



14116 - A Search for A Light Echo from Supernova 2013ej

Cycle: 23, 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) SN-2013EJ	WFC3/UVIS	2	09-Dec-2015 21:01:52.0	yes

2 Total Orbits Used

ABSTRACT

Light echoes from supernovae are fascinating phenomena and can probe both the circumstellar and interstellar structures, the size distribution and chemical composition of the scattering dust, and the detailed history of the outburst giving rise to the echo. Although light echoes from recent extragalactic supernovae could well be a common occurrence, observations which spatially resolve echoes are relatively rare. The main obstacle to resolving the echo is that the SN host galaxies must be relatively nearby, although, even then, the structures can only be revealed by the superior angular resolution of HST. The light echo of a SN results from the luminous ultraviolet (UV)/optical pulse scattered by dust in the SN environment. In particular, we can witness a record of the bright, rapid, elusive flash of X-ray/UV emission emerging as the SN shock breaks through the massive envelope around the progenitor star. We propose to search for a light echo around the recent Type II-Plateau Supernova 2013ej in the nearby, nearly face-on spiral host galaxy Messier 74. Previous HST imaging since the explosion has not revealed an echo. However, those observations were too soon, when the SN was still on the plateau and quite bright. The WFC3/UVIS multi-band imaging we propose will be late enough, near day 900 of the SN age, and sensitive enough to detect a possible light echo. There are very few other supernovae this nearby, at an old enough age, where adequately resolving the echo is possible. Cycle 23 is the time to do this for SN 2013ej, taking particular advantage of the UV.

OBSERVING DESCRIPTION

We will image the site of SN 2013ej in M74 with WFC3/UVIS in F275W, F336W, F438W, F555W, and F814W, using the subarray UVIS2-C1K1C-SUB. We will be able to precisely pinpoint the SN's location in the new images. Any echo around SN 2013ej could be appreciably fainter, given that there is apparently less internal host dust at the site than for the site of SN 2012aw. We have estimated that we can include 1280 sec total exposures in F275W and F336W in one full orbit, including overheads (guide star acquisition, dither, filter changes). With the subarray we save substantially in the need for buffer dumps. We can obtain 720-s total exposures in F438W and F555W, plus a 820-sec total exposure in F814W, into a second full orbit. The total exposures consist of equal pairs of exposures, which will be line-dithered and post-flashed, to mitigate against CR hits and improve overall sensitivity. In each of the bands we should be able to detect the integrated light of an echo around SN 2013ej at 5-sigma to the following magnitudes: 22.0 (F275W), 22.7 (F336W), 22.6 (F438W), 23.5 (F555W), and 22.2 (F814W). The SN itself should be extremely faint in all bands and should not therefore pose a problem; we should be able to detect any residual point source at the SN site, though, to, e.g., ~26.4 mag at 3-sigma in F814W. We would, then, potentially be able to determine that the identified red supergiant has vanished, confirming it as SN progenitor. We will also be able to characterize stars in the immediate SN environment as well. We should be able to fully and successfully model the flux from an observed SN 2013ej light echo.

Proposal 14116 - Visit 01 - A Search for A Light Echo from Supernova 2013ej

Thu Dec 10 02:01:54 GMT 2015

Visit	Proposal 14116, Visit 01 Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)										
	(Exposure 4 (Pattern 1, Exps 1-5 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 5 (Pattern 1, Exps 1-5 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false				(1-5)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	SN-2013EJ	RA: 01 36 48.1900 (24.2007917d) Dec: +15 45 30.70 (15.75853d) Equinox: J2000				V=23.5+/-1.0		Reference Frame: SIMBAD		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(1) SN-2013EJ	(1) SN-2013EJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F275W	FLASH=12		Pattern 1, Exps 1-5 in Visit 01 (1)	648 Secs (1296 Secs)		
									[==>(Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
	2	(1) SN-2013EJ	(1) SN-2013EJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F336W	FLASH=12		Pattern 1, Exps 1-5 in Visit 01 (1)	648 Secs (1296 Secs)		
									[==>(Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
	3	(1) SN-2013EJ	(1) SN-2013EJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=9		Pattern 1, Exps 1-5 in Visit 01 (1)	360 Secs (720 Secs)		
									[==>(Pattern 1)]		[1]
									[==>(Pattern 2)]		[2]
	4	(1) SN-2013EJ	(1) SN-2013EJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F555W			Pattern 1, Exps 1-5 in Visit 01 (1)	360 Secs (720 Secs)		
									[==>(Pattern 1)]		[1]
								[==>(Pattern 2)]		[2]	
5	(1) SN-2013EJ	(1) SN-2013EJ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W			Pattern 1, Exps 1-5 in Visit 01 (1)	930 Secs (930 Secs)			
								[==>410.0 Secs (Pattern 1)]		[1]	
								[==>520.0 Secs (Pattern 2)]		[2]	

Orbit 1

Server Version: 20150609

Orbit Structure



