16458 - A long gamma-ray burst from the nucleus of an ancient galaxy

Cycle: 28, 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) GRB191019A	WFC3/UVIS	1	11-Nov-2020 11:00:23.0	yes
02	(1) GRB191019A	WFC3/UVIS	1	11-Nov-2020 11:00:24.0	yes

2 Total Orbits Used

ABSTRACT

Long-duration gamma-ray bursts are associated with the collapse of massive stars, occurring ubiquitously in star-forming environments. These insights are based on studies of the more than 1000 bursts localised over the past 20 years. However, last year one burst, GRB 191019A, was discovered which appeared to challenge this rule. GRB 191019A is a regular long GRB coincident with the nucleus of an apparently passive galaxy at z=0.248. The probability of chance alignment within 0.1" of the galaxy nucleus is minimal (~10^-6), and so the association appears secure. There is no sign of any underlying supernova (SN) to limits >10 times fainter than typically in GRB supernovae. There is also no indication of nuclear SMBH activity in the galaxy (no X-ray detection to deep limits, or emission lines in the optical spectrum), and the source vanishes within a few hours, too quick for the expected evolution of tidal disruption events. This event may therefore represent a genuinely new route to the creation of a long GRB. Here we request deep UV observations to search for any underlying star formation to limits of <0.01 Msol/yr. The detection of even weak star formation would favour the origin in a massive star, in keeping with other GRBs. In this case, it is likely to provide evidence for the direct collapse of a massive star to a black hole. Alternatively, the absence of star formation may suggest a dynamical channel in the dense nuclear regions of the host galaxy. These HST observations are hence crucial in determining the origin of this new, and possibly so-far unidentified signal of stellar death.

OBSERVING DESCRIPTION

We will obtain two orbits of observations of the host galaxy of GRB 191019A with WFC3 UVIS. One orbit will be on obtain in F225W and one in F275W. A standard 4 point dither pattern will be used. The source will be placed close to the corner of the chip to avoid mitigate for CTE, and the chip will be flashed to ~20 electrons. In practice, since the source is extended the CTE is less of a concern.

Visit

Proposal 16458, Visit 01 Wed Nov 11 16:00:24 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 01)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

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)

Fixed Targets

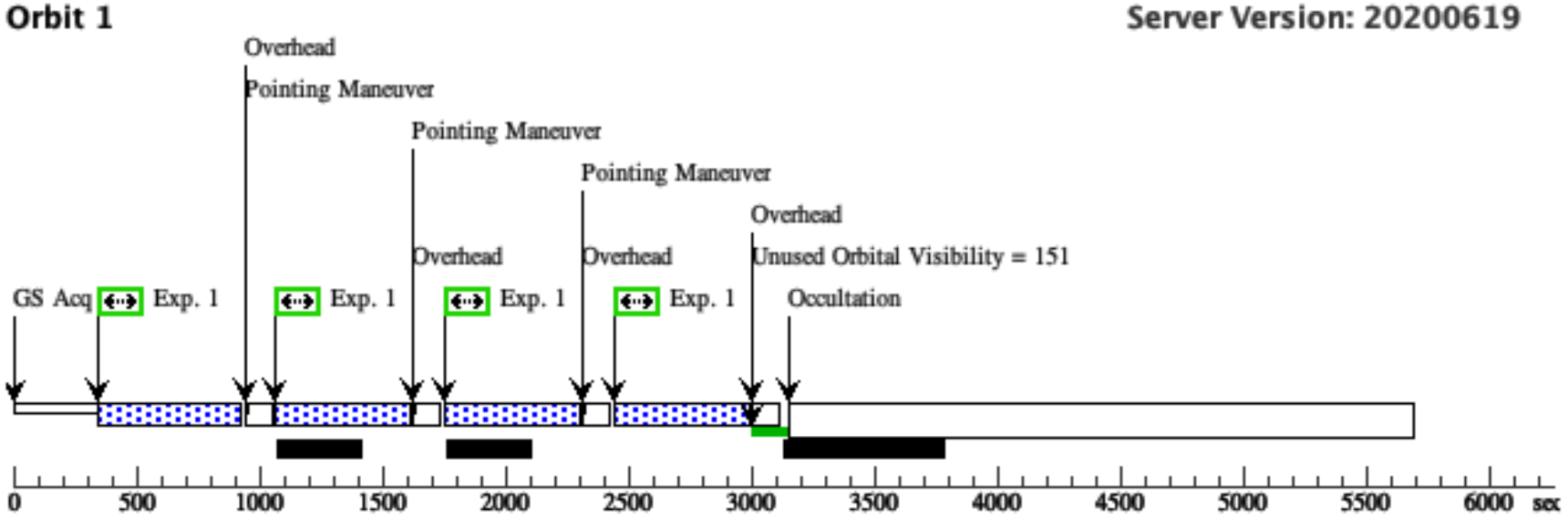
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8700 (340.0244583d) Dec: -17 19 40.80 (-17.32800d) Equinox: J2000		V=19+/-0.5	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	WFC3/UVIS, ACCUM, UVIS2	F225W	FLASH=19	POS TARG -55,-25	Pattern 1, Exps 1-1 in Visit 01 (1)	550 Secs (2200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 16458, Visit 02 Wed Nov 11 16:00:25 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(Exposure 1 (Pattern 1, Exps 1-1 in Visit 02)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

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)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8700 (340.0244583d) Dec: -17 19 40.80 (-17.32800d) Equinox: J2000		V=19+/-0.5	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	WFC3/UVIS, ACCUM, UVIS2	F275W	FLASH=19	POS TARG -55,-25	Pattern 1, Exps 1-1 in Visit 02 (1)	550 Secs (2200 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure