14.9+/-0.1	Reference Frame: NED
		Dec: +69 46 31.00 (69.77528d)			
		Equinox: J2000			

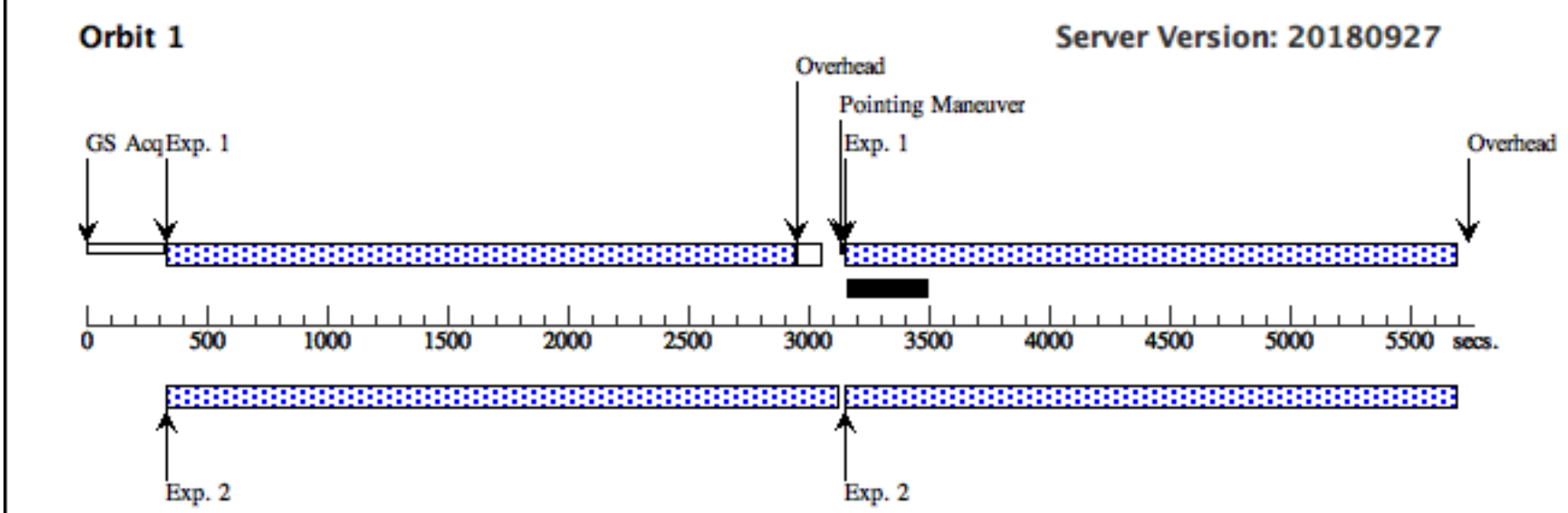
Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]

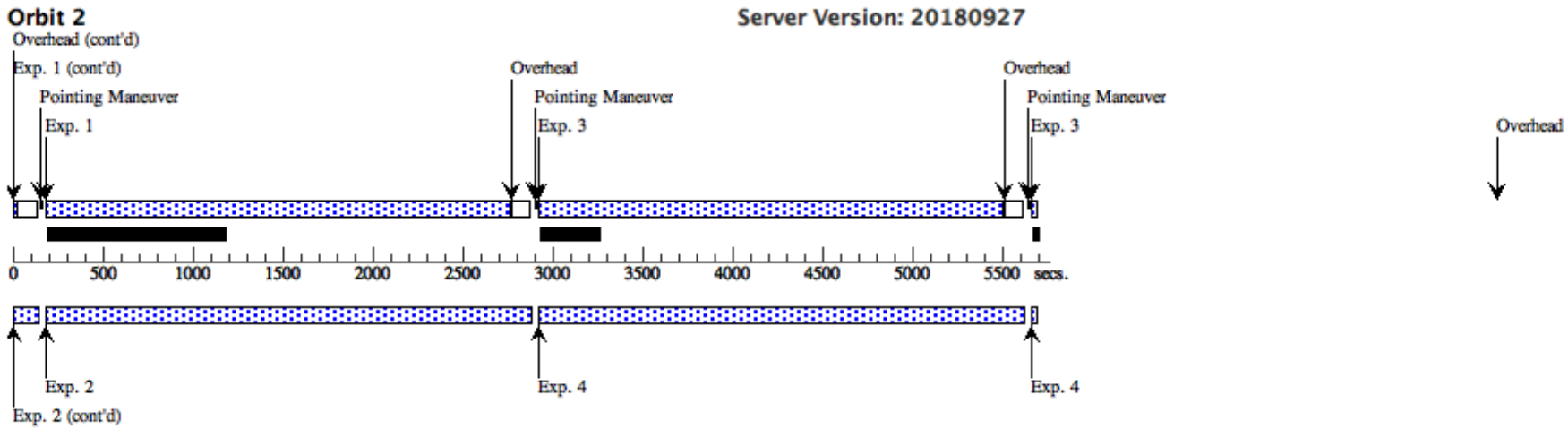
Exposures

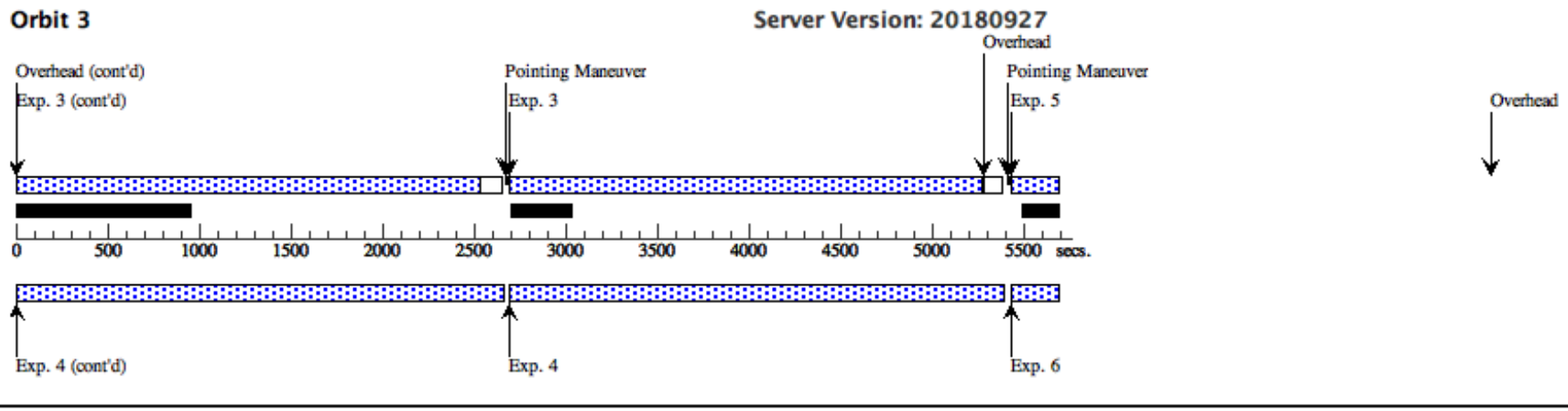
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	visit1_3exposures_F606W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 1, Exps 1-2 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (1)	2580 Secs (7740 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
							Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	*[==>(Pattern 3)]*	***[2]***
2	visit1_3exposures_F606W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Pattern 1, Exps 1-2 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (1)	2580 Secs (7740 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
							Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	*[==>(Pattern 3)]*	***[2]***
3	visit1_3exposures_F606W_2_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 0.158,0.070	Pattern 1, Exps 3-4 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (1)	2580 Secs (7740 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
							Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	*[==>(Pattern 3)]*	***[3]***
4	visit1_3exposures_F606W_2_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Pattern 1, Exps 3-4 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (1)	2580 Secs (7740 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
							Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	*[==>(Pattern 3)]*	***[3]***
5	Visit1_1exposure_F814W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG -0.089,-1.203	Prime + Parallel Group 5-6 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[3]***
6	Visit1_1exposure_F814W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 5-6 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[3]***
7	Visit1_1exposure_F606W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG -0.071,-2.235	Prime + Parallel Group 7-8 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[4]***
8	Visit1_1exposure_F606W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 7-8 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[4]***
9	Visit1_1exposure_F814W_2_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.069,-1.133	Prime + Parallel Group 9-10 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[4]***

	10	Visit1_1exposure_F814W_2_ACS	(1) UGC4483	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 9-10 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (2580 Secs) *[==>]*	***[4]***
	11	visit1_2exposures_F606W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W			Pattern 2, Exps 11-12 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (2) Prime + Parallel Group 11-12 in Pattern 2, Exps 11-12 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (5160 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[5]***
	12	visit1_2exposures_F606W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Pattern 2, Exps 11-12 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01) (2) Prime + Parallel Group 11-12 in Pattern 2, Exps 11-12 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	2580 Secs (5160 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[5]***
	13	visit1_1exposure_Ha_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F656N	FLASH=10	POS TARG -0.089,-1.203	Prime + Parallel Group 13-14 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	1680 Secs (1680 Secs) *[==>]*	***[6]***
	14	visit1_1exposure_Ha_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F658N			Prime + Parallel Group 13-14 in visit1_4.5orbF6060W_0.5orbHa_1orbF814W (01)	1680 Secs (1680 Secs) *[==>]*	***[6]***

Orbit Structure



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Exp. 3 (cont'd)
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Overhead
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Exp. 5
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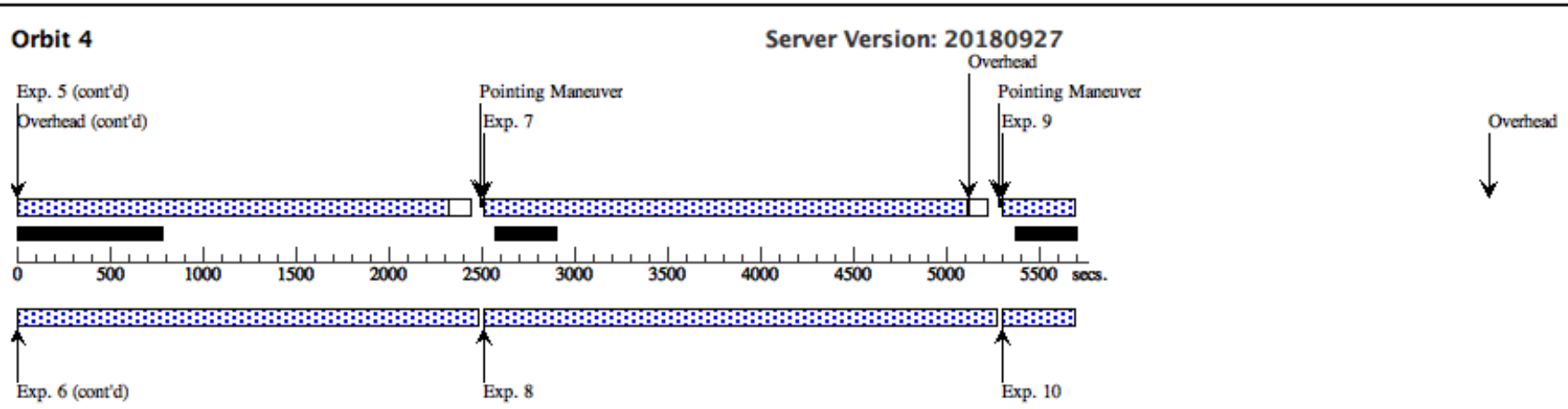
Exp. 4 (cont'd)
Exp. 4
Exp. 6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Overhead (cont'd)
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Exp. 7
Overhead
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Exp. 9
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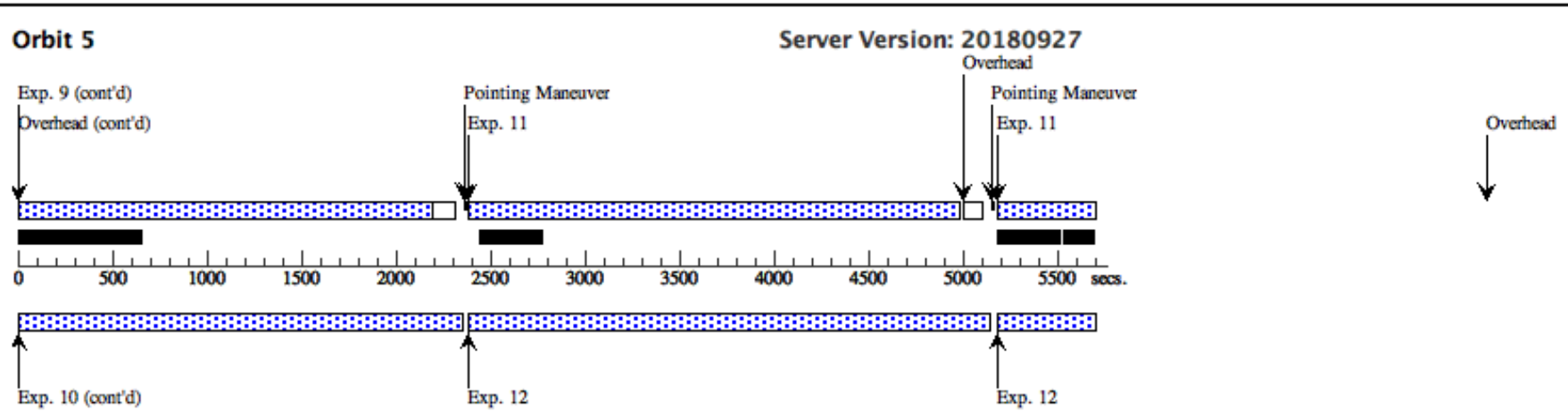
Exp. 6 (cont'd)
Exp. 8
Exp. 10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Overhead
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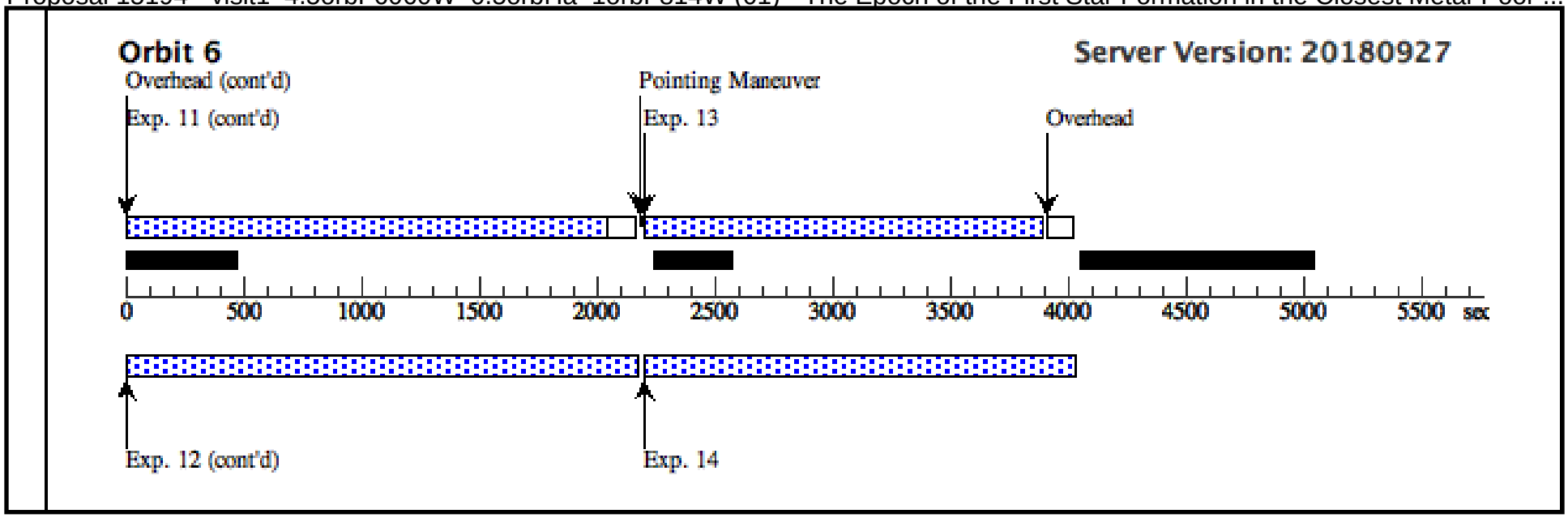
Exp. 10 (cont'd)
Exp. 12
Exp. 12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3500
4000
4500
5000
5500
sec
Exp. 12 (cont'd)
Exp. 14

Visit

Proposal 15194, visit2_2.5orbF606W_0.5orbHa_3orbF814W (02), implementation Wed Nov 28 21:03:34 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: CVZ; SAME ORIENT AS 01; AFTER 01

Comments: Visit 2 needs to be between 100 degrees and 250 degrees to avoid effects of a bright star outside of the field. The window now available for scheduling of this visit is the same as visit 1 (Jan 6, 2019). The orientation will be the same as visit 1 (205-215 degrees).

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGC4483	RA: 08 37 3.0000 (129.2625000d) Dec: +69 46 31.00 (69.77528d) Equinox: J2000		V=14.9+/-0.1	Reference Frame: NED

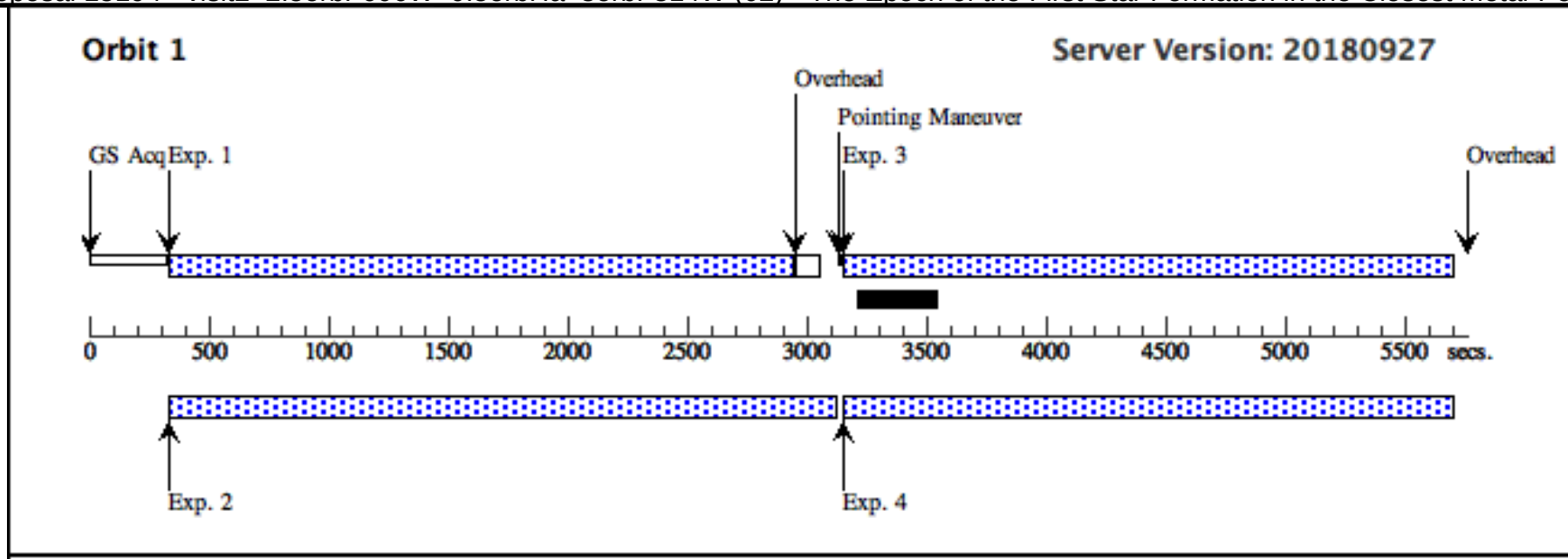
Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]

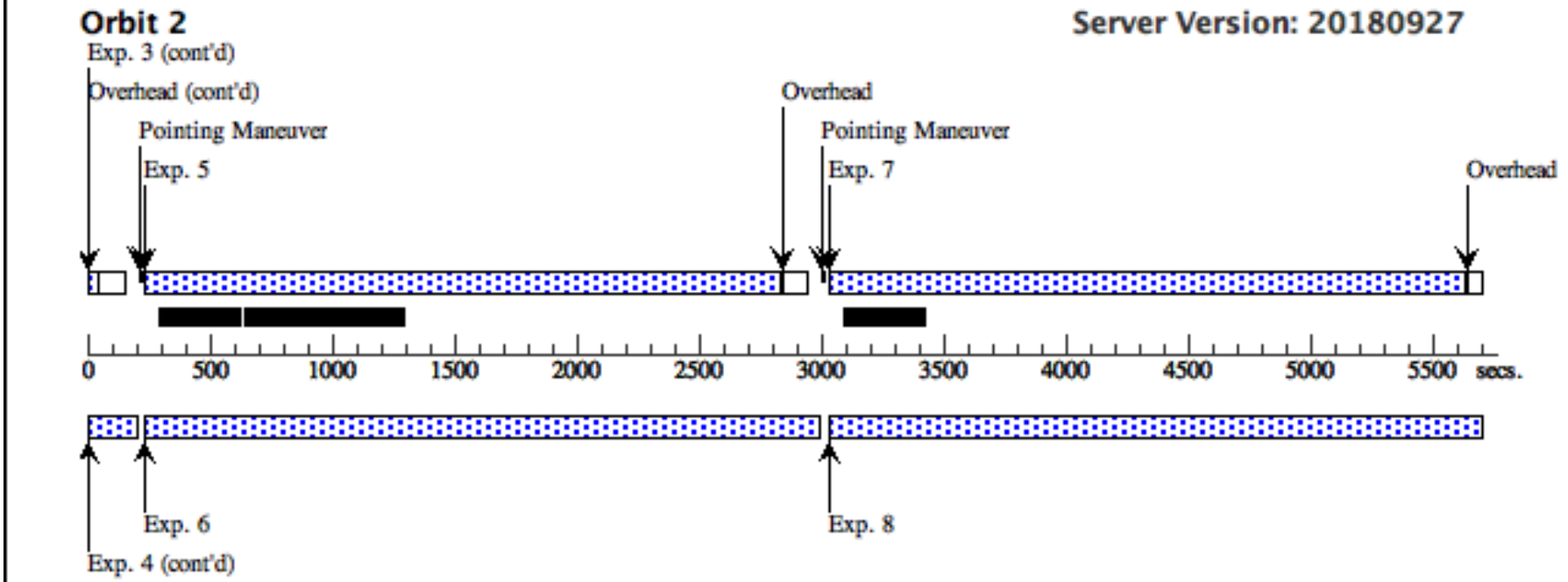
Exposures

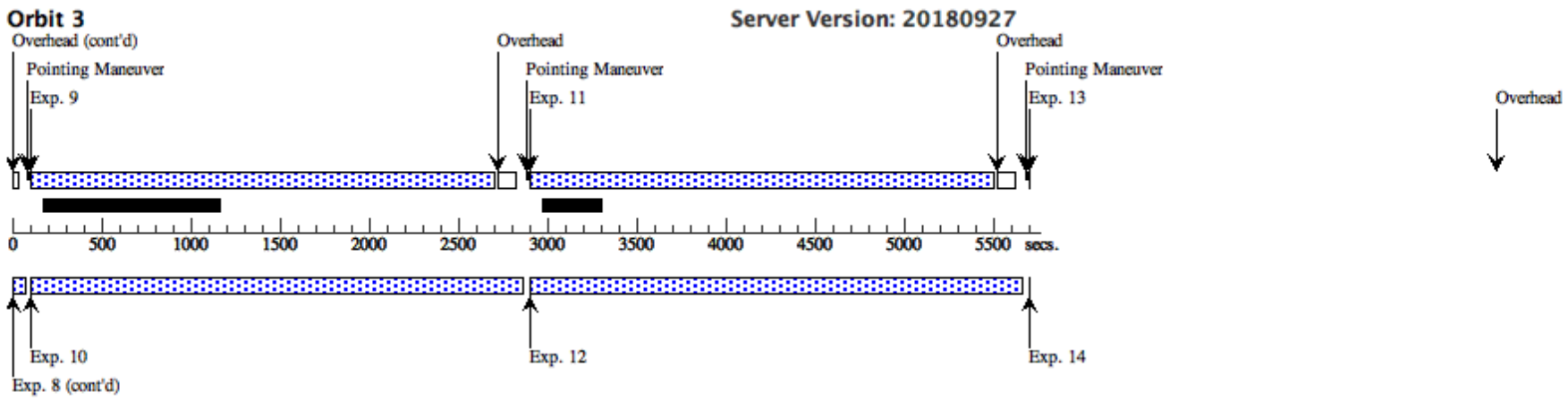
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Visit2_1exposure_F814W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.01,-1.038	Prime + Parallel Group 1-2 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[1]***
2	Visit2_1exposure_F814W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 1-2 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[1]***
3	Visit2_1exposure_F606W_1_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 0.099,0.165	Prime + Parallel Group 3-4 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[1]***
4	Visit2_1exposure_F606W_1_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 3-4 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[1]***
5	Visit2_1exposure_F814W_2_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG -0.149,-1.108	Prime + Parallel Group 5-6 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[2]***
6	Visit2_1exposure_F814W_2_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 5-6 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[2]***
7	Visit2_1exposure_F606W_2_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 0.269,2.565	Prime + Parallel Group 7-8 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[2]***
8	Visit2_1exposure_F606W_2_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 7-8 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[2]***
9	Visit2_1exposure_F814W_3_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.089,1.203	Prime + Parallel Group 9-10 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***
10	Visit2_1exposure_F814W_3_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 9-10 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***
11	Visit2_1exposure_F606W_3_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG -0.23,-2.305	Prime + Parallel Group 11-12 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***
12	Visit2_1exposure_F606W_3_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 11-12 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***
13	Visit2_1exposure_F814W_4_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.247,1.273	Prime + Parallel Group 13-14 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***
14	Visit2_1exposure_F814W_4_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 13-14 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[3]***

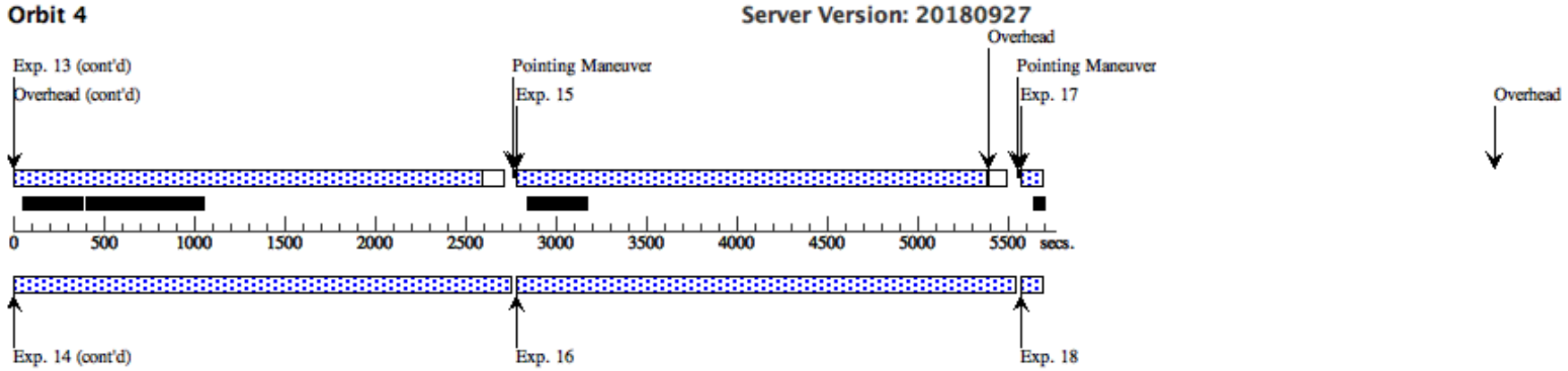
	15	Visit2_1exposure_F606W_4_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG -0.06,0.095	Prime + Parallel Group 15-16 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[4]***
	16	Visit2_1exposure_F606W_4_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 15-16 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[4]***
	17	Visit2_1exposure_F814W_5_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.188,1.368	Prime + Parallel Group 17-18 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[4]***
	18	Visit2_1exposure_F814W_5_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 17-18 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[4]***
	19	Visit2_1exposure_F606W_5_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F606W		POS TARG 0.11,2.495	Prime + Parallel Group 19-20 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[5]***
	20	Visit2_1exposure_F606W_5_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F606W			Prime + Parallel Group 19-20 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[5]***
	21	Visit2_1exposure_F814W_6_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.029,1.298	Prime + Parallel Group 21-22 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[5]***
	22	Visit2_1exposure_F814W_6_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Prime + Parallel Group 21-22 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	2580 Secs (2580 Secs) *[==>]*	***[5]***
	23	visit2_1exposure_Ha_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS2	F656N	FLASH=10	POS TARG 0.089,1.203	Prime + Parallel Group 23-24 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	1990 Secs (1990 Secs) *[==>]*	***[6]***
	24	visit2_1exposure_Ha_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F658N			Prime + Parallel Group 23-24 in visit2_2.5orbF606W_0.5orbHa_3orbF814W (02)	1990 Secs (1990 Secs) *[==>]*	***[6]***

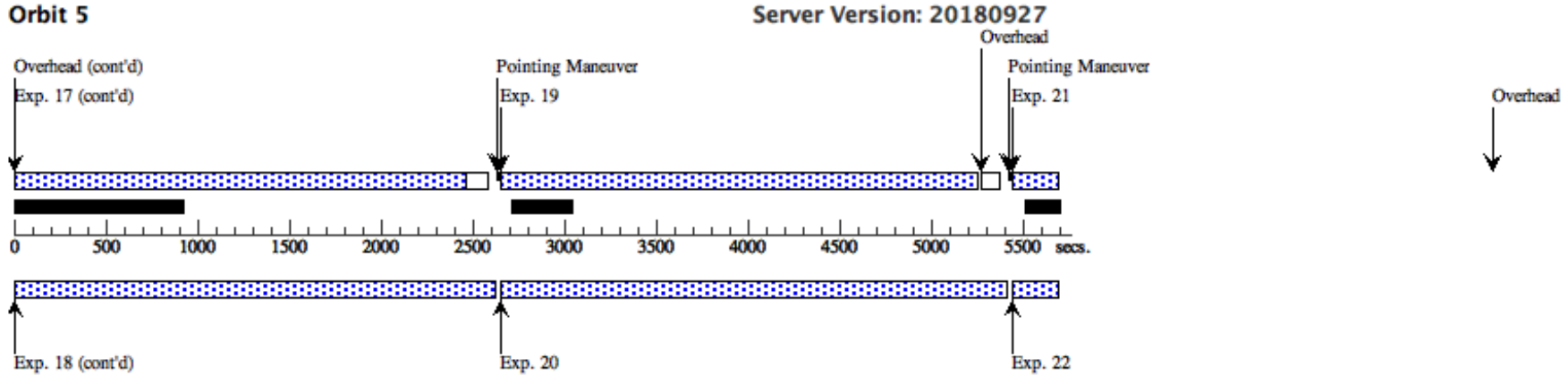
Orbit Structure

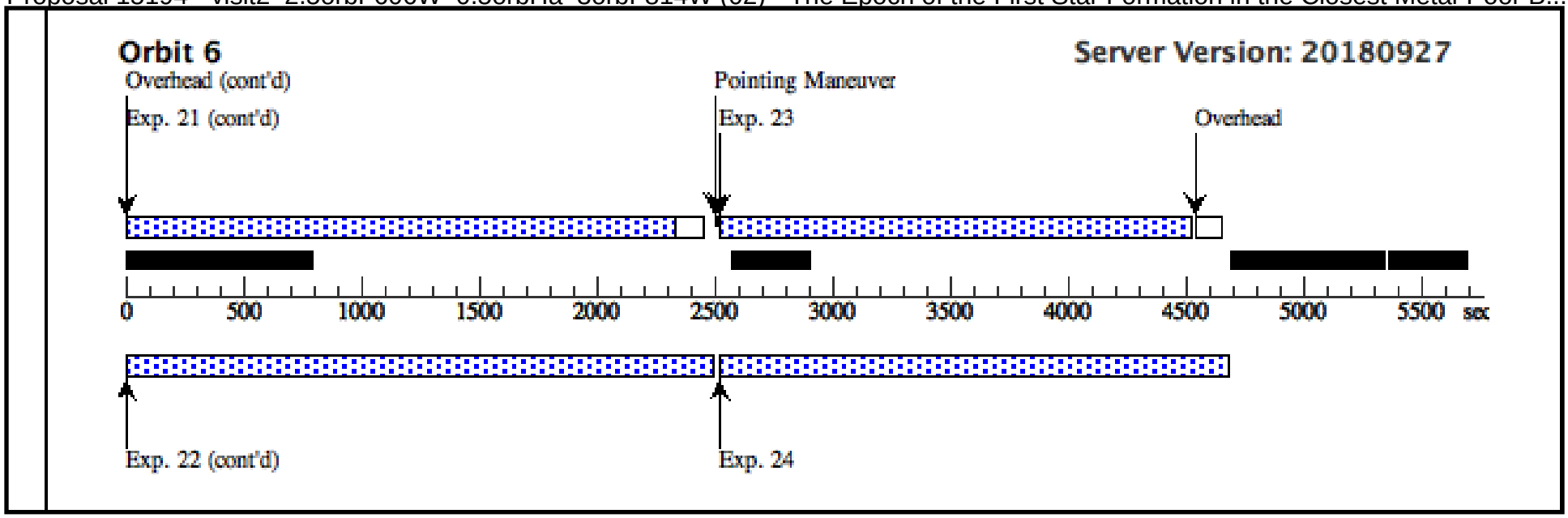





Orbit 3
Server Version: 20180927
Overhead (cont'd)
Pointing Maneuver
Exp. 9
Overhead
Pointing Maneuver
Exp. 11
Overhead
Pointing Maneuver
Exp. 13
Overhead
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 secs.
Exp. 10
Exp. 12
Exp. 14
Exp. 8 (cont'd)


Orbit 4
Server Version: 20180927
Exp. 13 (cont'd)
Overhead (cont'd)
Pointing Maneuver
Exp. 15
Overhead
Pointing Maneuver
Exp. 17
Overhead
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 secs.
Exp. 14 (cont'd)
Exp. 16
Exp. 18


Orbit 5
Server Version: 20180927
Overhead (cont'd)
Exp. 17 (cont'd)
Pointing Maneuver
Exp. 19
Overhead
Pointing Maneuver
Exp. 21
Overhead
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 secs.
Exp. 18 (cont'd)
Exp. 20
Exp. 22


Orbit 6
Server Version: 20180927
Overhead (cont'd)
Exp. 21 (cont'd)
Pointing Maneuver
Exp. 23
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 22 (cont'd)
Exp. 24

Visit

Proposal 15194, visit3_6orbF814W (03), implementation Wed Nov 28 21:03:34 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: CVZ; ORIENT 130D TO 135 D; AFTER 02

Comments: Visit 3 needs to be between 100 degrees and 250 degrees to avoid effects of a bright star outside of the field. The window now available for scheduling of this visit is Feb26, 2019 and the orientation will be 132 degrees. This has been included more tightly in the orienation requirements below (130-135 degrees).

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(3)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG	Pattern Type=WFC3-UVIS-DITHER-BOX	Coordinate Frame=POS-TARG	(1-2)
	Purpose=MOSAIC	Pattern Orientation=85.759	Purpose=DITHER	Pattern Orientation=23.884	
	Number Of Points=3	Angle Between Sides=	Number Of Points=4	Angle Between Sides=81.785	
	Point Spacing=2.414	Center Pattern=true	Point Spacing=0.173	Center Pattern=false	
	Line Spacing=		Line Spacing=0.112		

Fixed Targets

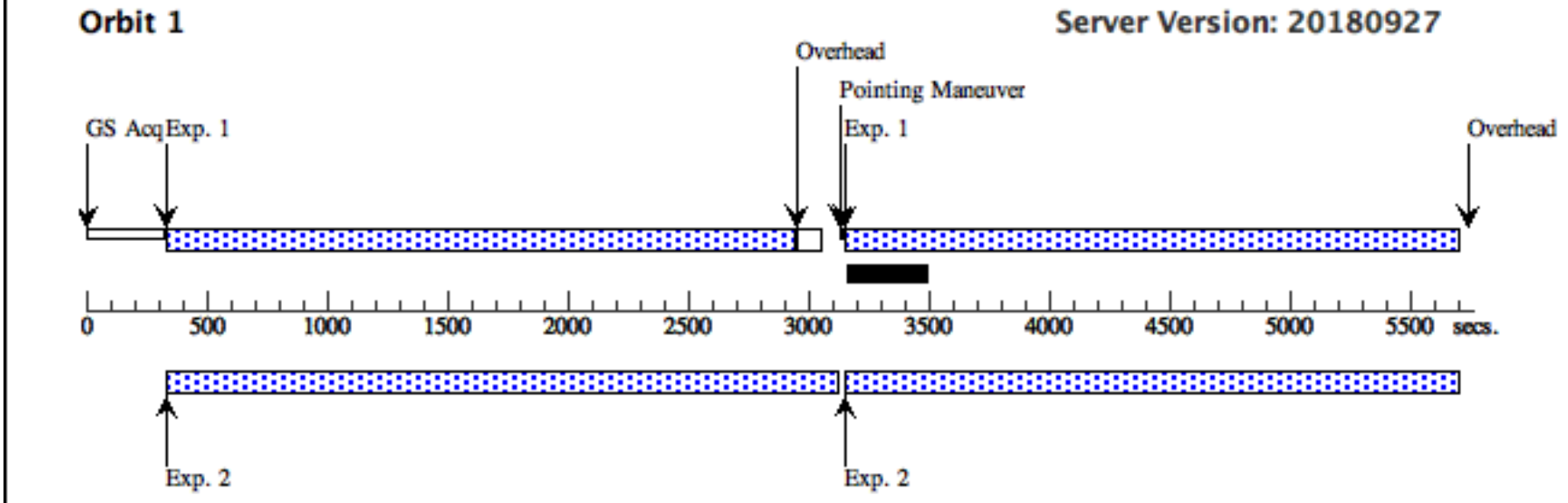
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UGC4483	RA: 08 37 3.0000 (129.2625000d)		V=14.9+/-0.1	Reference Frame: NED
		Dec: +69 46 31.00 (69.77528d)			
		Equinox: J2000			

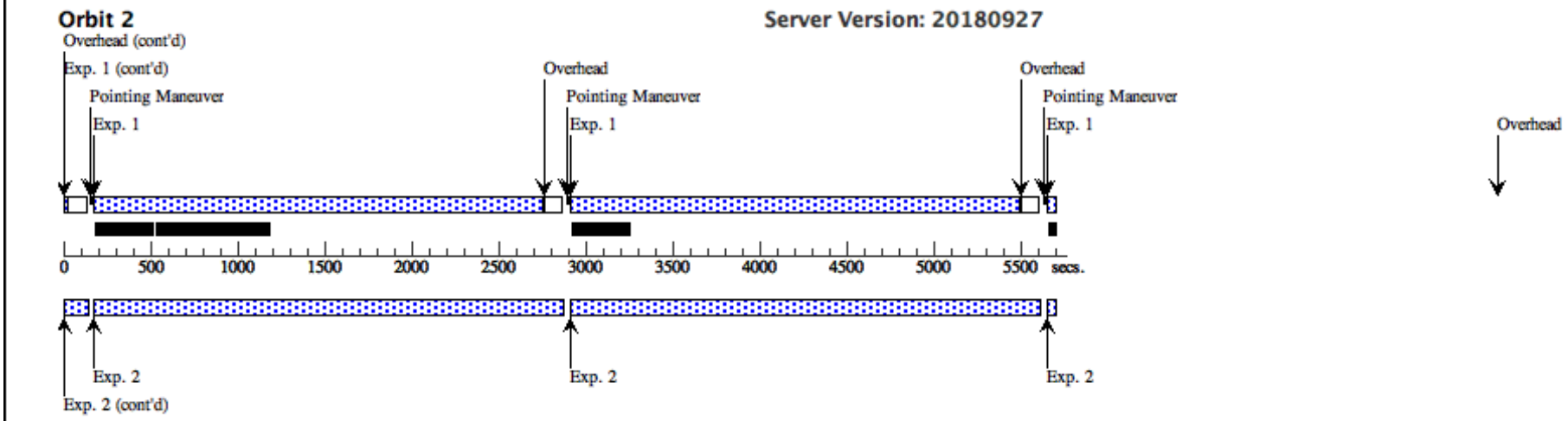
Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]

Exposures

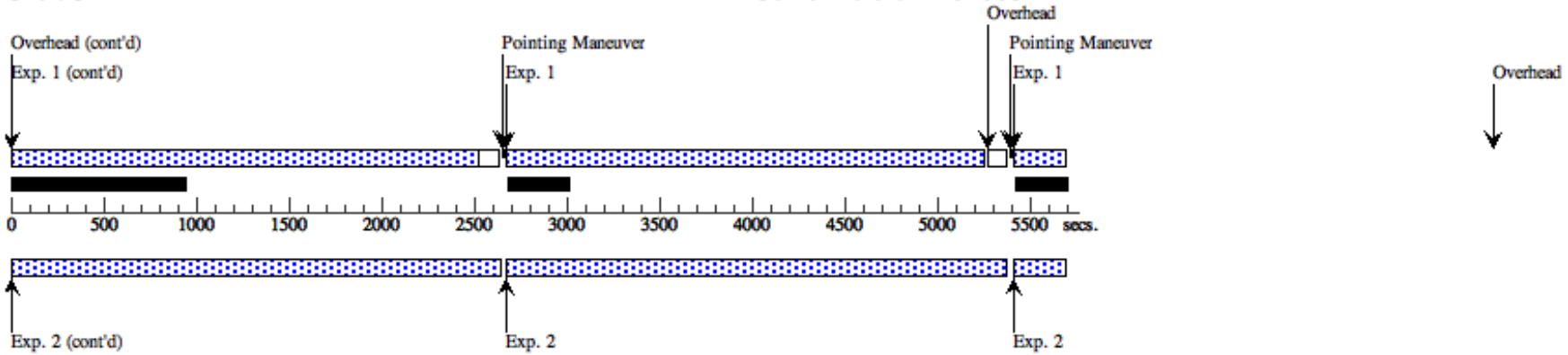
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	visit3_12exposures_F814W_WFC3	(1) UGC4483	WFC3/UVIS, ACCUM, UVIS	F814W			Pattern 3, Exps 1-2 in visit3_6orbF814W (03) (3) Prime + Parallel Group 1-2 in Pattern 3, Exps 1-2 in visit3_6orbF814W (03)	2580 Secs (30960 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]*	***[1]***
								[==>(Pattern 1,3)] *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]*	***[2]***
								[==>(Pattern 2,2)] *[==>(Pattern 2,3)]*	***[3]***
								[==>(Pattern 2,4)] *[==>(Pattern 3,1)]*	***[4]***
								[==>(Pattern 3,2)] *[==>(Pattern 3,3)]*	***[5]***
								[==>(Pattern 3,4)]	***[6]***
2	visit3_12exposures_F814W_ACS	ANY	ACS/WFC, ACCUM, WFC-FIX	F814W			Pattern 3, Exps 1-2 in visit3_6orbF814W (03) (3) Prime + Parallel Group 1-2 in Pattern 3, Exps 1-2 in visit3_6orbF814W (03)	2580 Secs (30960 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]*	***[1]***
								[==>(Pattern 1,3)] *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]*	***[2]***
								[==>(Pattern 2,2)] *[==>(Pattern 2,3)]*	***[3]***
								[==>(Pattern 2,4)] *[==>(Pattern 3,1)]*	***[4]***
								[==>(Pattern 3,2)] *[==>(Pattern 3,3)]*	***[5]***
								[==>(Pattern 3,4)]	***[6]***

Orbit Structure

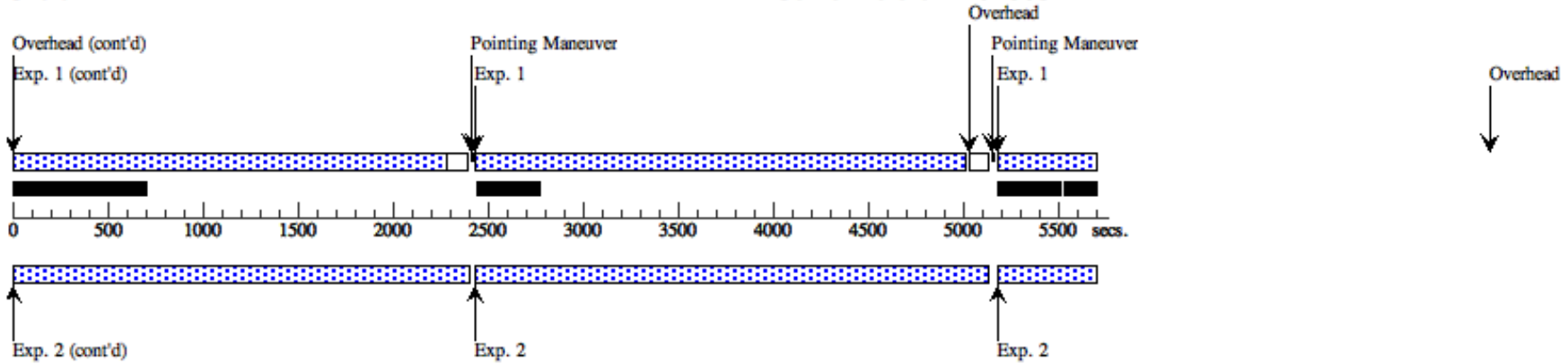


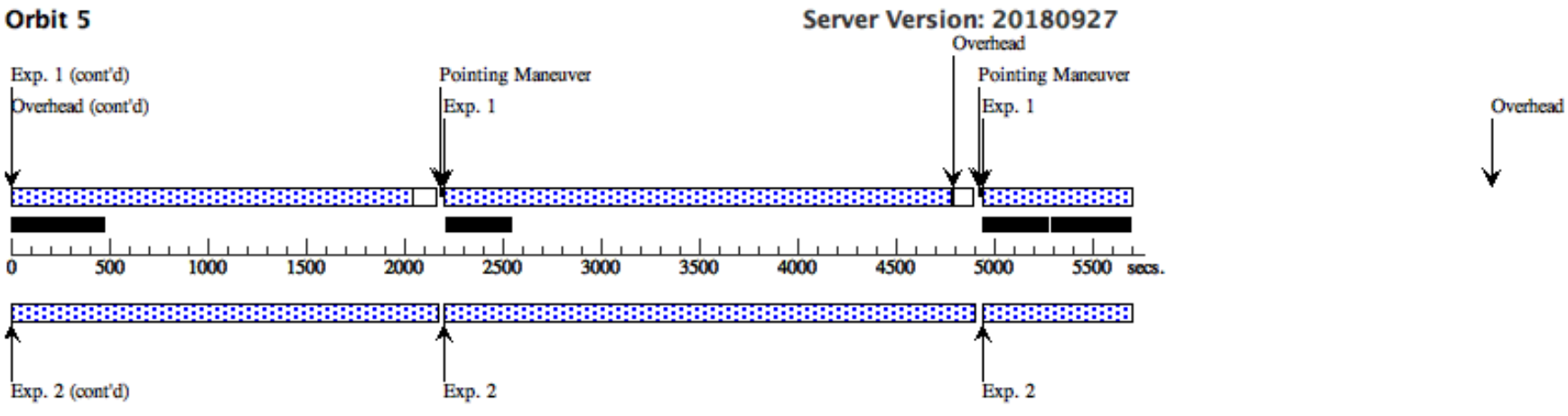


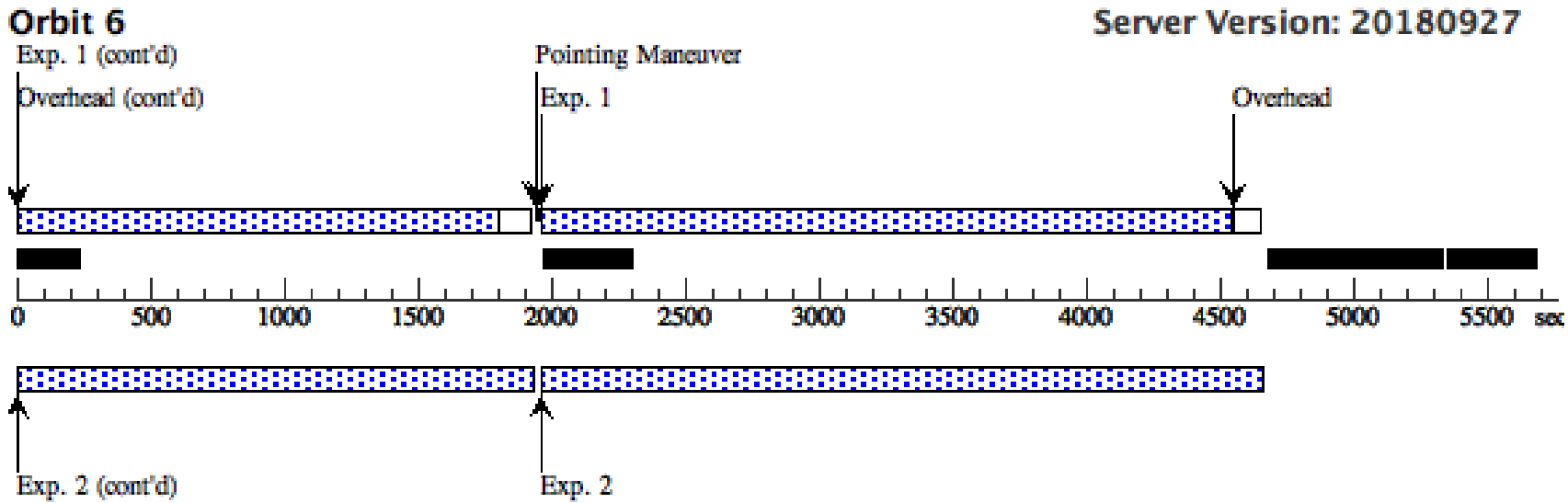
Orbit 3 **Server Version: 20180927**



Orbit 4 **Server Version: 20180927**




Orbit 5
Server Version: 20180927
Overhead
Exp. 1 (cont'd)
Overhead (cont'd)
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Exp. 2 (cont'd)
Exp. 2
Exp. 2


Orbit 6
Server Version: 20180927
Exp. 1 (cont'd)
Overhead (cont'd)
Pointing Maneuver
Exp. 1
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 2 (cont'd)
Exp. 2