16922 - Late-time Observations of Calcium-Rich Transient SN 2021gno

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Mr. Wynn Vicente Jacobson-Galan (PI) (Contact)	**University of California - Berkeley**	**wynnjg@berkeley.edu**
Dr. Raffaella Margutti (CoI)	University of California - Berkeley	rafmargutti@gmail.com
Prof. Ryan Foley (CoI)	University of California - Santa Cruz	foley@ucsc.edu
Dr. Charles Kilpatrick (CoI)	Northwestern University	ckilpatrick@northwestern.edu
Dr. Armin Rest (CoI)	Space Telescope Science Institute	arest@stsci.edu
Dr. Yossef Zenati (CoI)	The Johns Hopkins University	yzenati1@jhu.edu
Huei Sears (CoI)	Northwestern University	hueisears2024@u.northwestern.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(1) SN2021GNO	WFC3/IR WFC3/UVIS	2	03-May-2022 09:00:14.0	yes
03	(1) SN2021GNO	WFC3/IR WFC3/UVIS	2	03-May-2022 09:00:16.0	yes

4 Total Orbits Used

ABSTRACT

Supernova (SN) 2021gno in NGC 4165 (D=30.5 Mpc) is the second closest known Calcium-rich (Ca-rich) transient and only the second object in this class with an X-ray detection. Prompt, high-cadence follow-up of this transient across the EM spectrum has indicated that the progenitor star was

likely low mass (e.g., white dwarf or <10 Msun) 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 2021gno provides only the second 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 remains ambiguous. Here we propose multi-color imaging of SN 2021gno in order to understand its late-time bolometric behavior and to constrain the total masses of radioactive decay isotopes Ni-56 and Ni-57 synthesized in the explosion. This will allow us to test whether SN 2021gno 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 2021gno with WFC3/IR in F110W and F160W filters in the first of our two allocated orbits. In the second orbit, we will observe SN 2021gno with WFC3/UVIS in filters F555W and F814W. Our optimal observing window is between 28-April-2022 and 01-June-2022. 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:

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

Orbit 2:

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

Visit

Proposal 16922, UVIS/IR Orbits (02), failed Tue May 03 13:00:17 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: BETWEEN 28-APR-2022:00:00:00 AND 01-JUN-2022:00:00:00

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

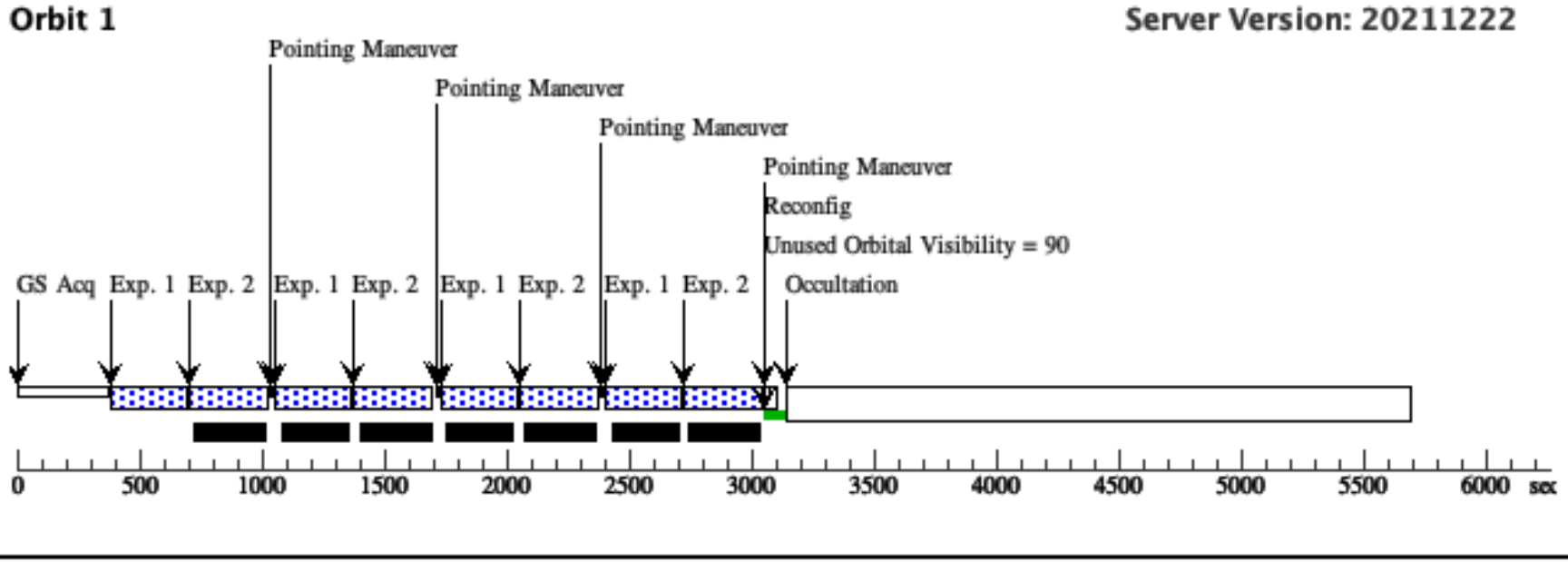
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2021GNO	RA: 12 12 10.2900 (183.0428750d) Dec: +13 14 57.04 (13.24918d) Equinox: J2000		V=25 g ~ 26-27, r ~ 25, i/z ~ 24	Reference Frame: ICRS

