15615 - Using Star Formation in NGC 2276 as an X-ray Binary Chronometer

Cycle: 26, 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) NGC2276	WFC3/UVIS	1	14-Dec-2018 15:01:18.0	yes
02	(1) NGC2276	WFC3/UVIS	1	14-Dec-2018 15:01:19.0	yes
03	(1) NGC2276	WFC3/UVIS	1	14-Dec-2018 15:01:20.0	yes
04	(1) NGC2276	WFC3/UVIS	1	14-Dec-2018 15:01:20.0	yes
05	(1) NGC2276	WFC3/UVIS	1	14-Dec-2018 15:01:21.0	yes

5 Total Orbits Used

ABSTRACT

We propose joint Chandra/HST observations (Chandra: 150 ks) of NGC 2276 to obtain a complete picture of its luminous high-mass X-ray binary (HMXB) population. Interaction of NGC 2276 with the intergalactic medium has ignited a recent, asymmetric burst of star formation. There is tantalizing evidence in existing observations that this asymmetry is also seen in the luminosity distributions of HMXBs. Because

the star formation rate and metallicity are similar across the galaxy, this galaxy provides a unique environment to test differences in the HMXB populations with age. This way we will directly test population synthesis models that predict specific timescales for the formation rate of HMXBs in different ages.

OBSERVING DESCRIPTION

The goal of this program is to study the age distribution of bright X-ray binaries by matching them to their nearby host star clusters. We will measure the ages of star clusters using SED fitting of five WFC3-UVIS bands, one orbit each: F275W, F336W, F438W, F555W, and F814W. We image the entire galaxy in one pointing per filter regardless of the roll angle, though we use a standard 4-point dither pattern to fill in chip gaps, subsample the PSF, reject cosmic rays and bad columns, etc. The APT gives a low background warning (for mitigating CTE losses) for our UV filters: F275W, F336W, F438W. Using a previous HST observation, we have determined that the NGC2276 galactic background in our regions of interest will be at least double that in the blank sky background. Accordingly, we have added post-flash to our F275W and F336W observations but do not need post-flash for our F438W observations. In summary when taking into account overheads and visibility, this results in 718 seconds per exposure for F814W, F555W, and F438W and 714 seconds per exposure for F336W and F275W.

Visit

Proposal 15615, NGC2276-F814W (01), implementation Fri Dec 14 20:01:21 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.4 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.754 Angle Between Sides= Center Pattern=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.119 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=33.606 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

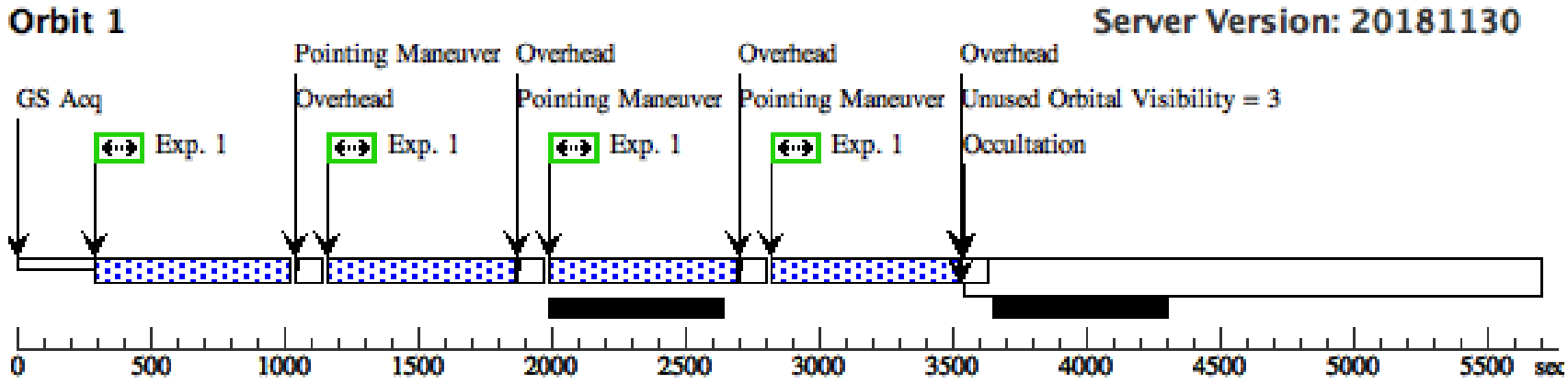
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC2276	RA: 07 27 33.4000 (111.8891667d) Dec: +85 45 29.50 (85.75819d) Equinox: J2000		V=11.3	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The center of the field was adjusted in order to ensure full coverage of the galaxy regardless of roll angle.
Category=GALAXY
Description=[ACCRETION DISK, SPIRAL, STAR FORMING REGION, STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC2276	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W			Pattern 1, Exps 1-1 in NGC2276-F814W (01) (1)	703 Secs (2812 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***

Orbit Structure



Visit

Proposal 15615, NGC2276-F555W (02), implementation Fri Dec 14 20:01:21 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.4 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.754 Angle Between Sides= Center Pattern=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.119 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=33.606 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

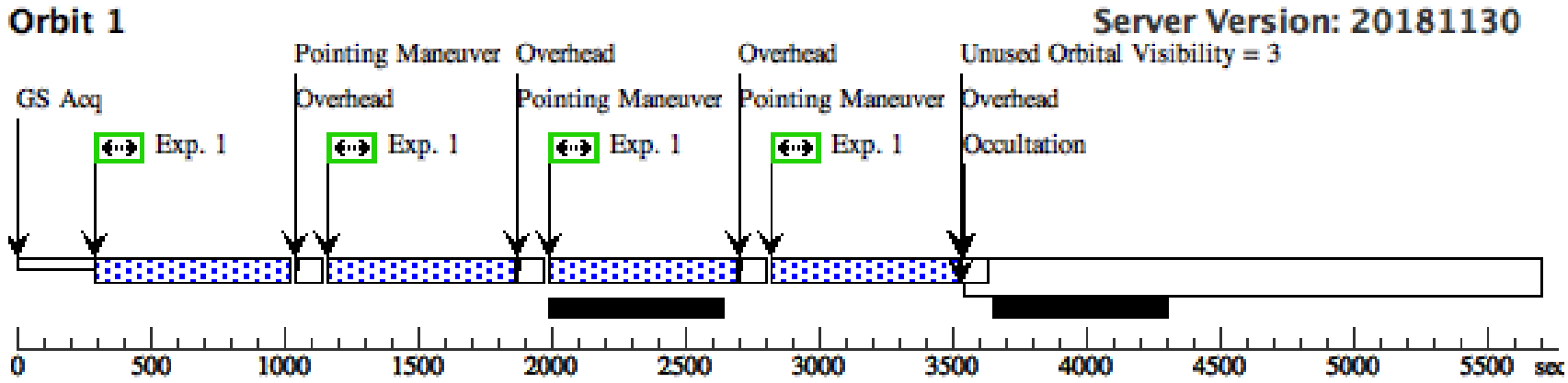
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC2276	RA: 07 27 33.4000 (111.8891667d) Dec: +85 45 29.50 (85.75819d) Equinox: J2000		V=11.3	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The center of the field was adjusted in order to ensure full coverage of the galaxy regardless of roll angle.
Category=GALAXY
Description=[ACCRETION DISK, SPIRAL, STAR FORMING REGION, STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC2276	WFC3/UVIS, ACCUM, UVIS-CENTER	F555W			Pattern 1, Exps 1-1 in NGC2276-F555W (02) (1)	703 Secs (2812 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	*[1]*

Orbit Structure



Visit

Proposal 15615, NGC2276-F438W (03), implementation Fri Dec 14 20:01:21 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in NGC2276-F438W (03))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.4 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.754 Angle Between Sides= Center Pattern=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.119 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=33.606 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC2276	RA: 07 27 33.4000 (111.8891667d) Dec: +85 45 29.50 (85.75819d) Equinox: J2000		V=11.3	Reference Frame: SIMBAD

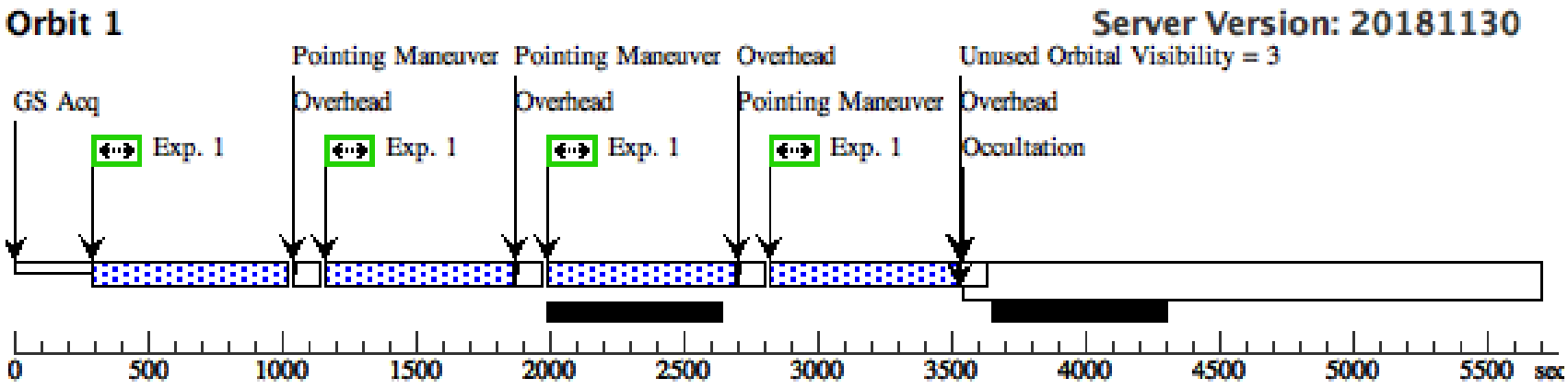
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The center of the field was adjusted in order to ensure full coverage of the galaxy regardless of roll angle.
Category=GALAXY
Description=[ACCRETION DISK, SPIRAL, STAR FORMING REGION, STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC2276	WFC3/UVIS, ACCUM, UVIS-CENTER	F438W			Pattern 1, Exps 1-1 in NGC2276-F438W (03) (1)	703 Secs (2812 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***

Comments: The regions of the target galaxy background will have >=12 e-/pix in this filter. No post-flash is needed.

Orbit Structure



Visit

Proposal 15615, NGC2276-F336W (04), implementation Fri Dec 14 20:01:21 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in NGC2276-F336W (04))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.4 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.754 Angle Between Sides= Center Pattern=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.119 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=33.606 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

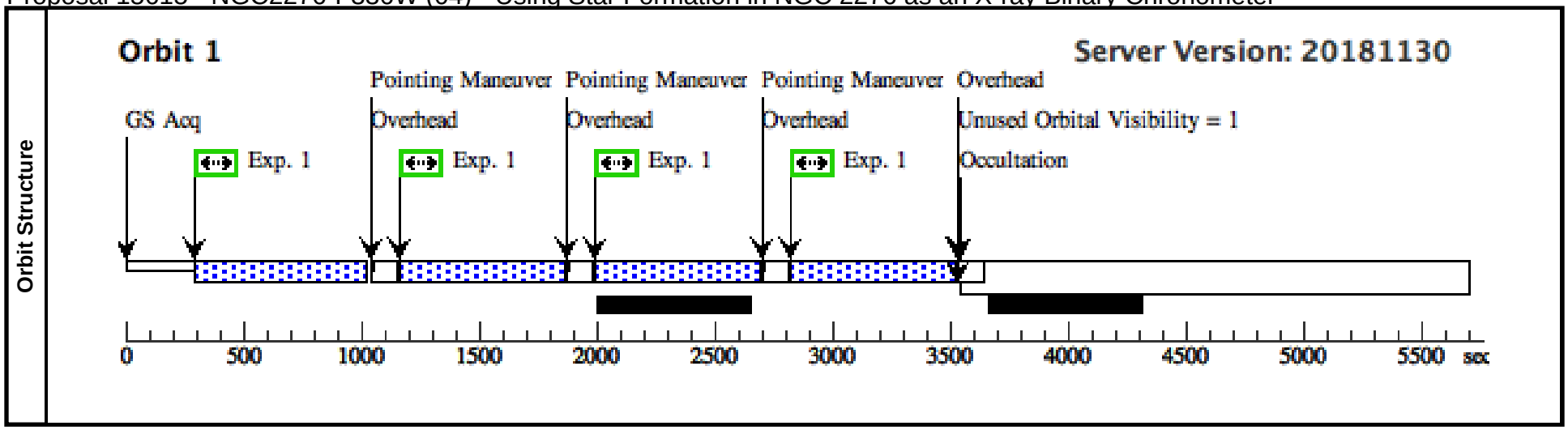
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC2276	RA: 07 27 33.4000 (111.8891667d) Dec: +85 45 29.50 (85.75819d) Equinox: J2000		V=11.3	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The center of the field was adjusted in order to ensure full coverage of the galaxy regardless of roll angle.
Category=GALAXY
Description=[ACCRETION DISK, SPIRAL, STAR FORMING REGION, STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC2276	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=8		Pattern 1, Exps 1-1 in NGC2276-F336W (04) (1)	699 Secs (2796 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***

Comments: A post-flash has been added so that the regions of interest on the galaxy will have >=12 e-/pix.


Orbit Structure
Orbit 1
Server Version: 20181130
GS Acq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Overhead
Unused Orbital Visibility = 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15615, NGC2276-F275W (05), implementation Fri Dec 14 20:01:21 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in NGC2276-F275W (05))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=MOSAIC Number Of Points=2 Point Spacing=2.4 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.754 Angle Between Sides= Center Pattern=true	Pattern Type=WFC3-UVIS-MOS-DITH-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.119 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=33.606 Angle Between Sides= Center Pattern=false	(1)

Fixed Targets

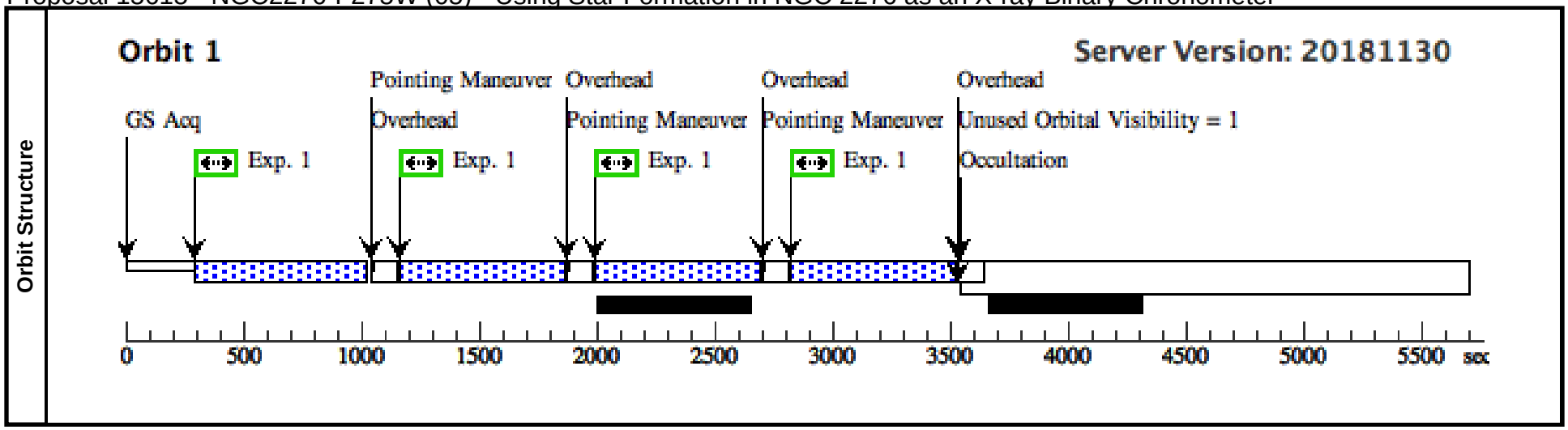
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC2276	RA: 07 27 33.4000 (111.8891667d) Dec: +85 45 29.50 (85.75819d) Equinox: J2000		V=11.3	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
The center of the field was adjusted in order to ensure full coverage of the galaxy regardless of roll angle.
Category=GALAXY
Description=[ACCRETION DISK, SPIRAL, STAR FORMING REGION, STARBURST]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC2276	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=9		Pattern 1, Exps 1-1 in NGC2276-F275W (05) (1)	699 Secs (2796 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	***[1]***

Comments: A post-flash has been added so that the regions of interest on the galaxy will have >=12 e-/pix.


Orbit Structure
Orbit 1
Server Version: 20181130
GS Acq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Overhead
Pointing Maneuver
Exp. 1
Overhead
Unused Orbital Visibility = 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec