



# 12559 - Stellar Forensics III: A post-explosion view of the progenitors of core-collapse supernovae

Cycle: 19, 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) SN2009KR	ACS/WFC	2	05-Jul-2011 21:28:51.0	yes
02	(2) SN2009MD	ACS/WFC	2	05-Jul-2011 21:29:00.0	yes

4 Total Orbits Used

## ABSTRACT

Recent studies have used high spatial resolution HST observations of supernova (SN) sites to directly identify the progenitors of core-collapse SNe on pre-explosion images. These studies have set constraints about the nature of massive stars and their evolution just prior to their explosion as SNe.

Now, at late-times when the SNe have faded sufficiently, it is possible to return to the sites of these core-collapse SNe to search for clues about the nature of their progenitors.

We request time to conduct deep, late-time, high-resolution imaging with ACS/WFC of the sites of two core-collapse SNe 2009kr and 2009md. We aim to: 1) Confirm our original identifications, made in pre-explosion images, by confirming that the progenitors are now missing; 2) Apply image subtraction techniques for this late-time imaging with our pre-explosion images to determine accurate photometry of the progenitors to constrain their temperatures and luminosities; and 3) study the stellar populations in the immediate vicinities of these SNe, previously obscured by the progenitor and the SN, to provide a measure of the progenitor's age, as well. HST provides the unique combination of high-resolution optical/IR imaging at very faint magnitudes that will facilitate this study.

### **OBSERVING DESCRIPTION**

We require 3 color imaging of the sites of 2 SNe (2009kr and 2009md) using ACS WFC. In order to reduce time spent on reading out, we will use the WFC 1k subarray.

For each SN we will use 2 orbits to acquire deep F435W, F555W and F814W imaging (to reach magnitude limits indicated below).

For each filter, we will adopt a four-point, box dither pattern for the removal of hot-pixels and cosmic rays. Tests of arranging the observations with only 4 pointing maneuvers (rather than the 16 we use) showed this pattern to be less efficient, hence we adopt 16 separate pointing maneuvers.

As stated in the Phase I, the SNe need to be faint (or completely absent) in these observations - hence we require them to be scheduled in the second half of Cycle 19 (which we take to be after 1 Apr 2012).

2009kr - Visit 1 - 2 orbits

I - 4x384s - I ~26 at 5sig

B - 4x270s - B ~26 at 3sig

V - 4x425s - V ~ 27 at 5sig

2009md - Visit 2 - 2 orbits

I - 4x384s - I ~26 at 5sig

B - 4x268s - B ~26 at 3sig

V - 4x425s - V ~ 27 at 5sig

Proposal 12559 - Visit 01 - Stellar Forensics III: A post-explosion view of the progenitors of core-collapse supernovae

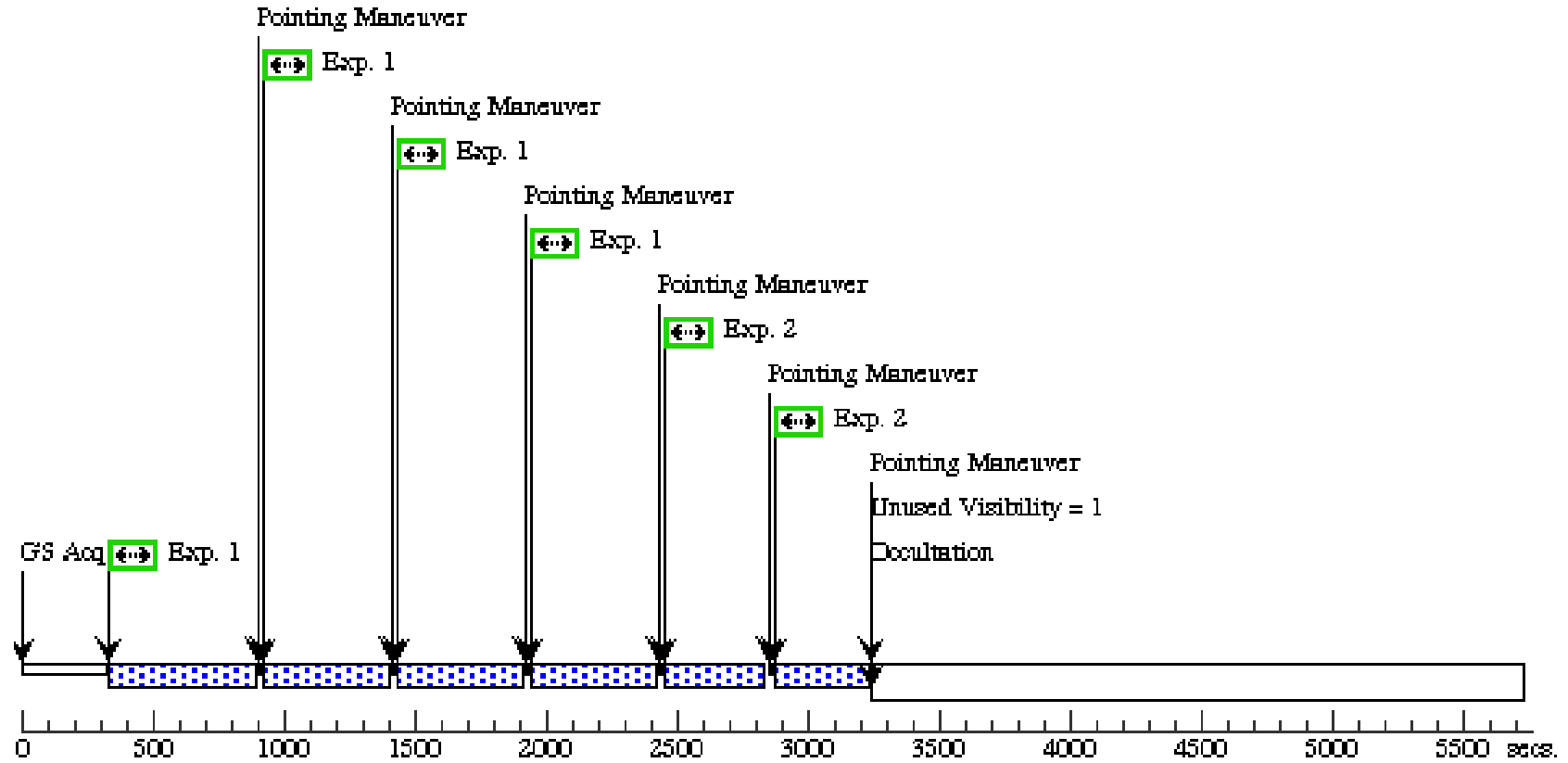
Wed Jul 06 01:29:04 GMT 2011

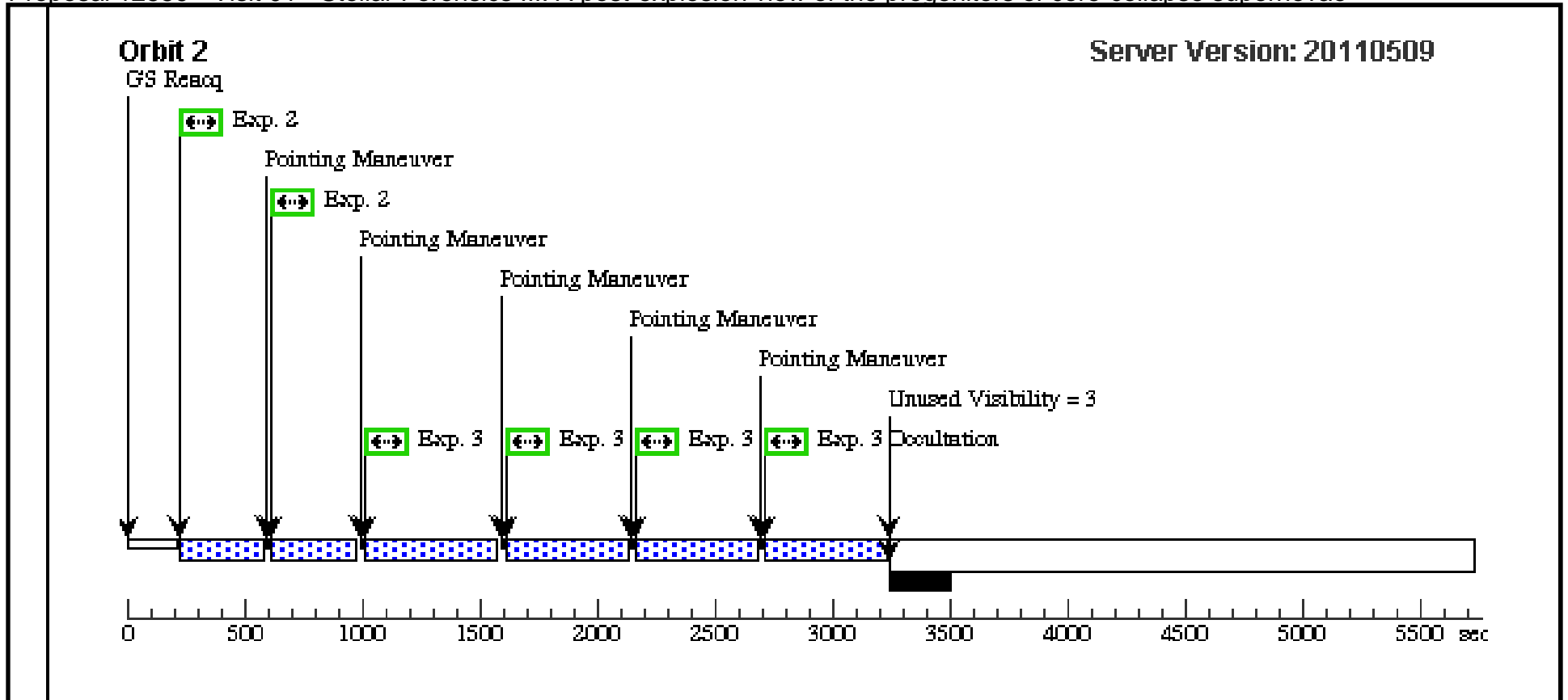
Visit	<b>Proposal 12559, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: ACS/WFC Special Requirements: AFTER 01-APR-2012 Comments: Visit for SN 2009kr									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2), (3)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2009KR	RA: 05 12 3.3000 (78.0137500d) Dec: -15 41 52.20 (-15.69783d) Equinox: J2000		V=27.5	Reference Frame: ICRS				
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	SN2009kr-I	(1) SN2009KR	ACS/WFC, ACCUM, WFC1-1K	F814W			Pattern 1, Exps 1-1 in Visit 01 (1)	385 Secs	
									[==>384.0 Secs (Pattern 1)]	
									[==>384.0 Secs (Pattern 2)]	[1]
								[==>384.0 Secs (Pattern 3)]		
								[==>384.0 Secs (Pattern 4)]		
2	SN2009kr-B	(1) SN2009KR	ACS/WFC, ACCUM, WFC1-1K	F435W			Pattern 1, Exps 2-2 in Visit 01 (1)	270 Secs		
								[==>270.0 Secs (Pattern 1)]		
								[==>270.0 Secs (Pattern 2)]	[1]	
								[==>(Pattern 3)]	[2]	
								[==>(Pattern 4)]		
3	SN2009kr-V	(1) SN2009KR	ACS/WFC, ACCUM, WFC1-1K	F555W			Pattern 1, Exps 3-3 in Visit 01 (1)	425 Secs		
								[==>(Pattern 1)]		
								[==>(Pattern 2)]		
								[==>(Pattern 3)]	[2]	
								[==>(Pattern 4)]		

Orbit 1

Server Version: 20110509

