



17777 - Confirming the first progenitor candidate of a rare type Ibn supernova

Cycle: 32, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Dr. Kirsty Taggart (PI) (Contact)	University of California - Santa Cruz
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Dr. Samaporn Tinyanont (CoI)	National Astronomical Research Institute of Thailand
Prof. Ryan Foley (CoI)	University of California - Santa Cruz

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) SN2023FYQ	WFC3/UVIS	3	16-Mar-2026 14:00:13.0	yes
03	(1) SN2023FYQ	WFC3/UVIS	1	16-Mar-2026 14:00:14.0	yes
02	(1) SN2023FYQ	WFC3/IR	1	16-Mar-2026 14:00:15.0	yes

5 Total Orbits Used

ABSTRACT

Type Ibn supernovae (SN Ibn) are hydrogen-poor SNe that interact with their hydrogen-poor circumstellar medium (CSM). They probe the advanced and little-understood stage of mass loss that strips helium from a massive star. SN 2023fyq is the closest SN Ibn to date at 18.2 Mpc. The explosion site of SN 2023fyq was imaged with HST in several filters (UV through NIR) 12 years before explosion, revealing a blue ($B - V = 0.2$) and luminous point source with $M = -9.5$ mag, consistent with either a WC/O-type star or a young cluster with a turnoff mass of >20 Msun.

We propose to obtain 4 orbits of deep HST imaging approximately two years after explosion to confirm the progenitor of SN 2023fyq and to discern its cluster or single stellar system nature -- yielding the first progenitor identification for a SN Ibn. Such a discovery would be crucial to

Proposal 17777 (STScI Edit Number: 1, Created: Monday, March 16, 2026, 1:00:15PM Eastern Standard Time) - Overview

understanding the mass loss mechanism responsible for stripping 1/3 of all core-collapse supernova progenitors of their hydrogen and/or helium, and to understanding what a stripped star looks like before its explosion.

OBSERVING DESCRIPTION

We request 4 orbits of HST imaging in Cycle 32 to observe SN 2023fyq in 5 filters, 2 years after explosion. These filters will achieve a depth of ~26 mag ($M=-6$), and will allow us to confirm that the progenitor candidate for SN 2023fyq.s

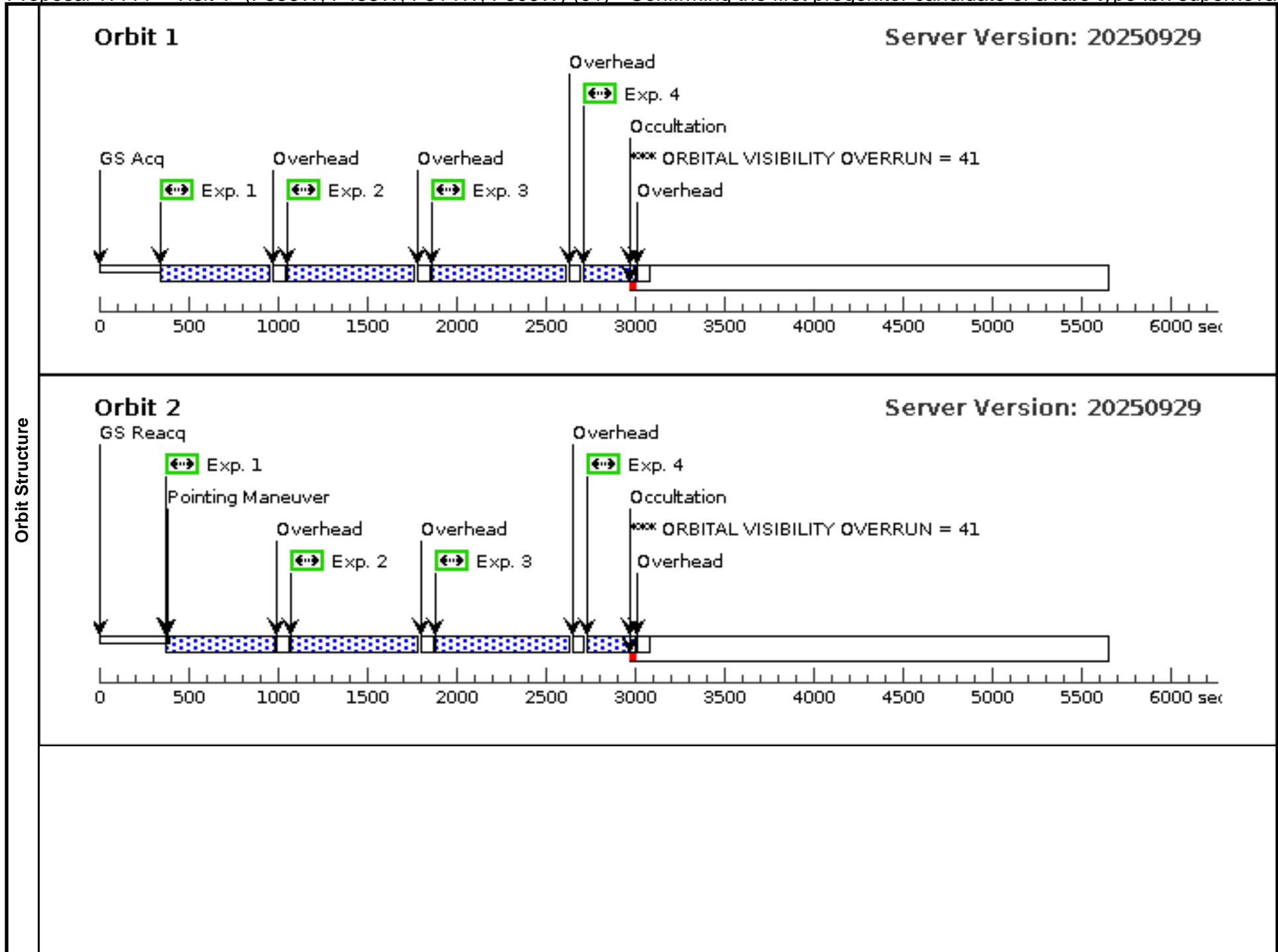
Proposal 17777 - Visit 1 -(F336W, F438W, F814W, F606W) (01) - Confirming the first progenitor candidate of a rare type Ibn supernova

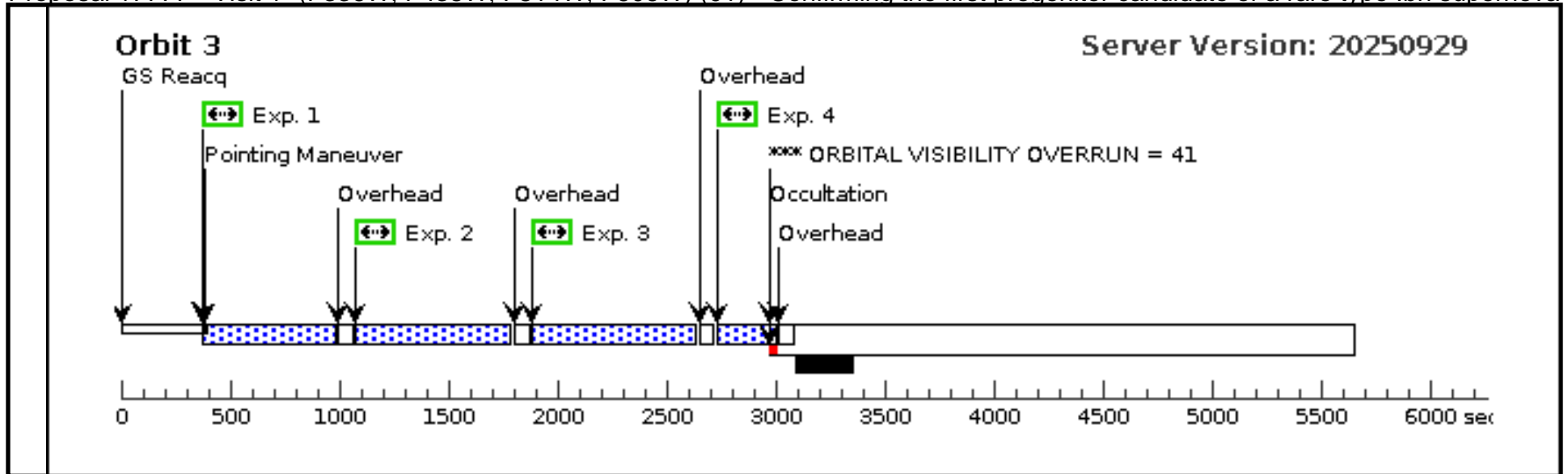
Mon Mar 16 18:00:15 GMT 2026

Visit	<p>Proposal 17777, Visit 1 -(F336W, F438W, F814W, F606W) (01), failed</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: AFTER 01-JAN-2025:00:00:00</p> <p><i>Comments: Estimates magnitudes (all AB mag):</i></p> <ul style="list-style-type: none"> - WFC3_UVIS1/F336W 26.28 - WFC3_UVIS1/F438W 26.28 - WFC3_UVIS1/F814W 26.20 - WFC3_UVIS1/F606W 26.05 <p><i>For SNR 8:</i></p> <p>F336W = 1,756 s - https://etc.stsci.edu/etc/results/WFC3UVIS.im.1923282/</p> <p>F814W = 2,210 s - https://etc.stsci.edu/etc/results/WFC3UVIS.im.1923285/</p> <p>F606W = 571 s - https://etc.stsci.edu/etc/results/WFC3UVIS.im.1923288/</p> <p>F438W = 2,083 s - https://etc.stsci.edu/etc/results/WFC3UVIS.im.1923294/</p> <p><i>Compared to previous imaging in 12185, the individual exposure times are increased by:</i></p> <p>F336W 585s - 1.32 times longer than GO-12185, AGN is fainter here, star cluster near SN is brighter at 3,366, so scaling counts is 4,443</p> <p>F438W 694s - 5.07 times longer than GO-12185, AGN is fainter here, star cluster near SN is brighter at 2,933, scaling counts is 14,870</p> <p>F814W 736s - 1.51 times longer than GO-12185, AGN maximum counts were 5,680, scaling up counts should be 8,580, less than the 48,000 DN</p> <p><i>Kept similar or same to previous program:</i></p> <p>F606W 270s in the middle between 160s and 400s, so kept the same</p> <p>F160W - kept the same because the AGN is already saturated in the previous exposures</p>					
	Diagnostics	<p>(Visit 1 -(F336W, F438W, F814W, F606W) (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p> <p>(Visit 1 -(F336W, F438W, F814W, F606W) (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p> <p>(Visit 1 -(F336W, F438W, F814W, F606W) (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN</p>				
Patterns	#	Primary Pattern		Secondary Pattern	Exposures	
	(3)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-4)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SN2023FYQ	RA: 12 25 45.8700 (186.4411250d) Dec: +12 39 48.68 (12.66352d) Equinox: J2000		V=26	Reference Frame: ICRS
		<p><i>Comments:</i></p> <p>Category=EXT-STAR</p> <p>Description=[SUPERNOVA TYPE IB]</p> <p>Extended=NO</p>				

Proposal 17777 - Visit 1 -(F336W, F438W, F814W, F606W) (01) - Confirming the first progenitor candidate of a rare type Ibn supernova

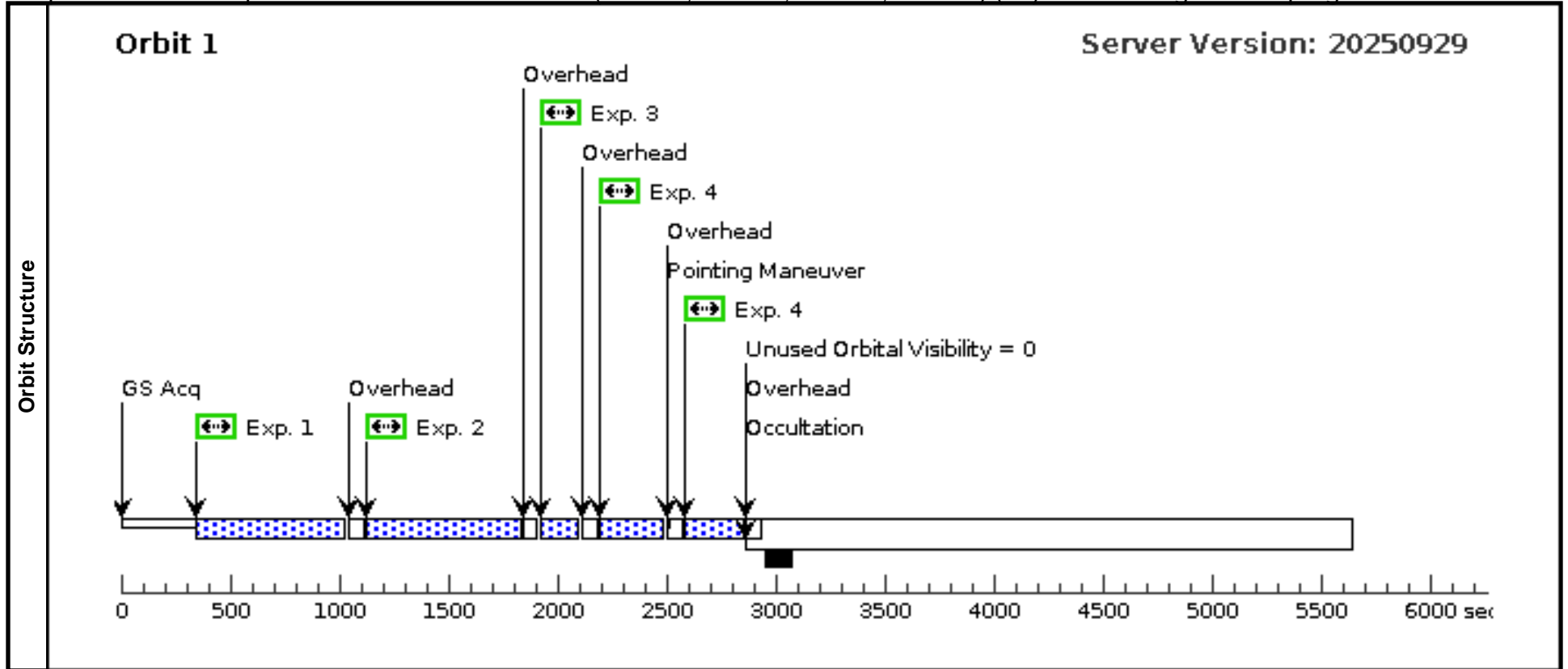
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F336W	FLASH=15		Pattern 3, Exps 1-4 in Visit 1 -(F336W, F438W, F814W, F606W) (01) (3)	585 Secs (1755 Secs)	
									[==>(Pattern 1)]	[1]
									[==>(Pattern 2)]	[2]
									[==>(Pattern 3)]	[3]
2		(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=15		Pattern 3, Exps 1-4 in Visit 1 -(F336W, F438W, F814W, F606W) (01) (3)	694 Secs (2082 Secs)		
								[==>(Pattern 1)]	[1]	
								[==>(Pattern 2)]	[2]	
								[==>(Pattern 3)]	[3]	
3		(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W				Pattern 3, Exps 1-4 in Visit 1 -(F336W, F438W, F814W, F606W) (01) (3)	736 Secs (2208 Secs)	
								[==>(Pattern 1)]	[1]	
								[==>(Pattern 2)]	[2]	
								[==>(Pattern 3)]	[3]	
	<i>Comments: 552</i>									
4		(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F606W	FLASH=8			Pattern 3, Exps 1-4 in Visit 1 -(F336W, F438W, F814W, F606W) (01) (3)	190 Secs (770 Secs)	
								[==>270.0 Secs (Pattern 1)]	[1]	
								[==>250.0 Secs (Pattern 2)]	[2]	
								[==>250.0 Secs (Pattern 3)]	[3]	





Proposal 17777 - Repeat of failed Visit 01 Orbit 1 - (F336W, F438W, F814W, F606W) (03) - Confirming the first progenitor candidate o...

Visit	Proposal 17777, Repeat of failed Visit 01 Orbit 1 - (F336W, F438W, F814W, F606W) (03), implementation					Mon Mar 16 18:00:15 GMT 2026				
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 100%; BEFORE 15-APR-2026:00:00:00 <i>Comments: Scheduling this repeat as soon as possible without causing disruption to the HST schedule and no later than April 15, 2026.</i> <i>I used SCHED 100 special observation requirement on the repeat.</i>									
Patterns	#	Primary Pattern			Secondary Pattern		Exposures			
	(4)	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					(4)			
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2023FYQ	RA: 12 25 45.8700 (186.4411250d) Dec: +12 39 48.68 (12.66352d) Equinox: J2000		V=26	Reference Frame: ICRS				
<i>Comments: Category=EXT-STAR Description=[SUPERNOVA TYPE IB] Extended=NO</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) SN2023FYQ	(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F438W	FLASH=15			694 Secs (652 Secs)	
									[==>652.0 Secs]	[1]
	2	(1) SN2023FYQ	(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=2			736 Secs (694 Secs)	
									[==>694.0 Secs]	[1]
3	(1) SN2023FYQ	(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F606W	FLASH=11			190 Secs (148 Secs)		
								[==>148.0 Secs]	[1]	
4	(1) SN2023FYQ	(1) SN2023FYQ	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F336W	FLASH=16			293 Secs (540 Secs)		
							Pattern 4, Exps 4-4 i n Repeat of failed Vi sit 01 Orbit 1 - (F336 W, F438W, F814W, F606W) (03) (4)	[==>270.0 Secs (Pattern 1)] [==>270.0 Secs (Pattern 2)]	[1]	



Proposal 17777 - Visit 2 - (F160W) (02) - Confirming the first progenitor candidate of a rare type Ibn supernova

Mon Mar 16 18:00:15 GMT 2026

Visit	<p>Proposal 17777, Visit 2 - (F160W) (02), completed</p> <p>Diagnostic Status: No Diagnostics</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: AFTER 01 BY 0 D TO 14 D</p> <p>Comments: WFC3_IR/F160W - estimated magnitude (AB) : 25.807 For SNR 8 we need: ~1,692 s - https://etc.stsci.edu/etc/results/WFC3IR.im.1923281/</p> <p>In the previous F160W imaging, AGN counts of 51,310 are indeed higher than the full-well saturation level of ~34,000 DN. We choose the same NSAMP as the previous imaging, and do an 9-point dither patter using pos-targ, with each dither point having 2 exposures.</p> <p>To measure the time-varying SED, we ideally require observations to be performed taken as close together, at least within 2 months of each other.</p>												
	Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN2023FYQ</td> <td>RA: 12 25 45.8700 (186.4411250d) Dec: +12 39 48.68 (12.66352d) Equinox: J2000</td> <td></td> <td>V=26</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <p>Comments: Category=EXT-STAR Description=[SUPERNOVA TYPE IB] Extended=NO</p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	SN2023FYQ	RA: 12 25 45.8700 (186.4411250d) Dec: +12 39 48.68 (12.66352d) Equinox: J2000		V=26
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous								
(1)	SN2023FYQ	RA: 12 25 45.8700 (186.4411250d) Dec: +12 39 48.68 (12.66352d) Equinox: J2000		V=26	Reference Frame: ICRS								

Proposal 17777 - Visit 2 - (F160W) (02) - Confirming the first progenitor candidate of a rare type Ibn supernova

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
Exposures	1	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.0000,0 .0000		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	<i>Comments: Since we are measuring the SED, which is varying in time, we group the two visits with the first visit occurring after January 2025, and the second visit occurring <2 weeks after the first. We use a 2 x 9-point dither pattern.</i>									
	2	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.317,0. 041		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	3	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.635,0. 081		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	4	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.952,0. 041		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	5	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.046,0. 324		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	6	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.364,0. 365		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	7	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.682,0. 446		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
	8	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.999,0. 365		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]	
9	(1) SN2023FYQ	WFC3/IR, MULTIACCUM, IRSUB512	F160W	NSAMP=9; SAMP-SEQ=STEP2 5	POS TARG 0.228,0. 527		105.518395 Secs X 2 (211.037 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]		