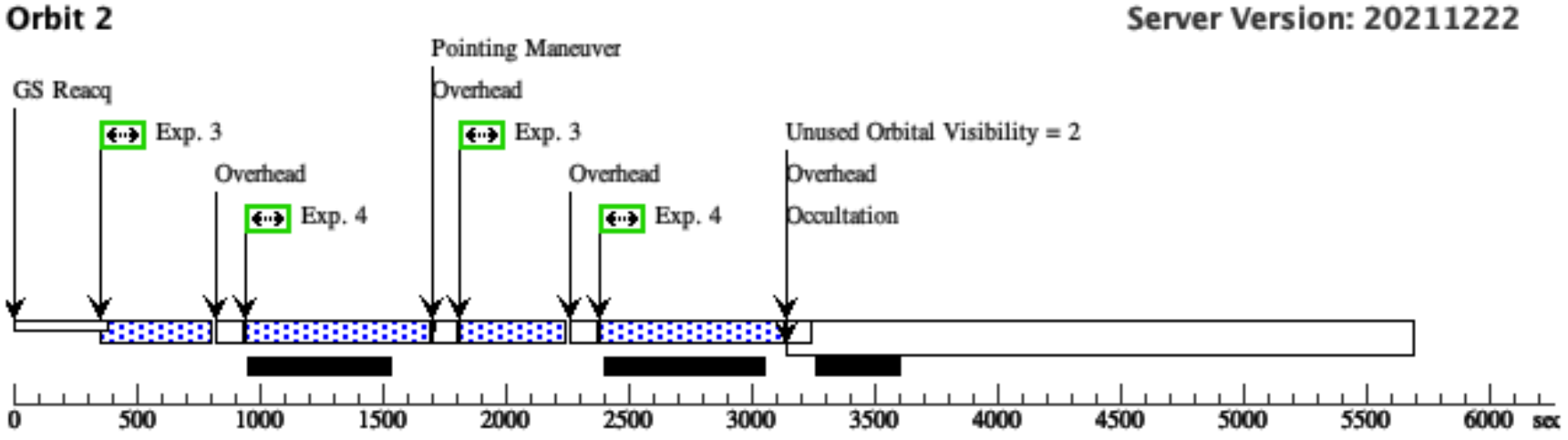
Comments:
Category=STAR
Description=[SUPERNOVA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F110W Obs.	(1) SN2021GNO	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=12; SAMP-SEQ=SPARS25		Pattern 2, Exps 1-2 in UVIS/IR Orbits (02) (2)	277.937956 Secs (1111.752 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2	F160W Obs.	(1) SN2021GNO	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS25; NSAMP=13		Pattern 2, Exps 1-2 in UVIS/IR Orbits (02) (2)	302.938471 Secs (1211.754 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3	F814W Obs.	(1) SN2021GNO	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=7		Pattern 1, Exps 3-4 in UVIS/IR Orbits (02) (1)	420 Secs (840 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
4	F555W Obs.	(1) SN2021GNO	WFC3/UVIS, ACCUM, UVIS	F555W			Pattern 1, Exps 3-4 in UVIS/IR Orbits (02) (1)	740 Secs (1480 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***

Orbit Structure





Visit

Proposal 16922, UVIS/IR Orbits (03) Tue May 03 13:00:17 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: BETWEEN 28-APR-2022:00:00:00 AND 01-JUN-2022:00:00:00

Comments: Orbit 1:
Filters: F110W, F160W

Orbit 2:
Filters: F555W, F814W

HOPR repeat of visit 2

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3	F814W Obs.	(1) SN2021GNO	WFC3/UVIS, ACCUM, UVIS	F814W	FLASH=7		Pattern 1, Exps 3-4 in UVIS/IR Orbits (03) (1)	420 Secs (840 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
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Orbit Structure