Orbit Structure





Proposal 12559 - Visit 02 - Stellar Forensics III: A post-explosion view of the progenitors of core-collapse supernovae

Wed Jul 06 01:29:06 GMT 2011

Visit	<b>Proposal 12559, Visit 02</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: ACS/WFC Special Requirements: AFTER 01-APR-2012 Comments: Visit for SN 2009md									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2), (3)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	SN2009MD	RA: 10 48 26.2800 (162.1095000d) Dec: +12 32 2.80 (12.53411d) Equinox: J2000		V=27.5+/-0.5	Reference Frame: ICRS				
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	2009md-I	(2) SN2009MD	ACS/WFC, ACCUM, WFC1-1K	F814W			Pattern 1, Exps 1-1 in Visit 02 (1)	384 Secs	
									[=>(Pattern 1)]	[1]
									[=>(Pattern 2)]	
								[=>(Pattern 3)]		
								[=>(Pattern 4)]		
2	SN2009md-B	(2) SN2009MD	ACS/WFC, ACCUM, WFC1-1K	F435W				Pattern 1, Exps 2-2 in Visit 02 (1)	268 Secs	
									[=>(Pattern 1)]	[1]
									[=>(Pattern 2)]	
									[=>(Pattern 3)]	[2]
									[=>(Pattern 4)]	
3	SN2009md-V	(2) SN2009MD	ACS/WFC, ACCUM, WFC1-1K	F555W				Pattern 1, Exps 3-3 in Visit 02 (1)	425 Secs	
									[=>(Pattern 1)]	
									[=>(Pattern 2)]	
									[=>(Pattern 3)]	[2]
									[=>(Pattern 4)]	

Orbit 1

Server Version: 20110509

Orbit Structure

