16047 - A SN Ia Event in a Globular Cluster of a Nearby Galaxy

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Prof. Joel N. Bregman (PI) (Contact)	**University of Michigan**	**jbregman@umich.edu**
Dr. Oleg Y. Gnedin (CoI)	University of Michigan	ognedin@umich.edu
Dr. Patrick O. Seitzer (CoI)	University of Michigan	pseitzer@umich.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN2019EIN	ACS/WFC	1	19-Mar-2020 16:00:12.0	yes
51	(1) SN2019EIN	ACS/WFC	1	19-Mar-2020 16:00:13.0	yes

2 Total Orbits Used

ABSTRACT

The path to a SN Ia is not observationally known as we have never observed the progenitor or its properties: mass, age, and metallicity. These shortcomings are removed when a SN Ia occurs in a globular cluster, an old population with near-uniform metallicity. Previous efforts to discover a SN Ia in globular cluster have failed, but a recent Ia event, SN 2019ein, lies within 0.5 arcseconds of a globular cluster candidate in the early-type galaxy NGC 5353 (D = 28 Mpc) on a pre-SN WFC3/IR F110W image (SN is 5.5 kpc from the galaxy center). To establish that this SN Ia-GC association is real and not due to chance, we propose observations that will reduce the error circle for the SN by a factor of 50 to 0.01 arcsec (1.4 pc, less than the half-light radii for a typical globular cluster). This is accomplished by obtaining an HST image while the supernova is still visible and registering that image on the pre-SN image; we propose to use the ACS/WFC F475W and F814W. These observations can also show the location of SN 2019ein within the GC, and as the binary is relatively heavy, it should lie toward the center. A confirmation of the SN-GC association would be

powerful evidence for the double-degenerate path, and once the SN has faded, further properties of the globular cluster can be obtained.

OBSERVING DESCRIPTION

This program constitutes images in two filter on the ACS/WFC, W475W and F814W, of approximate equal observing time, and for a total of 1 orbit. The target is a fading SN Ia, SN2019ein, which lies about 5 kpc from the center of NGC 5353. The image should be dithered to achieve the highest spatial resolution.

There are no particularly bright objects in the field, being mostly 20-27 mag plus some diffuse emission from the elliptical galaxy.

Visit

Proposal 16047, Visit 01, failed

Thu Mar 19 20:00:13 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.262 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

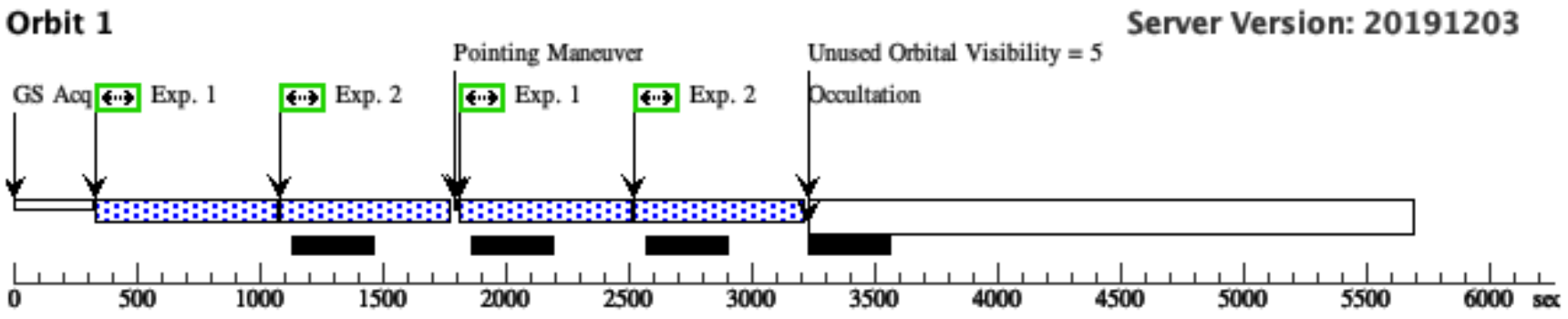
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EIN	RA: 13 53 29.1000 (208.3712500d) Dec: +40 16 31.40 (40.27539d) Equinox: J2000	Radial Velocity: 2325 km/sec	V=21.+/-1.0	Reference Frame: ICRS

Comments: Target should not be placed near the chip gap of the detectors.
Category=GALAXY
Description=[ELLIPTICAL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN2019EIN	ACS/WFC, ACCUM, WFC1-CTE	F475W			Pattern 1, Exps 1-2 in Visit 01 (1)	400 Secs (1064 Secs) *[==>532.0 Secs (Pattern 1)]* *[==>532.0 Secs (Pattern 2)]*	*[1]*
2		(1) SN2019EIN	ACS/WFC, ACCUM, WFC1-CTE	F814W			Pattern 1, Exps 1-2 in Visit 01 (1)	400 Secs (1064 Secs) *[==>532.0 Secs (Pattern 1)]* *[==>532.0 Secs (Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 16047, Visit 51 Thu Mar 19 20:00:13 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.262 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EIN	RA: 13 53 29.1000 (208.3712500d) Dec: +40 16 31.40 (40.27539d) Equinox: J2000	Radial Velocity: 2325 km/sec	V=21.+/-1.0	Reference Frame: ICRS

Comments: Target should not be placed near the chip gap of the detectors.
Category=GALAXY
Description=[ELLIPTICAL]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SN2019EIN	ACS/WFC, ACCUM, WFC1-CTE	F475W			Pattern 1, Exps 1-2 in Visit 51 (1)	400 Secs (1064 Secs) *[==>532.0 Secs (Pattern 1)]* *[==>532.0 Secs (Pattern 2)]*	*[1]*
2		(1) SN2019EIN	ACS/WFC, ACCUM, WFC1-CTE	F814W			Pattern 1, Exps 1-2 in Visit 51 (1)	400 Secs (1064 Secs) *[==>532.0 Secs (Pattern 1)]* *[==>532.0 Secs (Pattern 2)]*	*[1]*

Orbit Structure