16075 - Late-time Observations of Calcium-Rich Transient SN 2019ehk

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN2019EHK	WFC3/IR WFC3/UVIS	2	24-Mar-2020 17:00:19.0	yes

2 Total Orbits Used

ABSTRACT

Supernova (SN) 2019ehk in M100 is the closest known Calcium-rich (Ca-rich) transient and the only object in this class with an X-ray detection. Prompt, high-cadence follow-up of this transient across the EM spectrum, in addition to pre-explosion HST imaging, has indicated that the progenitor star was likely low mass and surrounded by dense circumstellar material (CSM) whose geometry/density was capable of producing luminous X-ray

emission as well as a double-peaked light curve. The close proximity of SN 2019ehk provides the first opportunity to track the photometric evolution of a Ca-rich transient at late phases (>300 days) when the SN luminosity is governed by radioactive decay and/or additional power sources e.g., CSM, and is too faint for ground-based observatories. These objects typically decrease in magnitude rapidly and thus their late-time decline rate and power source is unknown. Here we propose multi-color imaging of SN 2019ehk in order to understand its late-time bolometric behavior and to constrain the total mass of Ni-56 synthesized in the explosion. This will allow us to test whether SN 2019ehk is powered solely by radioactive decay or by additional CSM at large distances from the progenitor system.

OBSERVING DESCRIPTION

We propose to observe nearby supernova 2019ehk with WFC3/IR in F110W and F160W filters in the first of our two allocated orbits. In the second orbit, we will observe SN 2019ehk with WFC3/UVIS in filters F555W and F814W. Our optimal observing window is between 06-May-2020 and 01-June-2020. We have requested that IR imaging be taken within 3 days of the UVIS imaging orbit. Below is our observing plan for each filter in each orbit:

Orbit 1:

F555W: Total Exposure time = 1500s; Split into two 750s exposures using WFC3-UVIS-DITHER-LINE pattern
F814W: Total Exposure time = 900s; Split into two 450s exposures using WFC3-UVIS-DITHER-LINE pattern

Orbit 2:

F110W/F160W: Four ~300s individual exposures for each filter using the WFC3-IR-DILTER-BOX-MIN pattern.

Visit

Proposal 16075, UVIS/IR Orbits (01) Tue Mar 24 21:00:19 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: BETWEEN 06-MAY-2020:00:00:00 AND 01-JUN-2020:00:00:00

Comments: Orbit 1:
Filters: F110W, F160W

Orbit 2:
Filters: F555W, F814W

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		(3-4)
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERNOVA]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F110W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=13; SAMP-SEQ=SPARS25		Pattern 2, Exps 1-2 in UVIS/IR Orbits (01) (2)	302.938471 Secs (1211.754 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS25; NSAMP=13		Pattern 2, Exps 1-2 in UVIS/IR Orbits (01) (2)	302.938471 Secs (1211.754 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3	F814W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=5		Pattern 1, Exps 3-4 in UVIS/IR Orbits (01) (1)	450 Secs (900 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
4	F555W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS	F555W			Pattern 1, Exps 3-4 in UVIS/IR Orbits (01) (1)	750 Secs (1500 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***

Orbit Structure