13505 - SN 2012im/2013ek: A Supernova Double Take in NGC 6984

Cycle: 21, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Dan Milisavljevic (PI) (Contact)	**Harvard University**	**dmilisav@cfa.harvard.edu**
Prof. Alicia M. Soderberg (CoI)	Harvard University	asoderberg@cfa.harvard.edu
Dr. Robert A. Fesen (CoI)	Dartmouth College	robert.fesen@dartmouth.edu
Maria Drout (CoI)	Harvard University	mdrout@cfa.harvard.edu
Dr. Raffaella Margutti (CoI)	Harvard University	rmargutti@cfa.harvard.edu
Mr. Nathan Sanders (CoI)	Harvard University	nsanders@cfa.harvard.edu
Prof. Robert P. Kirshner (CoI)	Harvard University	kirshner@cfa.harvard.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN2013EK	WFC3/UVIS	2	07-Aug-2013 21:01:26.0	yes

2 Total Orbits Used

ABSTRACT

An unprecedented transient event has just been detected in a spiral arm of NGC 6984. Two H-poor supernovae - SN 2012im and 2013ek - both originating from massive stripped-envelope progenitor stars have been found at virtually the same location (< 0.4 arcsec). Interpretations have varied widely. Chance alignment of two completely independent supernovae of the same Type Ib/c class exploding within one year of each other from the same stellar cluster is statistically improbable. Thus, the two explosions are most likely physically related, and this has important ramifications in areas of high-mass binary star evolution and explosion mechanisms of core-collapse supernovae.

High resolution HST images are the only means by which to probe the stellar environment of the progenitor system. To this end, we request

WFC3/UVIS imaging in F336W, F475W, F555W, and F814W of SN 2013ek in the next month while SN 2013ek is still bright to pin down its precise location within a nearby cluster of stars visible in an archival plate of NGC 6984. Complementary follow-up images will be requested during regular GO proposals in Cycle 22 when the fading supernova reveals what is left behind. The proposed suite of images will allow us to model the cluster's broadband colors to determine properties of the progenitor star system's environment (e.g., mass, age, luminosity, star formation rate, metallicity) that will be used to constrain possible explosion scenarios.

We request Director's Discretionary time for these observations as a non-disruptive TOO.

OBSERVING DESCRIPTION

We request two orbits to image the region of SN 2013ek and host galaxy NGC 6984 using WFC3/UVIS with the F336W, F475W, F555W, and F814W filters. Target is visible between August 7-22, for 57 mins per orbit. We estimate total integration times of ~25-30 mins per filter. Three- or four-point sub-pixel dithering will achieve the best resolution possible.

NGC 6984 is at a distance of 65 Mpc. The 0.04" pixel scale of WFC3/UVIS will constrain the position of supernova and host cluster within ~12 pc.

Visit

Proposal 13505, Visit 01, implementation Thu Aug 08 01:01:38 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2), (3), (6), (7)

