12282 - The Final Word on the Progenitor of the Type II-Plateau Supernova SN 2006my

Cycle: 18, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Douglas C. Leonard (PI)	**San Diego State University**	**leonard@sciences.sdsu.edu**
Dr. Avishay Gal-Yam (CoI)	Weizmann Institute of Science	avishay.gal-yam@weizmann.ac.il
Dr. Derek B. Fox (CoI)	The Pennsylvania State University	dfox@astro.psu.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN2006MY	ACS/WFC	1	18-Aug-2010 15:42:47.0	yes

1 Total Orbits Used

ABSTRACT

Despite recent rapid progress, the field of supernova (SN) progenitor identification remains in its infancy, with only four supernovae having had unambiguous detection and characterization of their progenitor stars made. The existence of pre-SN WFPC2 images of the site of the nearby core-collapse (Type II-Plateau) SN 2006my has enabled three independent searches for its progenitor star to be carried out. In the first, Li et. al. (2007) find spatial coincidence between the SN and a possibly extended source with properties deemed consistent with those of a red supergiant. Subsequent analyses by Leonard et al. (2008) and Crockett et al. (2010) refute the Li et al. detection claim, but recognize that existing data do not permit a definitive resolution of the issue since even the revised SN localizations place SN 2006my on part of the putative progenitor's point-spread-function in the pre-SN frames (although no longer at its center). The time is ripe to settle the issue: A single-orbit reobservation of the SN site with HST/ACS will permit the definitive determination of whether this object is indeed associated with SN 2006my. If it is, and its flux is found to have diminished

(it was an extended source) or vanished (it was an isolated star), then this will enable the second conclusive characterization of a Type II-Plateau supernova's progenitor star's properties to be made. If it is not, then upper mass limits on the progenitor star will be confidently declared the final word on the topic.

OBSERVING DESCRIPTION

This phase II proposal outlines observations of the site of supernova SN 2006my to be taken during one orbit. The principal aim is to acquire high-resolution images in two photometric bands (V and I; filters F555W and F814W, respectively) with ACS/WFC to compare with images taken in the same filters (using WFPC2) prior to the supernova explosion. The observations here are being carried out in an effort to evaluate the status of a possible "progenitor star" that was identified in the pre-supernova images. Note that SN 2006my itself will _not_ be visible in the new images, as it is expected to have faded well below detectability (estimated I-band magnitude of ~31 mag), by the time these observations are made during Cycle 18. Our interest here is in better characterizing the progenitor star.

The observations consist of 4 individual exposures, two each through the F555W and F814W filters. The two exposures in each filter are dithered by 2 pixels in x and 2 pixels in y along the direction that minimizes the effects of scale vaiation across the detector to enable post-processing elimination of both hot pixels and cosmic ray hits (i.e., the ACS-WFC-DITHER-LINE pattern). Accounting for overheads, this permits four observations of 545 seconds each to be made. (This is according to the Astronomer's Proposal Tool; if additional time is available to observe, please extend the observations accordingly as there is no danger of saturation.)

The observing sequence thus proceeds as follows:

Exposure 1, F555W
Dither
Exposure 2, F555W
Repoint to original location
Exposure 3, F814W
Dither
Exposure 4, F814W

We have opted for the WFC1-CTE aperture, which places the target 200 x 200 pixels from the upper corner of the chip, to minimize CTE losses during readout. However, since we will be registering these new images with the archival ones, we desire a somewhat larger available region around the target location (to provide a sufficient number of stars surrounding the target location) than the nominal placement provides. Thus, we have offset the target location on the chip by -300 x -300 pixels (-15 x -15 arcsec) to place the final target location 500 x 500 pixels from the corner of the chip. This provides a sufficient area for the registration, while at the same time minimizing CTE losses.

Visit

Proposal 12282, Visit 01, implementation Wed Aug 18 19:42:49 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.146 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.17 Angle Between Sides= Center Pattern=false		(1), (2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2006MY	RA: 12 43 40.7400 (190.9197500d) Dec: +16 23 14.10 (16.38725d) Equinox: J2000		V=30	Reference Frame: NED

*Comments: This object was generated by the targetselector and retrieved from the NED database. Note that the supernova itself will *not* be visible on the frames, as it has faded well below detectability (Vmag ~30).*

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SN2006MY	ACS/WFC, ACCUM, WFC1-CTE	F555W		POS TARG -15,-15; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 (1)	545 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) SN2006MY	ACS/WFC, ACCUM, WFC1-CTE	F814W		POS TARG -15,-15	Pattern 1, Exps 2-2 (1)	545 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure