



12913 - The Peculiar Type Ia Supernova 2012Z: A Massive Star Progenitor?

Cycle: 20, 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-2012Z	WFC3/UVIS	1	09-Jul-2012 22:33:02.0	yes

1 Total Orbits Used

ABSTRACT

Despite the tremendous importance of type Ia supernovae (SNe Ia), from their use as cosmological distance indicators to their contribution to the chemical enrichment of the Universe, we are still puzzled by the basic questions: what are their progenitor systems and how do they explode? Peculiar SNe Ia, objects that resemble normal SNe Ia spectroscopically, but lie off the one-parameter Phillips relationship the vast majority of SN Ia follow, play a useful role in answering these questions. By understanding what makes a small, but significant, fraction of SNe Ia different than their normal cousins, we may identify the key initial conditions and physical processes at work. Here we propose late-time HST WFC3/UVIS optical photometry of SN 2012Z, the most recent member of the peculiar SN 2002cx-like subclass of SNe Ia. We will compare our observations with

extremely deep pre-explosion HST ACS images of the host galaxy NGC 1309, to test whether bright ($M_I = -6$) stars near the position of the SN are in fact coincident with it, testing a massive star progenitor hypothesis for this subclass of explosions, contrary to the most likely progenitor models for normal SNe Ia. We will also continue to follow the optical light curve of SN 2012Z to epochs later than any peculiar SNe Ia has been observed, in order to test signatures of explosion models for these objects.

OBSERVING DESCRIPTION

We propose to obtain late-time optical WFC3/UVIS VrI photometry of SN 2012Z in NGC 1309 in two epochs, once during Cycle 20 (sometime approximately 400 to 600 days after SN maximum light), and again during Cycle 21 (sometime approximately 750 to 950 days past maximum).

In the first epoch observations (between March and September 2013) we anticipate SN 2012Z will have $V \sim 22.3$, $r \sim 22.5$, and $I \sim 22.5$, with an uncertainty of about 1 mag. To accurately measure the position of the SN, we require $S/N > \sim 20$ in F555W, even in a pessimistic case (with the SN 1 mag below the prediction and near the end of the observing window). Based on the WFC3/UVIS exposure time calculator, and including overheads and two dithered exposures in each filter, our first epoch observations will fit comfortably within one orbit.

The second epoch (Cycle 21) observations in 3 orbits will be submitted separately.

Proposal 12913 - SN2012Z-epoch1 (01) - The Peculiar Type Ia Supernova 2012Z: A Massive Star Progenitor?

Tue Jul 10 02:33:10 GMT 2012

Visit	Proposal 12913, SN2012Z-epoch1 (01) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 100%; BETWEEN 28-FEB-2013:23:59:59 AND 01-OCT-2013:00:00:01									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	SN-2012Z	RA: 03 22 5.3500 (50.5222917d) Dec: -15 23 15.60 (-15.38767d) Equinox: J2000		V=23+/-1 fading	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F625W				281 Secs [==>]	[1]
	2	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F814W				350 Secs [==>]	[1]
	3	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F555W				350 Secs [==>]	[1]
	4	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F555W		POS TARG 0.099,0.106		350 Secs [==>]	[1]
	5	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F814W		POS TARG 0.099,0.106		350 Secs [==>]	[1]
	6	(1) SN-2012Z	(1) SN-2012Z	WFC3/UVIS, ACCUM, UVIS2	F625W		POS TARG 0.099,0.106		281 Secs [==>]	[1]

