



11105 - The LBV progenitor of SN 2005gl - a new key to massive star evolution puzzles

Cycle: 16, 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) SN2005GL	WFPC2	1	25-Jul-2007 12:07:06.0	yes
51	(1) SN2005GL	WFPC2	1	25-Jul-2007 12:07:12.0	yes

2 Total Orbits Used

ABSTRACT

The currently accepted theory regarding the last stages of massive star evolution maintains that the evolution of the envelope is coupled to that of the stellar core. For this reason, very massive stars are expected to shed their outer hydrogen envelopes before they develop large iron cores, and ultimately, explode as core-collapse supernovae (SNe). It is therefore a strict prediction of current models that massive stars (certainly those above ~ 40 solar mass) will explode as hydrogen-poor SNe, i.e., of Types Ib and Ic. In particular, the class of luminous blue variables (LBVs) such as η -Carina, which are known to be very massive (up to 100 solar masses and above) are expected to lose their entire hydrogen envelopes prior to their ultimate explosions as SNe. However, using pre-explosion HST/WFPC2 imaging of the location of the recent hydrogen-rich type II In SN 2005gl, we have identified (Gal-Yam et al. 2007) its putative progenitor as a very luminous point source (with absolute V magnitude of -10.2). If this is a single

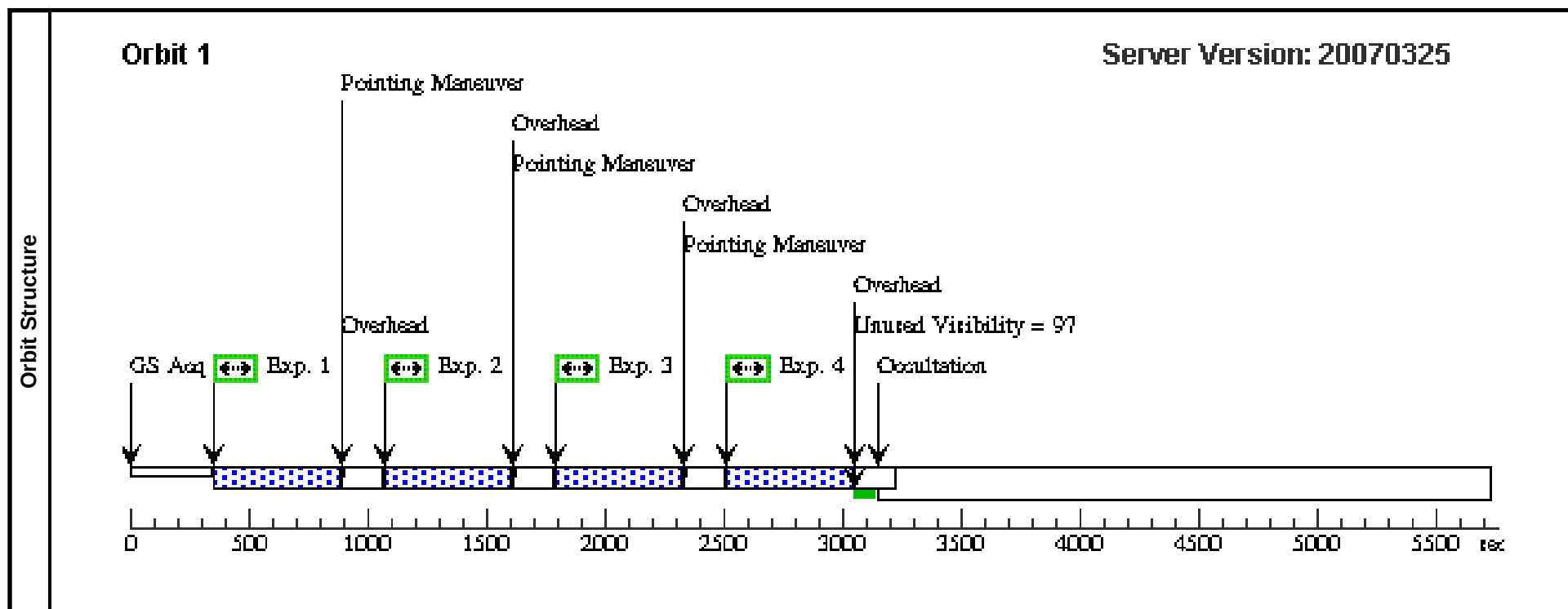
star, it must be an LBV from luminosity considerations (no other stars are as luminous). If our progenitor identification is correct, at least in some cases, massive stars explode before losing most of their hydrogen envelope, indicating the core and envelope are decoupled, and requiring revision of stellar evolution theory. Here, we propose a single-orbit HST observation of the location of SN 2005gl designed to test whether the point source we identified as its LBV progenitor has indeed disappeared (as expected from a single star) or remained unchanged (as expected, e.g., if it is a compact star cluster). These data are the last observational ingredient required to firmly establish (or refute) the explosion of an LBV as a type II_n SN, with fundamental implications for the theory of massive star evolution. Since the new data will be compared to pre-explosion WFPC2 images, this program is perfectly suited to be carried out with the WFPC2 camera.

OBSERVING DESCRIPTION

We will observe the location of SN 2005gl using the F547M filter for one orbit, to determine whether the putative progenitor star of the SN has indeed disappeared.

Proposal 11105 - Visit 01 - The LBV progenitor of SN 2005gl - a new key to massive star evolution puzzles

Visit	Proposal 11105, Visit 01, completed Wed Jul 25 16:07:14 GMT 2007									
	Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: (none) <i>Comments: Single visit in this proposal</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2005GL	RA: 00 49 50.0000 (12.4583333d) Dec: +32 16 57.00 (32.28250d) Equinox: J2000		V=25.0+/-0.5	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	SN2006gl-e xp1	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO		Sequence 1-4 Non-Int	500.0 Secs	
									[=>400.0 Secs]	[1]
	2	SN2005gl-e xp2	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG 1.03,0	Sequence 1-4 Non-Int	500.0 Secs	
									[=>400.0 Secs]	[1]
	3	SN2005gl-e xp3	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG 0,1.03	Sequence 1-4 Non-Int	500.0 Secs	
									[=>400.0 Secs]	[1]
	4	SN2005gl-e xp4	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG -1.03,-1.03	Sequence 1-4 Non-Int	500.0 Secs	
									[=>400.0 Secs]	[1]



Proposal 11105 - Visit 51 - The LBV progenitor of SN 2005gl - a new key to massive star evolution puzzles

Visit	Proposal 11105, Visit 51 Wed Jul 25 16:07:15 GMT 2007									
	Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: (none) Comments: <i>Single visit in this proposal</i> <i>This is a repeat of visit 1</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2005GL	RA: 00 49 50.0000 (12.4583333d) Dec: +32 16 57.00 (32.28250d) Equinox: J2000		V=25.0+/-0.5	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	SN2006gl-e xp1	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO		Sequence 1-4 Non-Int	500.0 Secs	
									[==>400.0 Secs]	[1]
	2	SN2005gl-e xp2	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG 1.03,0	Sequence 1-4 Non-Int	500.0 Secs	
									[==>400.0 Secs]	[1]
	3	SN2005gl-e xp3	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG 0,1.03	Sequence 1-4 Non-Int	500.0 Secs	
									[==>400.0 Secs]	[1]
	4	SN2005gl-e xp4	(1) SN2005GL	WFPC2, IMAGE, WF3	F547M	CR-SPLIT=NO	POS TARG -1.03,-1.03	Sequence 1-4 Non-Int	500.0 Secs	
									[==>400.0 Secs]	[1]

