15272 - The Progenitor of Supernova 2016gkg

Cycle: 25, 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) SN2016GKG	ACS/WFC	2	20-Jul-2017 13:22:19.0	yes

2 Total Orbits Used

ABSTRACT

Supernova (SN) 2016gkg is called to be one of the most interesting events of its kind in the coming years. Its discovery minutes/hours after explosion, subsequent intensive monitoring from ground and space, and the existence of pre-explosion HST imaging where a progenitor candidate

was detected, makes this SN an ideal case to study the fate of massive stars that explode after losing most of their outer envelopes. We propose to revisit the SN site with HST once the ejecta fade below the pre-explosion brightness in order to test the progenitor identification. This will also allow a better characterization of the progenitor object, which is crucial to confirm our proposal that it belonged to an interacting binary system. The images will have additional archival value as they will sample a large fraction of the host galaxy NGC 613.

OBSERVING DESCRIPTION

We will re-observe the site of SN 2016gkg in NGC 613 using ACS/WFC through three optical bands that most closely resemble the available pre-SN observations (i.e., F435W, F606W, and F814W) in order to determine whether the progenitor candidate has disappeared. According to our modeling, the candidate object is indeed the SN progenitor, so we expect the observed flux to be below the pre-explosion level in all bands. We expect the fading SN ejecta to be at 26 <F435W< 27 mag; 25.5 <F606W< 26.5 mag; and 25.5 <F814W< 26.5 mag at the time of our observations.

In order to increase the potential archival value of the images, we decided to center the FOV near the galaxy nucleus, and NOT AT THE SN LOCATION. Nevertheless, the SN site sits comfortably in one of the WFC chips.

Our program comprises one visit containing two orbits. We will divide the time among the three requested bands, obtaining total exposure times of 1600 s in F435W, 1370 s in F606W, and 1800 s in F814W. For each filter we will subdivide the exposures into two dithered images. According to the ACS ETC, with those exposure times, we will reach F435W~ 27.8 mag, F606W~ 27.9 mag, and F814W~ 27.1 mag, with a signal-to-noise ratio of S/N ~ 3.

In order to allow enough time for the SN to fade below the flux of the pre-SN object we have placed a scheduling constraint for the observations after July 3, 2018 (according to the observability windows allowed by the "Visit Planner" tool). This means that our program can be scheduled at the end of Cycle 25, or during Cycle 26.

We have checked for bright nearby sources and found that only one such source (a ~10th mag field star) is bright enough to saturate. However, its location is outside the chip FOV. We have also found that there is no need for post-flash exposures in any of the bands because the exposure times are long enough to avoid CTE problems.

Visit

Proposal 15272, Visit 1 (01) Thu Jul 20 17:22:20 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: AFTER 03-JUL-2018:00:00:00

Comments: This visit contains the whole program. Two orbits that will be used to observe with ACS/WFC and filters F435W, F606W, and F814W.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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), (2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2016GKG	RA: 01 34 17.0000 (23.5708333d) Dec: -29 25 30.00 (-29.42500d) Equinox: J2000		V=26+/-0.5	Reference Frame: ICRS

Comments: Given coordinates are not those of the SN because we chose to center the FOV near the host-galaxy nucleus.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F435W (ACS.im.10 12687)	(1) SN2016GKG	ACS/WFC, ACCUM, WFC	F435W			Pattern 1, Exps 1-1 in Visit 1 (01) (1)	800 Secs (1600 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***
2	F606W (ACS.im.10 12710)	(1) SN2016GKG	ACS/WFC, ACCUM, WFC	F606W			Pattern 1, Exps 2-2 in Visit 1 (01) (1)	685 Secs (1370 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]*** ***[2]***
3	F814W (ACS.im.10 12708)	(1) SN2016GKG	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 3-3 in Visit 1 (01) (1)	900 Secs (1800 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[2]***

Orbit Structure