16923 - Solidifying the Origin of a Possible Kilonova at 350 Mpc

Cycle: 29, 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) GRB211211A	ACS/WFC	1	13-Mar-2022 16:00:17.0	yes
02	(1) GRB211211A	WFC3/IR	1	13-Mar-2022 16:00:17.0	yes

2 Total Orbits Used

ABSTRACT

Neutron star mergers are confirmed sites of r-process nucleosynthesis, observationally identified by their kilonovae. In particular, the study of short gamma-ray bursts (SGRBs), which span z~0.1-2, are a promising avenue to uncover kilonovae. Monitoring the temporal and color evolution of SGRB-kilonovae provides quantifiable estimates of their ejecta masses and compositions, of interest to assessing the contribution of such mergers to the universe's heavy element budget. In particular, the identification of nearby (z<0.1) kilonovae provide great distinguishing power. Recently, GRB 211211A was discovered in likely association with a galaxy at 350 Mpc (z=0.076). At this distance, the detection and temporal behavior of an associated NIR transient is fully consistent with a kilonova. If the distance is confirmed, this would make GRB 211211A the most nearby such event beyond the multi-messenger GW170817. We propose 2 orbits of HST imaging to secure the nearby origin of GRB 211211A by placing constraints on an underlying, unseen galaxy. Current ground-based observations have reached their limits, and cannot rule out the full range of known host galaxy luminosities and redshifts. If an underlying galaxy is detected from a higher-redshift origin, the NIR transient would be equally exciting, outshining any known kilonova or supernova to date.

OBSERVING DESCRIPTION

This proposal is for 2 orbits of imaging at the position of the afterglow of GRB 211211A with ACS/WFC/F606W (1 orbit) and WFC3/IR/F140W (1 orbit). These observations are to place deep constraints on an underlying host galaxy and to calculate a precise offset between the counterpart and the center of the host galaxy. The expected brightness of the afterglow is > 28 mag. The putative host galaxy is r = 19.8 AB mag.

Visit

Proposal 16923, optical (01) Sun Mar 13 20:00:18 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 165D TO 145 D; BEFORE 31-MAY-2022:00:00:00

Comments: 1-orbit observation with ACS/WFC/F606W.

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

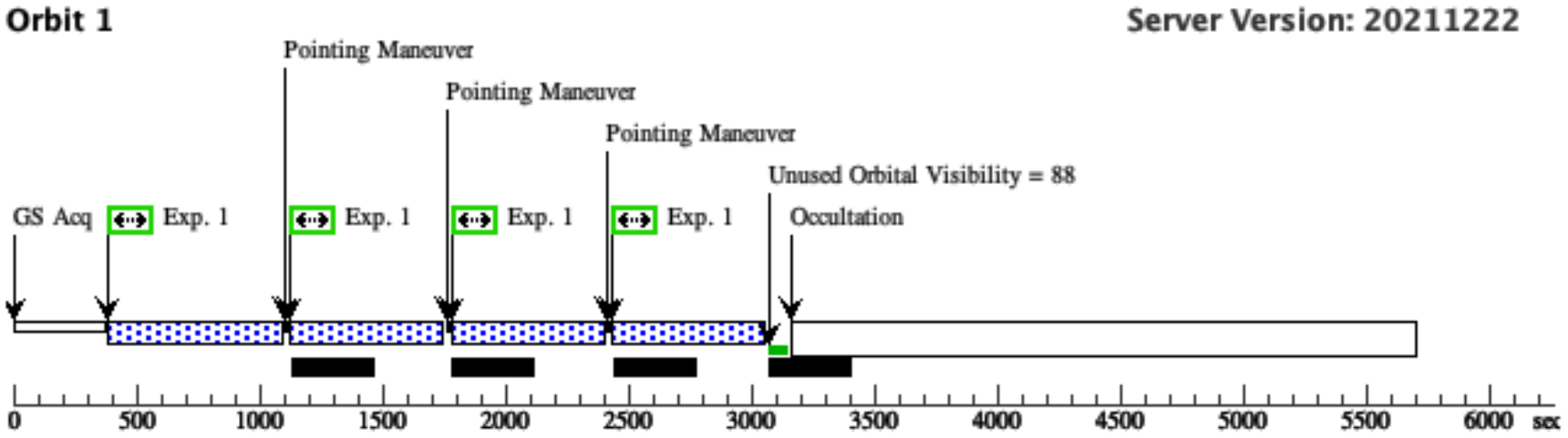
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB211211A	RA: 14 09 10.0898 (212.2920408d) Dec: +27 53 20.66 (27.88907d) Equinox: J2000		V=27.0	Reference Frame: SDSS

Comments:
Category=EXT-STAR
Description=[GAMMA RAY BURSTER, NEUTRON STAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB211211A	ACS/WFC, ACCUM, WFC1-CTE	F606W		POS TARG -20,-21	Pattern 1, Exps 1-1 in optical (01) (1)	500 Secs (2000 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 16923, near-IR (02) Sun Mar 13 20:00:18 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 165D TO 145 D; BEFORE 31-MAY-2022:00:00:00

Comments: 1-orbit observation with WFC3/IR/F140W.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB211211A	RA: 14 09 10.0898 (212.2920408d) Dec: +27 53 20.66 (27.88907d) Equinox: J2000		V=27.0	Reference Frame: SDSS

Comments:
Category=EXT-STAR
Description=[GAMMA RAY BURSTER, NEUTRON STAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB211211A	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=7; SAMP-SEQ=SPARS100		Pattern 3, Exps 1-1 in near-IR (02) (3)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure