15974 - Unmasking the cow: Distinguishing models for the unique transient AT2018cow

Cycle: 27, 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) AT2018COWHOST	WFC3/UVIS	1	25-Jul-2019 08:01:03.0	yes
02	(1) AT2018COWHOST	WFC3/UVIS	1	25-Jul-2019 08:01:04.0	yes
03	(1) AT2018COWHOST	WFC3/UVIS	1	25-Jul-2019 08:01:05.0	yes

3 Total Orbits Used

ABSTRACT

AT2018 is a transient unlike any seen before, unprecedented in its rapid rise time and high luminosity. It may well be a manifestation of one of two long sought after astrophysical phenomena: either an intermediate mass black hole, or a direct view to the central engine in a collapsing star. Here we propose a modest set of HST imaging observations to answer a vital question relating to AT2018cow -- where was it born? If it was created in the

tidal disruption of a white dwarf star by an intermediate-mass black hole, we might expect to uncover a globular cluster at its location, since it is in these locations that IMBHs may exist with a sufficiently high stellar density for white dwarfs to be scattered into their loss cone. Alternatively, if the source of AT2018cow is a massive star, we should see signs of ongoing star formation. Our observations in H-alpha and the UV will probe very young, extremely massive (tens of solar masses) stars and distinguish them from somewhat older, less massive (~10 Msol) stars. Deep optical observations will uncover any underlying globular cluster directly. Through these observations, we will measure the environment in which AT2018cow was born, and through that environment, we will determine its origin.

OBSERVING DESCRIPTION

We propose to obtain three orbits of observations of AT2018cow after is has faded with the aim of understandings its environment. We will obtain images in two UV filters (F225W and F606W), two optical filters (F555W and F814W) and two narrow band filters (F665N and F657N, the first of these will be off-band at the redshift of AT2018cow, while the second will match with H-alpha).

For each filter we will obtain 3 exposures along a standard line dither with an observation time of half an orbit. In order to fit within the orbit our UV and narrow band observations will use the UVIS2-C1K1C-SUB aperture to reduce overheads. For F555W and F814W it is possible to fit the observations within a single orbit while still using the full chip.

We have requested that the observations be scheduled approximately within 1 month of eachother since if there is any residual transient flux the data will be most useful if they are approximately taken at the same time.

Visit

Proposal 15974, Visit 01 Thu Jul 25 12:01:06 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: GROUP 01,02,03 WITHIN 30D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

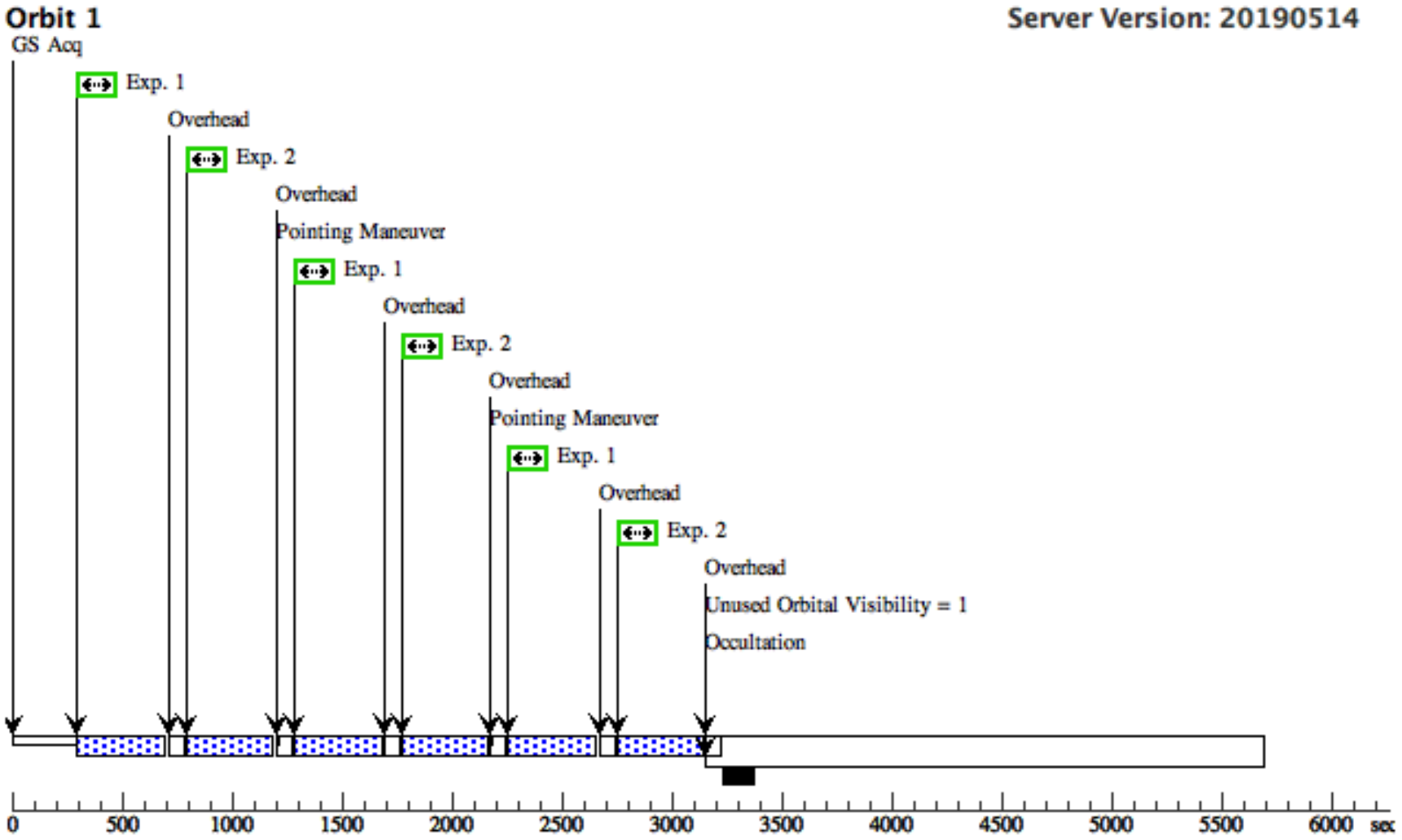
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	AT2018COWHOST	RA: 16 16 0.2242 (244.0009342d) Dec: +22 16 4.38 (22.26788d) Equinox: J2000		V=16+/-1	Reference Frame: ICRS

Comments:
Category=UNIDENTIFIED
Description=[GAMMA RAY EMITTER, RADIO EMITTER, X-RAY EMITTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F665N	FLASH=11		Pattern 1, Exps 1-2 in Visit 01 (1)	348 Secs (1119 Secs) *[==>373.0 Secs (Pattern 1)]* *[==>373.0 Secs (Pattern 2)]* *[==>373.0 Secs (Pattern 3)]*	***[1]***
2		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F657N	FLASH=11		Pattern 1, Exps 1-2 in Visit 01 (1)	348 Secs (1119 Secs) *[==>373.0 Secs (Pattern 1)]* *[==>373.0 Secs (Pattern 2)]* *[==>373.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 15974, Visit 02 Thu Jul 25 12:01:06 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: GROUP 02,01,03 WITHIN 30D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

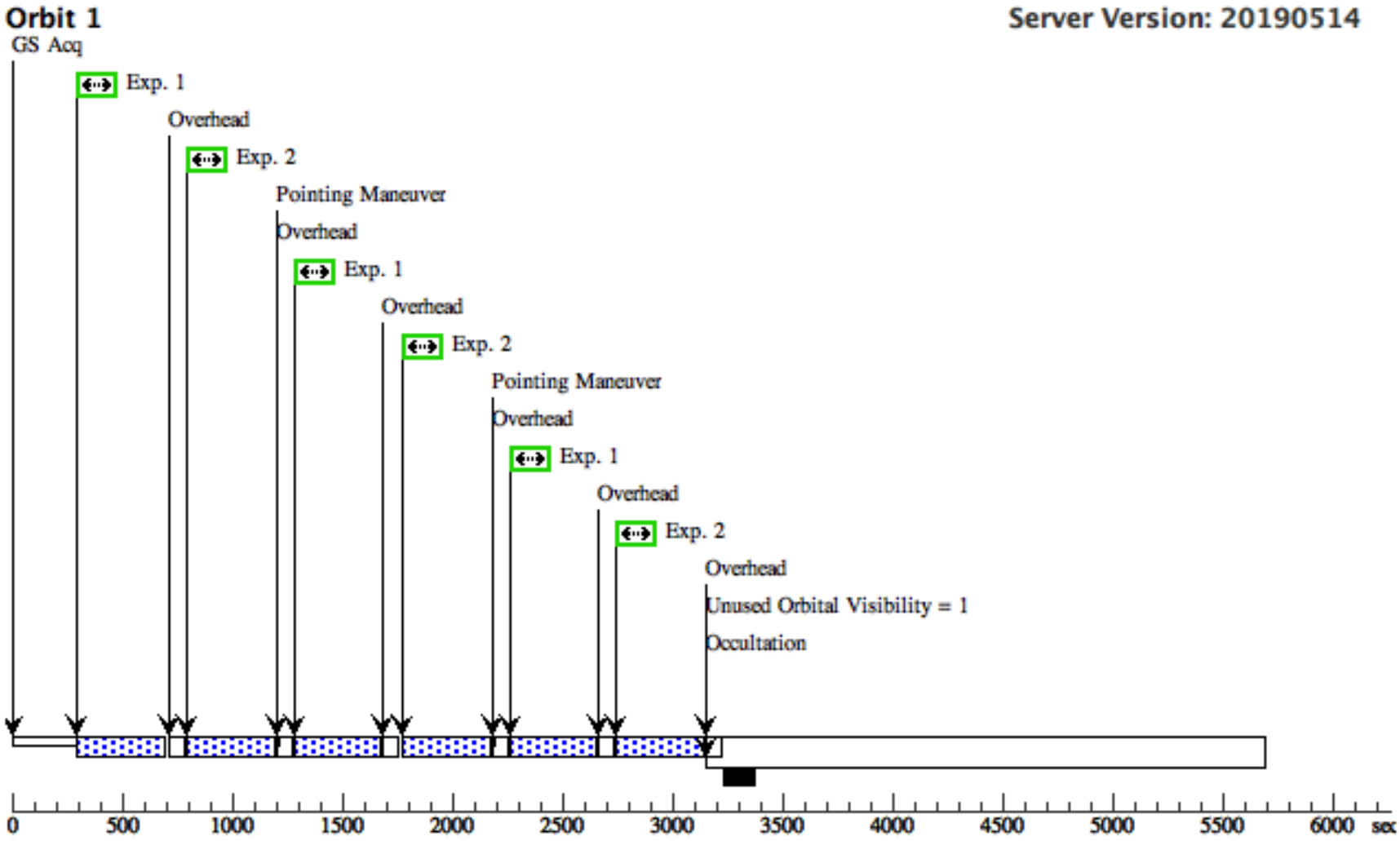
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	AT2018COWHOST	RA: 16 16 0.2242 (244.0009342d) Dec: +22 16 4.38 (22.26788d) Equinox: J2000		V=16+/-1	Reference Frame: ICRS

Comments:
Category=UNIDENTIFIED
Description=[GAMMA RAY EMITTER, RADIO EMITTER, X-RAY EMITTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=11		Pattern 1, Exps 1-2 in Visit 02 (1)	348 Secs (1116 Secs) *[==>372.0 Secs (Pattern 1)]* *[==>372.0 Secs (Pattern 2)]* *[==>372.0 Secs (Pattern 3)]*	***[1]***
2		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F336W	FLASH=11		Pattern 1, Exps 1-2 in Visit 02 (1)	348 Secs (1116 Secs) *[==>372.0 Secs (Pattern 1)]* *[==>372.0 Secs (Pattern 2)]* *[==>372.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 15974, Visit 03 Thu Jul 25 12:01:06 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: GROUP 03,01,02 WITHIN 30D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	AT2018COWHOST	RA: 16 16 0.2242 (244.0009342d) Dec: +22 16 4.38 (22.26788d) Equinox: J2000		V=16+/-1	Reference Frame: ICRS

Comments:
Category=UNIDENTIFIED
Description=[GAMMA RAY EMITTER, RADIO EMITTER, X-RAY EMITTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2	F555W	FLASH=4		Pattern 1, Exps 1-2 in Visit 03 (1)	348 Secs (1044 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[1]***
								[==>(Pattern 3)]	
2		(1) AT2018COWHOST	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=5		Pattern 1, Exps 1-2 in Visit 03 (1)	348 Secs (1044 Secs)	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[1]***
								[==>(Pattern 3)]	

Orbit Structure