16051 - A long gamma-ray burst in an ancient galaxy

Cycle: 27, Proposal Category: GO/DD

(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	ACS/WFC	1	24-Mar-2020 09:00:22.0	yes
02	(1) GRB191019A	ACS/WFC	1	24-Mar-2020 09:00:23.0	yes
03	(1) GRB191019A	ACS/WFC	1	24-Mar-2020 09:00:24.0	yes
04	(1) GRB191019A	ACS/WFC	1	24-Mar-2020 09:00:25.0	yes

4 Total Orbits Used

ABSTRACT

Long-duration gamma-ray bursts are securely associated with the collapse of massive stars, and like core-collapse supernovae are always found in star-forming environments. The recent identification of GRB 191019A in a passive galaxy is, therefore, a major surprise. The source is close to the host nucleus (chance probability ~10^-6) and so is securely associated with the host. It is, therefore, imperative to determine the origin of the burst - does it arise from a core-collapse supernova in an environment never before seen for a long GRB? Was the event created via rare different channels (unusual binary evolution, dynamical interactions etc.) and so is it associated with a different kind of supernova? Does the proximity of the burst to its host nucleus imply a direct connection to the supermassive black hole, due either to unusual AGN activity or a tidal disruption event (TDE)? We propose a modest set of HST observations that will conclusively answer these questions. We will: (i) perform the most sensitive possible search for any associated supernova; (ii) pinpoint the source within its host galaxy with exceptional accuracy to determine if it may be associated with a TDE around a supermassive black hole; and (iii) track the decay to ascertain if the source vanishes or fades into an underlying active galaxy. These observations can conclusively determine the origin of GRB 191019A, and so provide direct constraints on the diversity of processes that can create gamma-ray burst-like explosions.

OBSERVING DESCRIPTION

We request to obtain two orbits of ACS grism observations of GRB 191019A in an apparently passive galaxy at z=0.23. Our experimental design is simple.We will obtain epochs 180 degrees (and approximately 180 days) apart to get a good subtraction of the host galaxy light. At each epoch we will obtain 1 F606W image (180s) duration and 4x400s exposures in G800L with a standard 4-point dither pattern.

Visit

Proposal 16051, Visit 01, completed Tue Mar 24 13:00:25 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1)

Fixed Targets

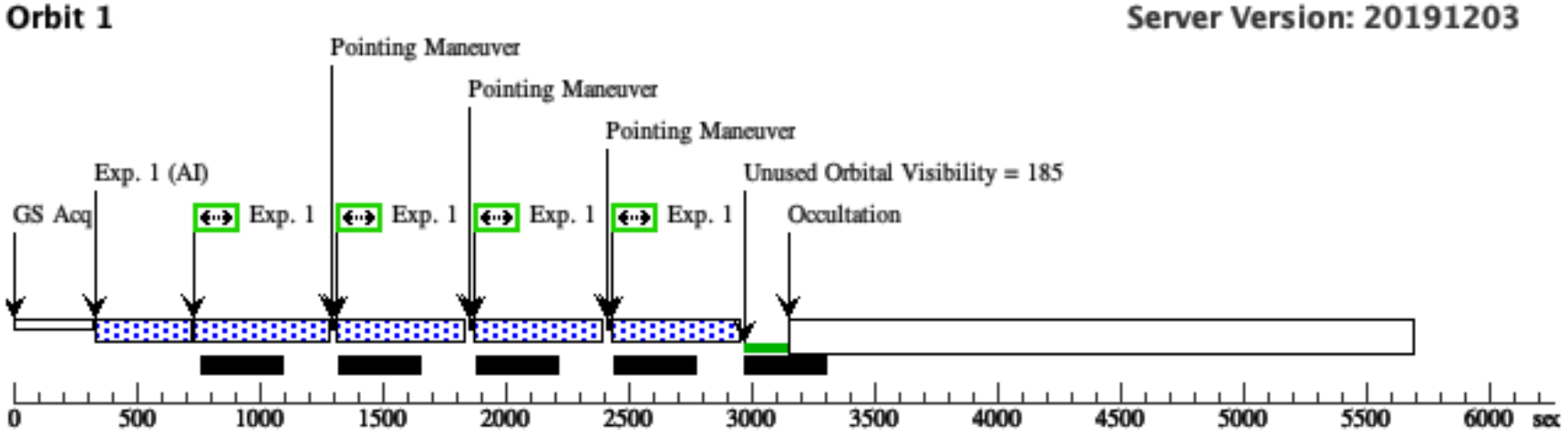
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8600 (340.0244167d) Dec: -17 19 41.30 (-17.32814d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, STAR FORMING REGION]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	G800L		POS TARG 75,-95	Pattern 1, Exps 1-1 in Visit 01 (1)	400 Secs (1600 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 16051, Visit 02, withdrawn Tue Mar 24 13:00:26 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1)
(3)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.604 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2)

Fixed Targets

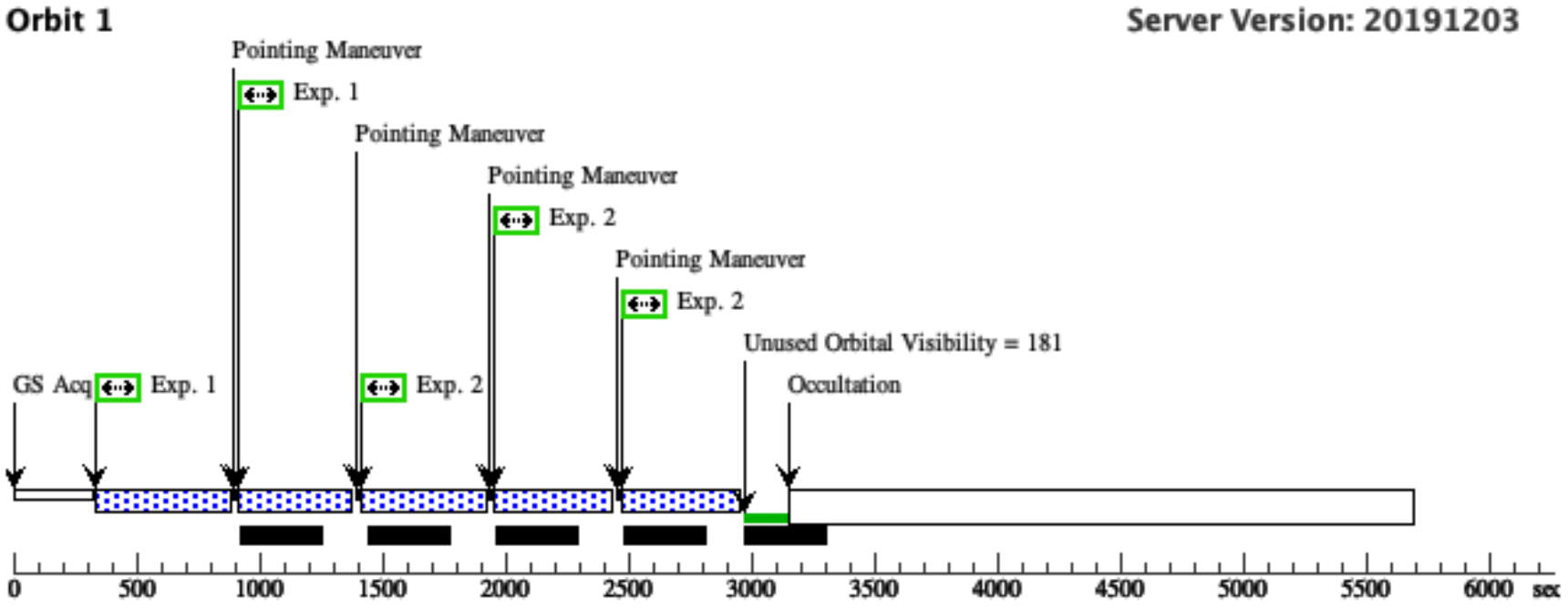
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8600 (340.0244167d) Dec: -17 19 41.30 (-17.32814d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, STAR FORMING REGION]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	F606W		POS TARG 75,-95	Pattern 2, Exps 1-1 in Visit 02 (2)	340 Secs (680 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	G800L	AUTOIMAGE=NO	POS TARG 75,-95	Pattern 3, Exps 2-2 in Visit 02 (3)	360 Secs (1080 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 16051, Visit 03, implementation Tue Mar 24 13:00:26 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 180.0D TO 180.0D FROM 01

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1)
(3)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.604 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2)

Fixed Targets

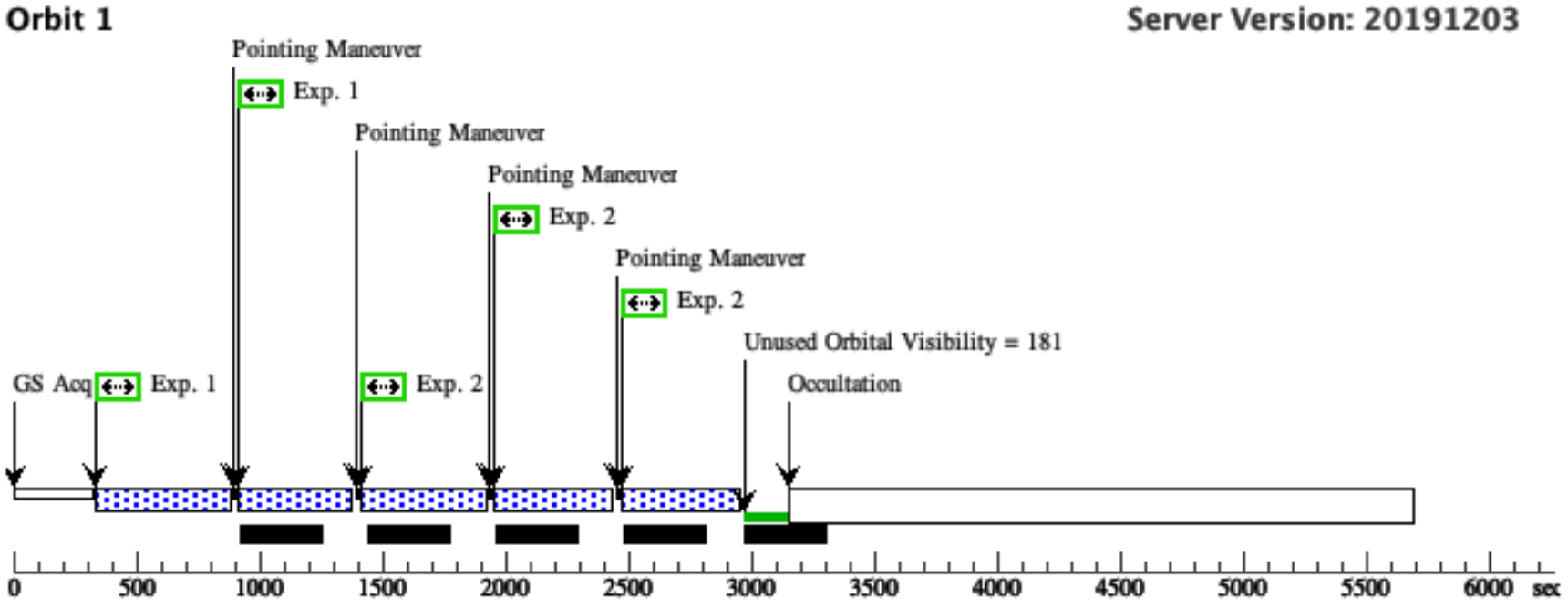
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8600 (340.0244167d) Dec: -17 19 41.30 (-17.32814d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, STAR FORMING REGION]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	F606W		POS TARG 65,-85	Sequence 1-2 Non-Int in Visit 03 Pattern 2, Exps 1-1 in Sequence 1-2 Non-Int in Visit 03 (2)	340 Secs (680 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	G800L	AUTOIMAGE=NO	POS TARG 65,-85	Sequence 1-2 Non-Int in Visit 03 Pattern 3, Exps 2-2 in Sequence 1-2 Non-Int in Visit 03 (3)	360 Secs (1080 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 16051, Visit 04, withdrawn Tue Mar 24 13:00:26 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1)
(3)	Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.604 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB191019A	RA: 22 40 5.8600 (340.0244167d) Dec: -17 19 41.30 (-17.32814d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ELLIPTICAL, STAR FORMING REGION]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	F606W		POS TARG 55,-75	Pattern 2, Exps 1-1 in Visit 04 (2)	340 Secs (680 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) GRB191019A	ACS/WFC, ACCUM, WFC-FIX	G800L	AUTOIMAGE=NO	POS TARG 55,-75	Pattern 3, Exps 2-2 in Visit 04 (3)	360 Secs (1080 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***

Orbit Structure