16500 - Probing the Post-genitor System of Calcium-rich Transient SN 2019ehk

Cycle: 28, 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/UVIS	1	26-Jul-2021 12:01:45.0	yes
02	(1) SN2019EHK	WFC3/IR	1	26-Jul-2021 12:01:47.0	yes
51	(1) SN2019EHK	WFC3/UVIS	1	26-Jul-2021 12:01:48.0	yes
52	(1) SN2019EHK	WFC3/IR	1	26-Jul-2021 12:01:49.0	yes
61	(1) SN2019EHK	WFC3/UVIS	1	26-Jul-2021 12:01:49.0	yes
62	(1) SN2019EHK	WFC3/IR	1	26-Jul-2021 12:01:51.0	yes

6 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 (e.g., white dwarf or <10Msun) and surrounded by dense circumstellar material (CSM) whose geometry/density was capable of producing luminous X-ray emission as well as a double-peaked optical light curve. The close proximity of SN 2019ehk provided the first opportunity to obtain multi-color HST observations out to 400 days post explosion, which revealed a pure radioactive decay power source. Ca-rich transients typically decrease in magnitude rapidly and therefore, prior to SN 2019ehk, their late-time decline rate and power source at t<400 days was unknown. Here we propose multi-color imaging of SN 2019ehk in order to search for emission from a bound remnant white dwarf as predicted by a favored progenitor model for this explosion. Detection and characterization of such a remnant will provide a novel constraint on the progenitors of Ca-rich transients and provide a new window into the explosion itself. Additionally, these observations will provide the best constraints to date on a potential non-degenerate companion star in any thermonuclear SN progenitor system such as Ca-rich SNe.

OBSERVING DESCRIPTION

We propose to observe nearby supernova 2019ehk with WFC3/UVIS in filters F555W and F814W in the first of our two allocated orbits. In the second orbit, we will observe SN 2019ehk with WFC3/IR in filter F160W. Our optimal observing window is between 19-April-2021 and 16-May-2021, however, 22-May-2021 to 12-July-2021 is another acceptable scheduling window. 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:

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

Visit

Proposal 16500, UVIS Orbit (01), failed Mon Jul 26 16:01:51 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 19-APR-2021:00:00:00 AND 16-MAY-2021:00:00:00; BETWEEN 22-MAY-2021:00:00:00 AND 12-JUL-2021:00:00:00

Comments: Orbit 1:
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		(1-2)

Fixed Targets

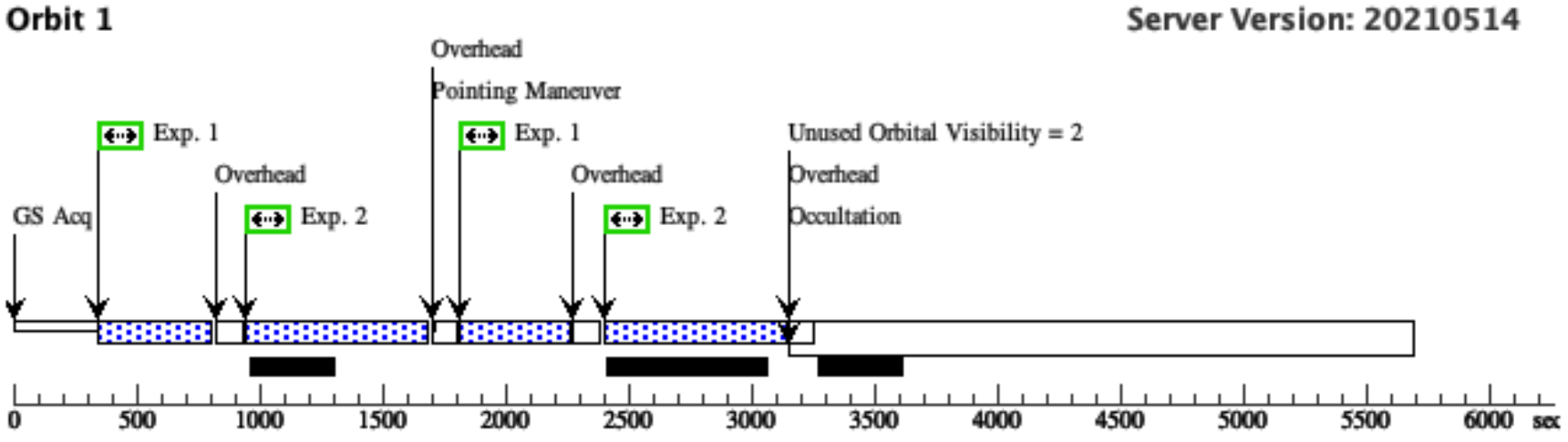
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F814W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F814W	FLASH=5		Pattern 1, Exps 1-2 in UVIS Orbit (01) (1)	450 Secs (868 Secs) *[==>434.0 Secs (Pattern 1)]* *[==>434.0 Secs (Pattern 2)]*	***[1]***
2	F555W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F555W			Pattern 1, Exps 1-2 in UVIS Orbit (01) (1)	750 Secs (1468 Secs) *[==>734.0 Secs (Pattern 1)]* *[==>734.0 Secs (Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 16500, IR Orbit (02), failed Mon Jul 26 16:01:51 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: AFTER 01 BY 1 D TO 3 D; BETWEEN 19-APR-2021:00:00:00 AND 16-MAY-2021:00:00:00; BETWEEN 22-MAY-2021:00:00:00 AND 12-JUL-2021:00:00:00

Comments: Orbit 2: IR F160W Filter, wide-8 dither pattern

Fixed Targets

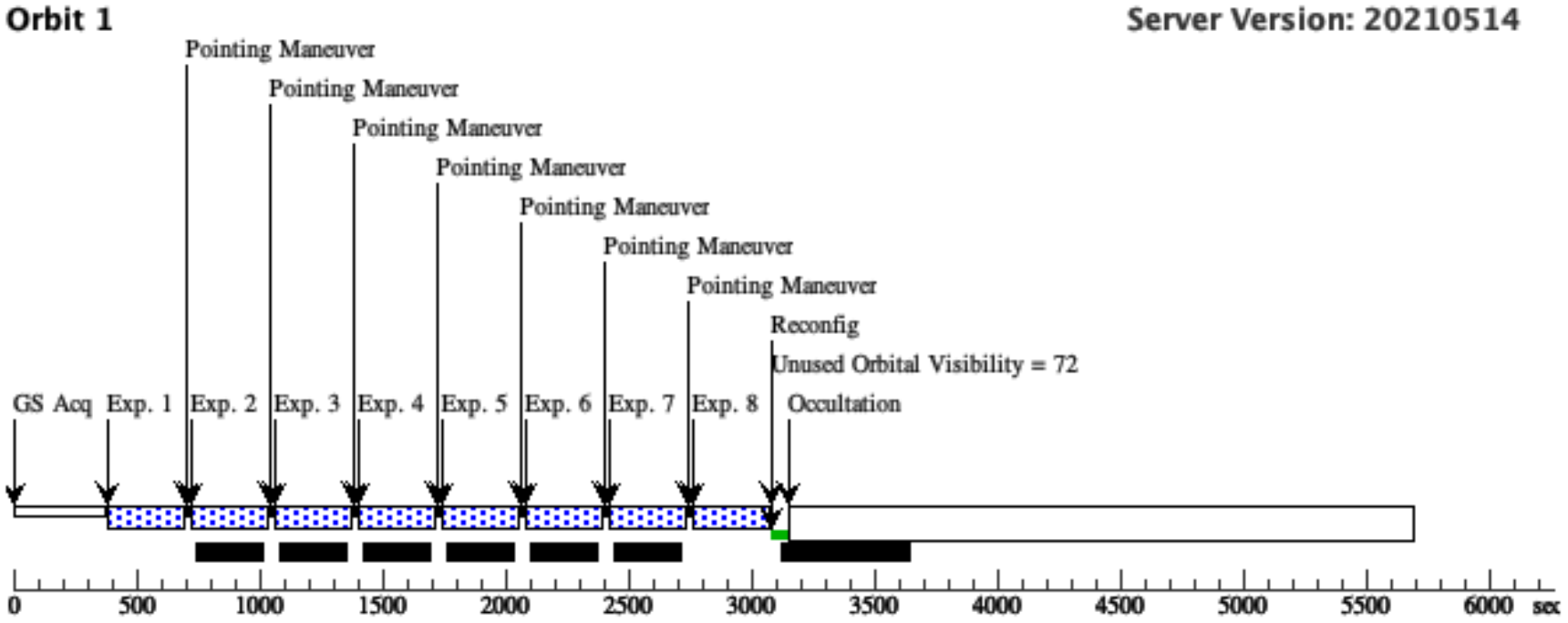
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0,0		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
2	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.694,0.048		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
3	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.388,0.095		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
4	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.051,0.620		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
5	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.745,0.668		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
6	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.440,0.716		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
7	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.373,1.242		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
8	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.067,1.289		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16500, UVIS Orbit (51), failed Mon Jul 26 16:01:51 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 19-APR-2021:00:00:00 AND 16-MAY-2021:00:00:00; BETWEEN 22-MAY-2021:00:00:00 AND 12-JUL-2021:00:00:00

Comments: Orbit 1:
Filters: F555W, F814W

This is a repeat of failed visit 01.

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		(1-2)

Fixed Targets

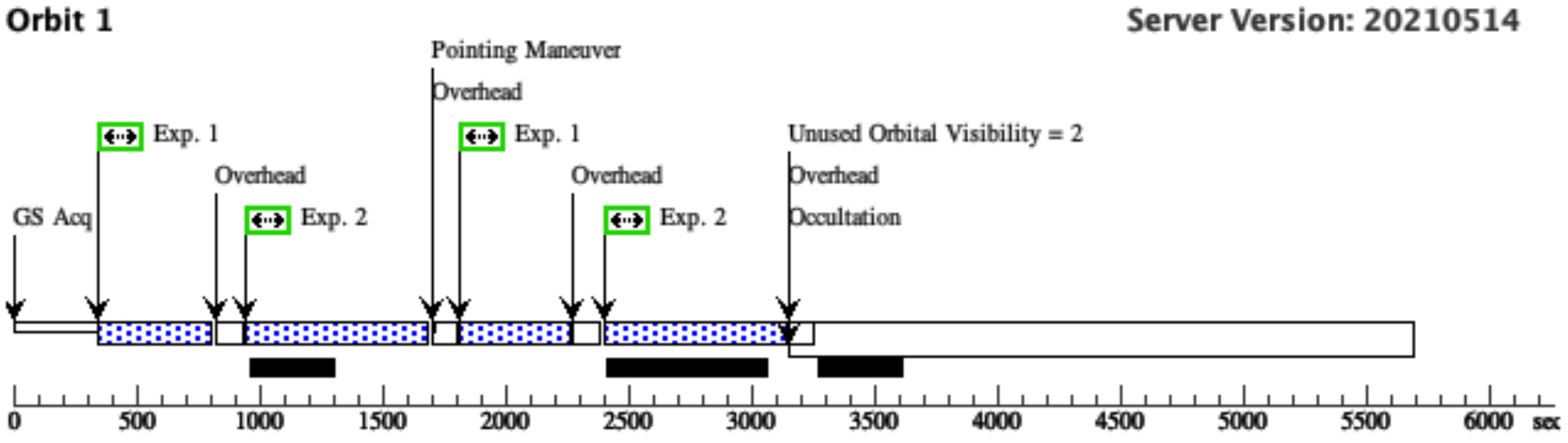
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F814W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F814W	FLASH=5		Pattern 1, Exps 1-2 in UVIS Orbit (51) (1)	450 Secs (868 Secs) *[==>434.0 Secs (Pattern 1)]* *[==>434.0 Secs (Pattern 2)]*	***[1]***
2	F555W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F555W			Pattern 1, Exps 1-2 in UVIS Orbit (51) (1)	750 Secs (1468 Secs) *[==>734.0 Secs (Pattern 1)]* *[==>734.0 Secs (Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 16500, IR Orbit (52), failed Mon Jul 26 16:01:51 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: AFTER 51 BY 1 D TO 3 D; BETWEEN 19-APR-2021:00:00:00 AND 16-MAY-2021:00:00:00; BETWEEN 22-MAY-2021:00:00:00 AND 12-JUL-2021:00:00:00

Comments: Orbit 2: IR F160W Filter, wide-8 dither pattern

This is a repeat of failed visit 02.

Fixed Targets

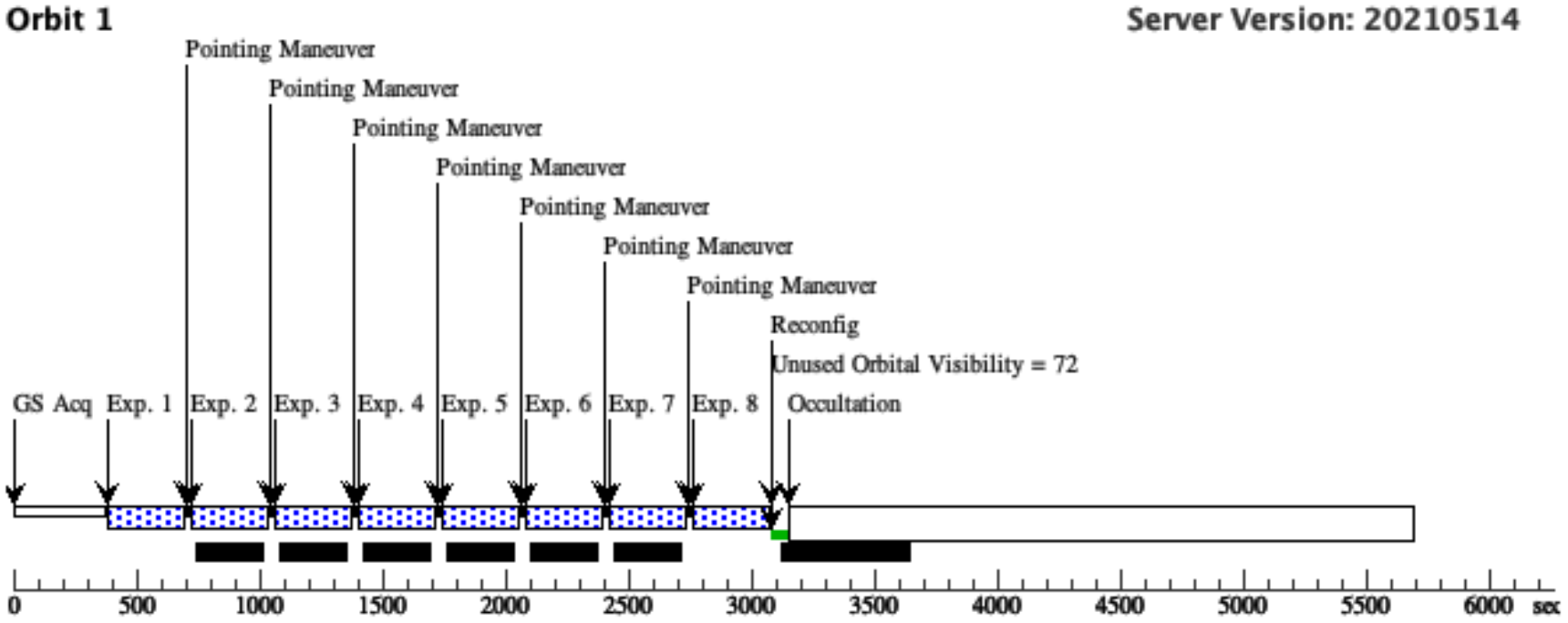
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0,0		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
2	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.694,0.048		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
3	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.388,0.095		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
4	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.051,0.620		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
5	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.745,0.668		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
6	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.440,0.716		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
7	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.373,1.242		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
8	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.067,1.289		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16500, UVIS Orbit (61) Mon Jul 26 16:01:51 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: Orbit 1:
Filters: F555W, F814W

This is a repeat of failed visit 51 (impacted by safing).

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		(1-2)

Fixed Targets

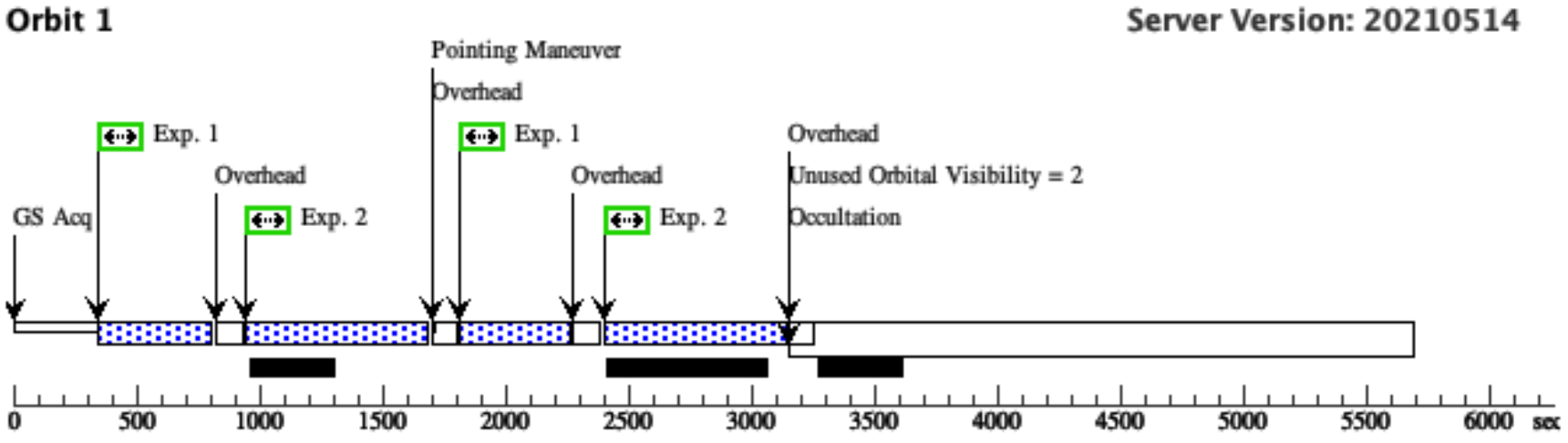
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN2019EHK	RA: 12 22 56.1300 (185.7338750d) Dec: +15 49 33.60 (15.82600d) Equinox: J2000		V=(?) g ~ 28, r ~ 26.5, i/z ~ 24.2	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F814W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F814W	FLASH=5		Pattern 1, Exps 1-2 in UVIS Orbit (61) (1)	450 Secs (868 Secs) *[==>434.0 Secs (Pattern 1)]* *[==>434.0 Secs (Pattern 2)]*	***[1]***
2	F555W Obs.	(1) SN2019EHK	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F555W			Pattern 1, Exps 1-2 in UVIS Orbit (61) (1)	750 Secs (1468 Secs) *[==>734.0 Secs (Pattern 1)]* *[==>734.0 Secs (Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 16500, IR Orbit (62) Mon Jul 26 16:01:52 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: AFTER 61 BY 1 D TO 3 D

Comments: Orbit 2: IR F160W Filter, wide-8 dither pattern

This is a repeat of failed visit 52 (impacted by safing).

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: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0,0		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
2	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.694,0.048		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
3	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.388,0.095		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
4	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.051,0.620		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
5	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.745,0.668		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
6	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.440,0.716		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
7	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 0.373,1.242		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*
8	F160W Obs.	(1) SN2019EHK	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=12; SAMP-SEQ=SPARS25	POS TARG 1.067,1.289		277.937956 Secs (277.938 Secs) *[==>]*	*[1]*

Orbit Structure