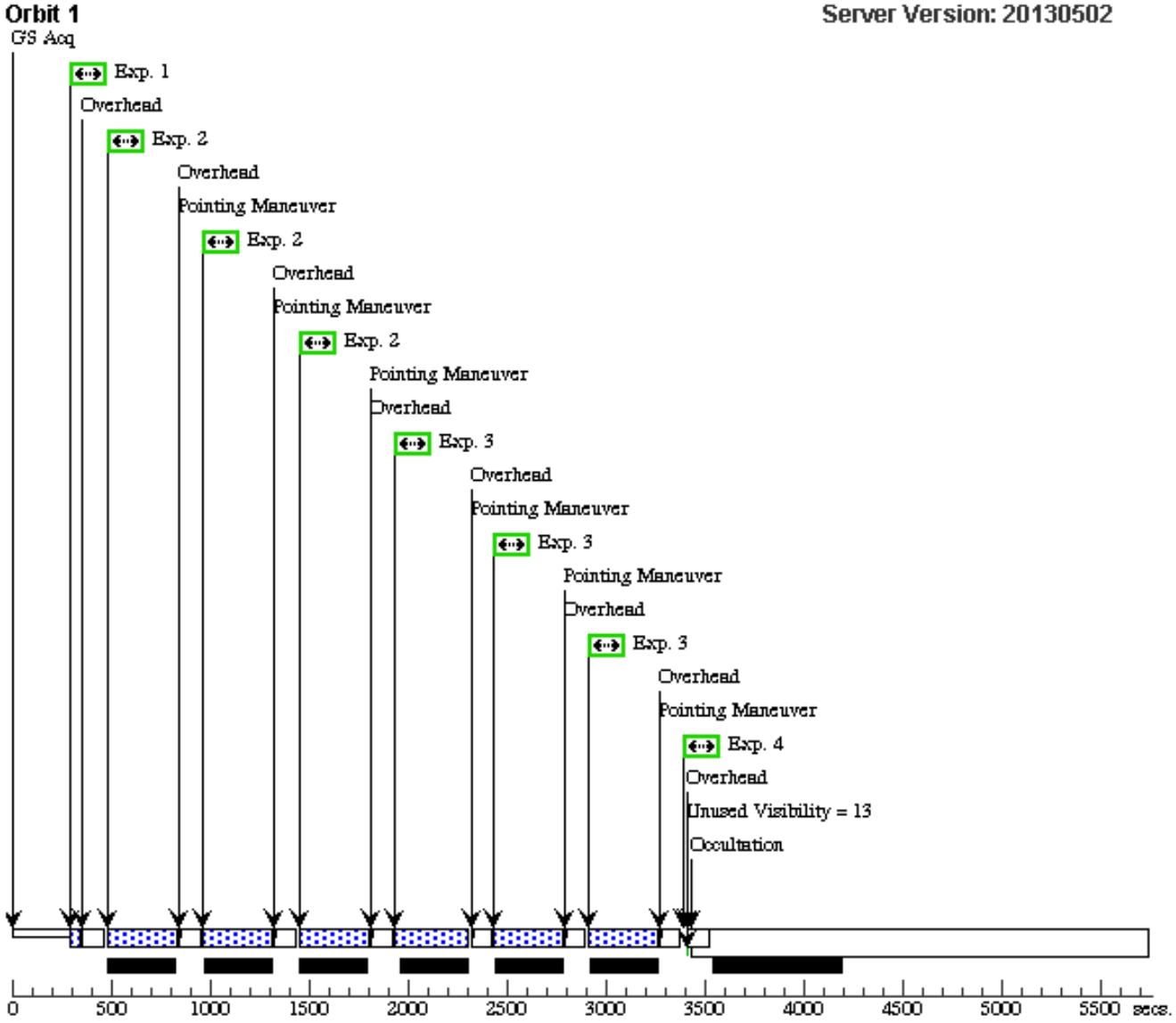
Fixed Targets

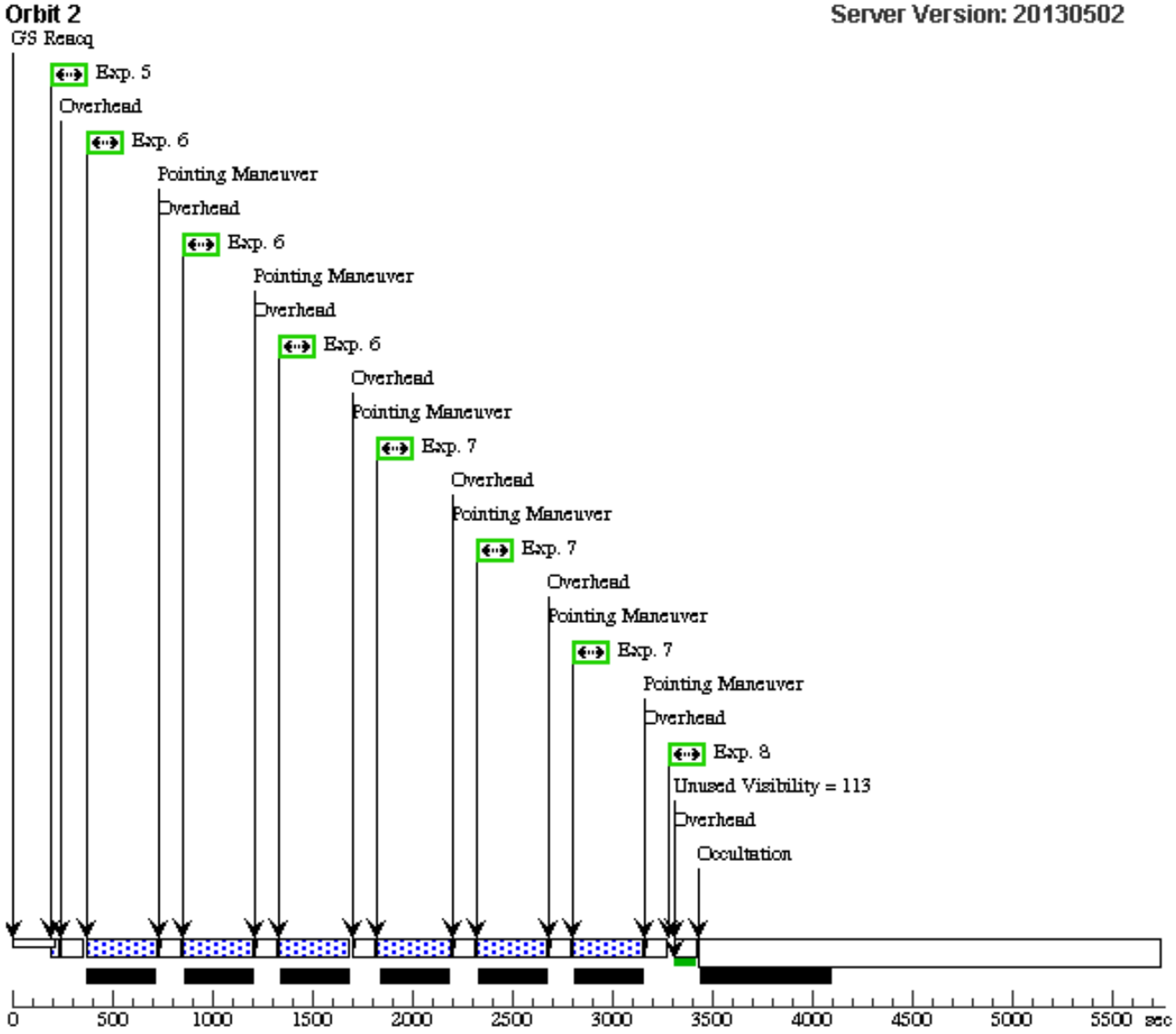
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2013EK	RA: 20 57 53.9000 (314.4745833d) Dec: -51 52 24.50 (-51.87347d) Equinox: J2000		V=17.5+/-1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=12			15 Secs (15 Secs)	
								[==>]	***[1]***
2		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F336W	FLASH=11		Pattern 1, Exps 2-2 in Visit 01 (1)	350 Secs (1050 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
3		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F555W			Pattern 1, Exps 3-3 in Visit 01 (1)	350 Secs (1050 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
4		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F555W	FLASH=12			10 Secs (10 Secs)	
								[==>]	***[1]***
5		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F438W	FLASH=12			15 Secs (15 Secs)	
								[==>]	***[2]***
6		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F438W	FLASH=9		Pattern 1, Exps 6-6 in Visit 01 (1)	350 Secs (1050 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
7		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=4		Pattern 1, Exps 7-7 in Visit 01 (1)	350 Secs (1050 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***
8		(1) SN2013EK	WFC3/UVIS, ACCUM, UVIS2	F814W	FLASH=12			15 Secs (15 Secs)	
								[==>]	***[2]***

Orbit Structure




Orbit 2
Server Version: 20130502
GS Reacq
Exp. 5
Overhead
Exp. 6
Pointing Maneuver
Overhead
Exp. 6
Pointing Maneuver
Overhead
Exp. 6
Overhead
Pointing Maneuver
Exp. 7
Overhead
Pointing Maneuver
Exp. 7
Overhead
Pointing Maneuver
Exp. 7
Pointing Maneuver
Overhead
Exp. 8
Unused Visibility = 113
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec