



12295 - Searching for the Progenitor of the Type Ib Supernova 2010O

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) SN2010O	WFC3/UVIS	1	11-Jun-2010 21:04:57.0	yes

1 Total Orbits Used

ABSTRACT

Several progenitor stars of Type II supernovae (SNe) have been identified in archival pre-explosion HST images. All of them are consistent with being red supergiants, as had been expected but never actually confirmed until the advent of HST imaging.

The hydrogen-deficient Type Ib and Ic SNe are in a less satisfactory state. They are believed to be core-collapse SNe arising from massive stars that have lost their H envelopes. Unfortunately, though, there has never been an identified progenitor of an SN Ib or Ic, so it remains uncertain whether they are massive Wolf-Rayet stars, or less-massive stars in interacting binaries.

The appearance of the Type Ib SN 2010O, in the starburst interacting galaxy NGC 3690 (Arp 299), offers a tantalizing new opportunity. NGC 3690 has been the subject of extensive HST observations, ranging from the UV and optical to the near-IR. We obtained ground-based images of SN 2010O, and find that there is a blue cluster in the archival HST images close to the nominal SN position. If the SN did indeed arise in this cluster, its spectral energy distribution, obtained from the HST archival data, constrains the turnoff mass to about 14 Msun. SN 2010O has also become even more interesting because of its close proximity to a variable X-ray source discovered by our team in pre-explosion Chandra images. Both of these findings would support the interacting-binary origin of this SN Ib.

The astrometric precision possible from our ground-based images is insufficient to verify the location of SN 2010O conclusively. We therefore propose a set of short WFC3 exposures, while the SN is still luminous, in order to confirm the association of the SN with the young cluster and with the X-ray source.

OBSERVING DESCRIPTION

The observations consist of WFC3/UVIS images of the interacting galaxies NGC 3690/Arp 299, for the primary purpose of precision astrometry of two supernovae while they are still bright, SN 2010O and SN 2010P. The astrometry will allow us to determine the precise locations of these SNe in pre-outburst archival HST images.

We will take dithered exposures of 2 frames each in the U (F336W), B (F438W), and I (F814W) filters. We are placing the two SNe in chip 2, away from the chip gap, so as to center the galaxies better in the field, thus adding to the value of our images to the archive. To make sure that the SNe are not near the gap, we are constraining the ORIENT angle, and we include a BEFORE requirement to make sure that the SNe will still be bright enough to be detected at reasonably high S/N. The chosen dither pattern will fill in the chip gap.

Proposal 12295 (STScI Edit Number: 0, Created: Friday, June 11, 2010 8:05:01 PM EST) - Overview

Visit	Proposal 12295, Visit 01, implementation					Sat Jun 12 01:05:02 GMT 2010				
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/UVIS									
	Special Requirements: SCHED 40%; ORIENT 75D TO 95 D; BEFORE 10-JUL-2010:00:00:00									
	Comments: ORIENT requirement ensures that chip gap will not be near either of the two main targets.									
BEFORE date is because targets are supernovae which are fading, and must be observed as soon as practicable.										
Both constraints can be relaxed somewhat if necessary for scheduling.										
Patterns	#	Primary Pattern			Secondary Pattern		Exposures			
	(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Coordinate Frame=POS-TARG Pattern Orientation=85.772 Purpose=DITHER Angle Between Sides= Number Of Points=2 Center Pattern=true Point Spacing=2.428 Line Spacing=					(1-3)			
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2010O	RA: 11 28 29.0000 (172.1208333d) Dec: +58 34 7.00 (58.56861d) Equinox: J2000		V=21	Reference Frame: ICRS				
Comments: Primary target SN 2010O is at 11 38 33.86 +58 33 51.6 and secondary target SN 2010P is at 11 28 31.38 +58 33 49.3. The pointing entered above covers both targets (in chip 2), while placing most of the host galaxy well within the field of view.										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) SN2010O	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=NO		Pattern 1, Exps 1-3 (1)	395 Secs	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	
	2		(1) SN2010O	WFC3/UVIS, ACCUM, UVIS	F438W	CR-SPLIT=NO		Pattern 1, Exps 1-3 (1)	370 Secs	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	
	3		(1) SN2010O	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=NO		Pattern 1, Exps 1-3 (1)	370 Secs	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	

Server Version: 20100505

Orbit Structure

