14937 - Neutral Hydrogen in Tidal Tails: Probing the Extremes of Star Formation

Cycle: 25, Proposal Category: GO

(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) MCG-03-13-063	WFC3/UVIS	2	14-Aug-2017 14:01:24.0	yes
02	(2) AM-1054-325	WFC3/UVIS	2	14-Aug-2017 14:01:26.0	yes

4 Total Orbits Used

ABSTRACT

The morphologically diverse, HI-rich tidal tails of interacting galaxies represent the edges of the complex parameter space that allows massive star clusters to form and survive. In a prior optical study with the Hubble Space Telescope, our group analyzed 25 tidal tails and their star cluster populations, representing a broad continuum of star/clusterforming activity from a template set of interacting galaxy pairs. Of these 25 tails, we have analyzed and published data on 22 of them. However, our remaining systems, AM 1054-325, MCG-03-13-063, and ESO 376-G028, occupy the extremes of cluster formation: two prolifically cluster-forming environments and one devoid of ongoing star and cluster formation. We propose to observe these systems in the neutral hydrogen 21 cm line with the VLA to gauge the effects of the distribution and kinematics of the HI medium on cluster formation, in the relatively unexplored tidal tail environment. We further propose to age date these clusters with joint HST observations, to

link cluster age to the local ISM. Combining these observations with our sample's archival VLA/ATCA data will elucidate the connection between star clusters, the conditions in the HI-dominated ISM that produce them, and holistically, the types of galaxy interactions that promote those conditions.

OBSERVING DESCRIPTION

Our program involves U/F336W and B/F438W WFC3 imaging of two interacting galaxies, as part of a successful VLA observing program. We are splitting our 4 orbit request into a pair of 2-orbit visits. We are interested in photometry of faint point- and marginally-resolved sources over the entire WFC3 FOV, and we are requesting a 4 point dither pattern for each filter to properly sample the PSF in our final, combined images. We do not need to cover the chip gap, as long as the ORIENT ranges (below) are OK. We need to make sure the chip gap does not cover area where stars clusters were detected in a previous HST program.

Our original request was to have 1.5 orbits in U, and 0.5 orbit in B; however, with the need for a 4-dither pattern, and avoiding any observing inefficiencies with <360s exposures, our best possible observing strategy appears to be 1.3 orbits (U), the rest in B. Although we are interested in the highest possible S/N in our observations, we have left a few x 10s left in each orbit to allow for maximum flexibility in scheduling. Should these cuts be unnecessary, we would like to bump up the F338W observation exposure times as much as is possible.

Our ORIENT requests are based on the requirement to cover the WFPC2 footprint from previous observations of these galaxies, but we have found we have many months of available scheduling for each object. We are also trying to avoid a bright star near MCG-03-13-063. NOTE added: we have shifted location of this field to avoid the 'dragons breath' from a nearby star.

Finally, we also require a post-FLASH for all images due to the relatively short individual exposures in these blue filters. We used the ETC to look at the expected range of background levels in best and worst-case scenarios for our targets, which have ecliptic latitudes of 35-40 degrees (see links to ETC results below). Note we have assumed a 'best' case scenario where we have the lowest possible zodiacal light, and minimal Earthshine.

F438W/B 380s exposures
http://etc.stsci.edu/etc/results/WFC3UVIS.im.1004584/
MU_V=22.0 Earth=High airglow=no 7.8 e-/pix HIGH
http://etc.stsci.edu/etc/results/WFC3UVIS.im.1004585/
MU_V=23.0 Earth=No airglow=no 2.8 e-/pix LOW
Need FLASH=9 to get to 12 e-/pixel

F336W/U 850s exposures

http://etc.stsci.edu/etc/results/WFC3UVIS.im.1004589/

MU_V=23.0 Earth=no airglow=no 3.2 e-/pix LOW

http://etc.stsci.edu/etc/results/WFC3UVIS.im.1004590/

MU_V=22.0 Earth=High airglow=high 5.6 e-/pix LOW

Again, need FLASH=9 to get to 12 e-/pixel

Visit

Proposal 14937, Visit (01), implementation Mon Aug 14 18:01:27 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 60D TO 65 D; ORIENT 240D TO 255 D

Comments: U- and B-band observations of MCG-03-13-063

Patterns

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

Fixed Targets

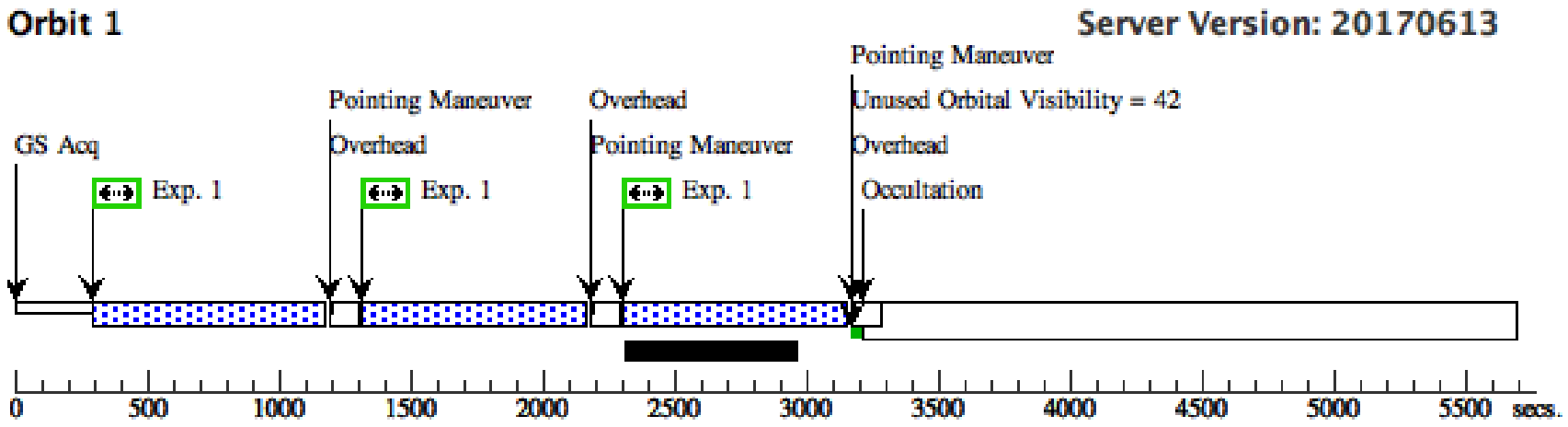
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MCG-03-13-063	RA: 05 04 28.1158 (76.1171492d) Dec: -16 35 30.35 (-16.59176d) Equinox: J2000	Radial Velocity: 3321 km/sec	V=14.0	Reference Frame: SIMBAD

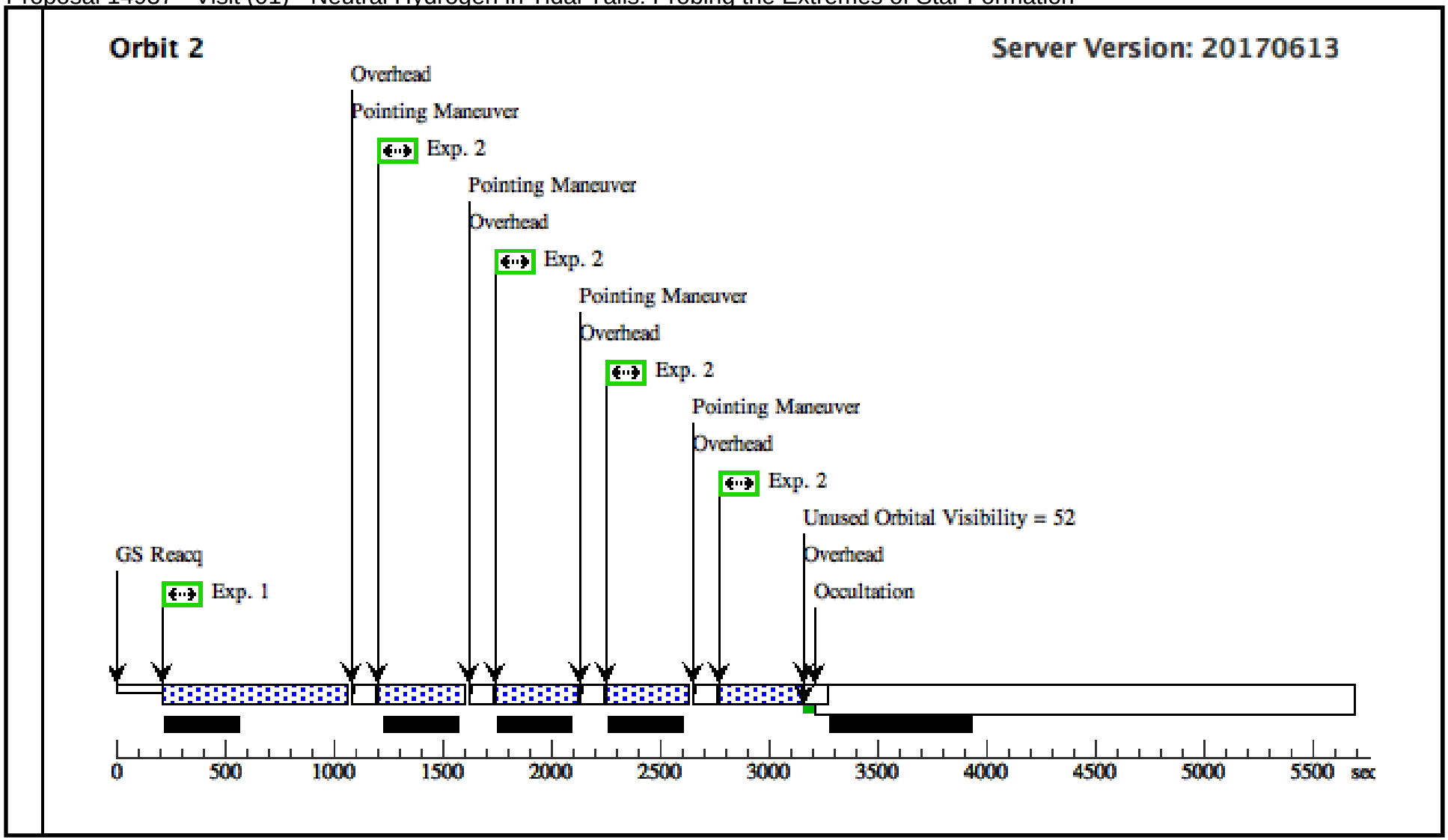
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) MCG-03-13-063	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=9		Pattern 1, Exps 1-1 in Visit (01) (1)	855 Secs (3420 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[1]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	***[2]***
2		(1) MCG-03-13-063	WFC3/UVIS, ACCUM, UVIS-CENTER	F438W	FLASH=9		Pattern 1, Exps 2-2 in Visit (01) (1)	380 Secs (1520 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	

Orbit Structure




Orbit 2
Server Version: 20170613
Overhead
Pointing Maneuver
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Unused Orbital Visibility = 52
Overhead
Occultation
GS Reacq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14937, Visit (02), implementation Mon Aug 14 18:01:27 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 270D TO 280 D; ORIENT 92D TO 102 D

Comments: U- and B-band observations of AM 1054-325 + ESO 376-G028

Patterns

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

Fixed Targets

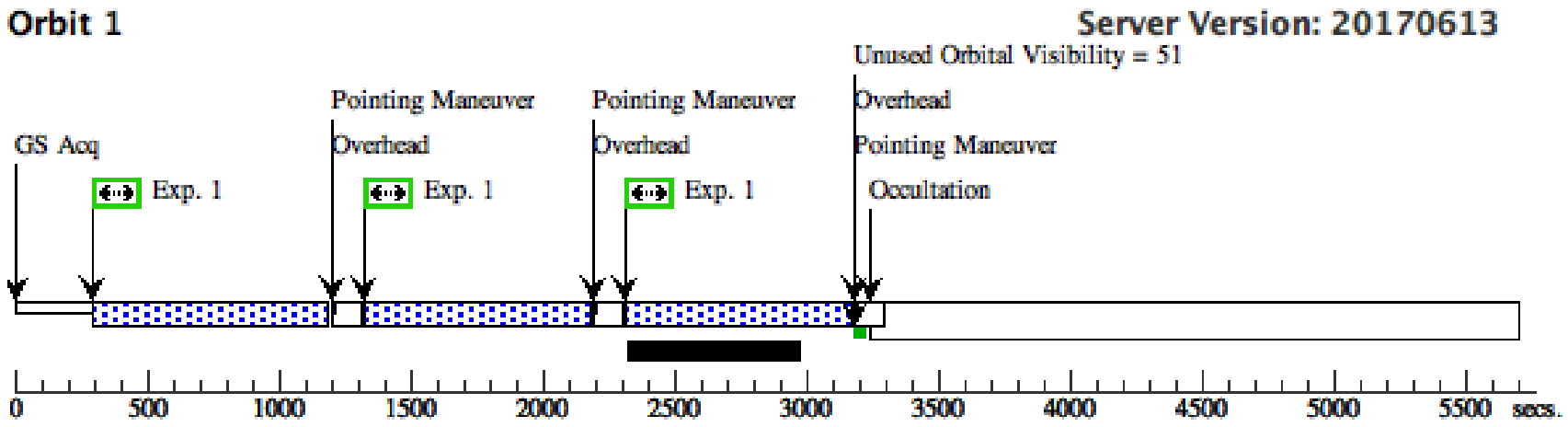
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	AM-1054-325	RA: 10 56 58.4331 (164.2434712d) Dec: -33 08 50.91 (-33.14747d) Equinox: J2000	Radial Velocity: 3850 km/sec	V=15.	Reference Frame: SIMBAD

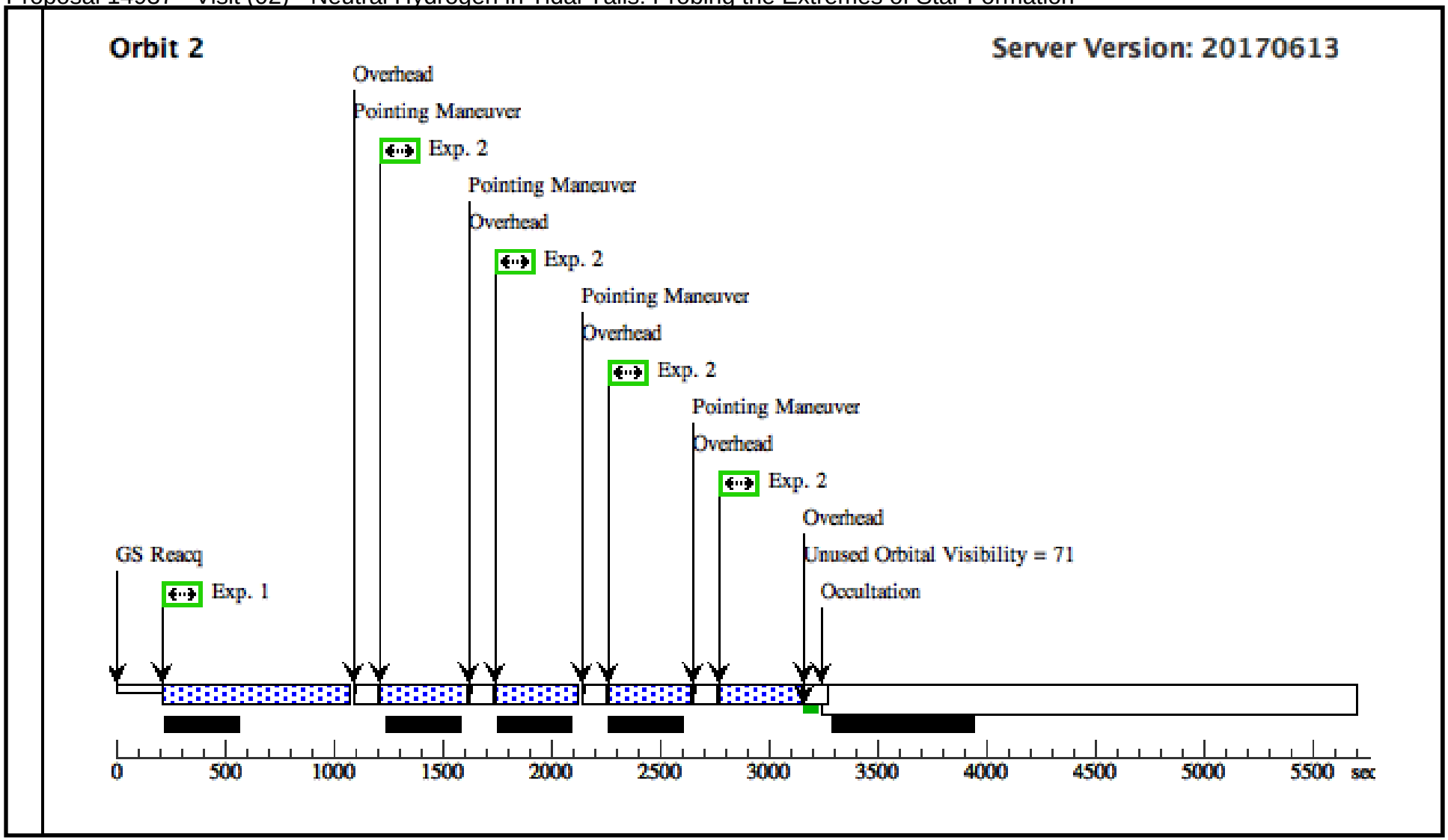
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) AM-1054-325	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=9		Pattern 1, Exps 1-1 in Visit (02) (1)	860 Secs (3440 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[1]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	***[2]***
2		(2) AM-1054-325	WFC3/UVIS, ACCUM, UVIS-CENTER	F438W	FLASH=9		Pattern 1, Exps 2-2 in Visit (02) (1)	380 Secs (1520 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	

Orbit Structure




Orbit 2
Server Version: 20170613
Overhead
Pointing Maneuver
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Overhead
Unused Orbital Visibility = 71
Occultation
GS Reacq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec