



18387 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abundance measurements

Cycle: 34, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
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Dr. Thomas Moore (CoI) (AdminUSPI)	Space Telescope Science Institute
Mr. Dylan Magill (CoI) (ESA Member)	Queen's University Belfast
Adam Smith (CoI) (ESA Member)	Queen's University Belfast
Dr. Charlotte Rebecca Angus (CoI) (ESA Member)	Queen's University Belfast

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) PTF12DAM-HOST	COS/FUV COS/NUV	3	17-Aug-2026 12:01:02.0	yes
02	(2) SN2020TCW-HOST	COS/FUV COS/NUV	3	17-Aug-2026 12:01:03.0	yes

<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>
03	(3) SN2017EGM-HOST (5) SN2017EGM-HOST-OFFSET	COS/FUV COS/NUV	3	17-Aug-2026 12:01:03.0	yes
04	(4) SN2018BSZ-HOST	COS/FUV COS/NUV	3	17-Aug-2026 12:01:04.0	yes

12 Total Orbits Used

ABSTRACT

It is a remarkable fact of our Universe that "superluminous" supernovae (SLSNe) occur preferentially in low-luminosity galaxies, but the reason for this is not well understood. Metallicity is likely to play a role, as it effects stellar evolution directly through the wind-driving efficiency. However, all metallicity constraints to date in SLSN host galaxies have been oxygen abundances measured via gas-phase emission lines, rather than the stellar iron abundances needed for detailed progenitor modelling. This program will provide the first direct iron abundances in a pilot sample of carefully selected SLSN hosts using far-UV spectroscopy with the Cosmic Origins Spectrograph. Established methods allow us to extract the iron abundance directly from the FUV continuum between 1200-2000 Angstroms. We will combine the HST FUV spectra with ground-based oxygen abundances to measure the alpha/Fe ratio in these galaxies. We can then test a clear prediction: since it is the iron, rather than oxygen, that primarily affects stellar evolution, if metallicity is the key ingredient in forming SLSNe these galaxies should show a strong preference for low iron abundance and would appear alpha-enhanced relative to other galaxies of a similar mass. With a modest time request, this proposal provides an entirely new approach to resolve the question of why SLSNe favour dwarf galaxies, and will provide a crucial input to stellar evolution models of SLSN progenitors.

OBSERVING DESCRIPTION

COS UV spectroscopy of four low-redshift SLSN host galaxies with GALEX detections. Three orbits per galaxy using G140L. Expected SNR~5-10 per pixel.

Acquisition requirements for extended sources:

For PTF12dam, SN2020tcw and SN2018bsz, we target the UV-brightest part of the galaxy, centering on the GALEX coordinates. For this ACQ/IMAGE should be the most effective method

For SN2017egm, the explosion did not occur in the brightest part of the galaxy. In this case we do not want to recentre to point at the brightest UV pixels. However, the light profile is relatively smooth around the SN location, and obtaining a spectrum centred with ~1 arcsecond of the quoted

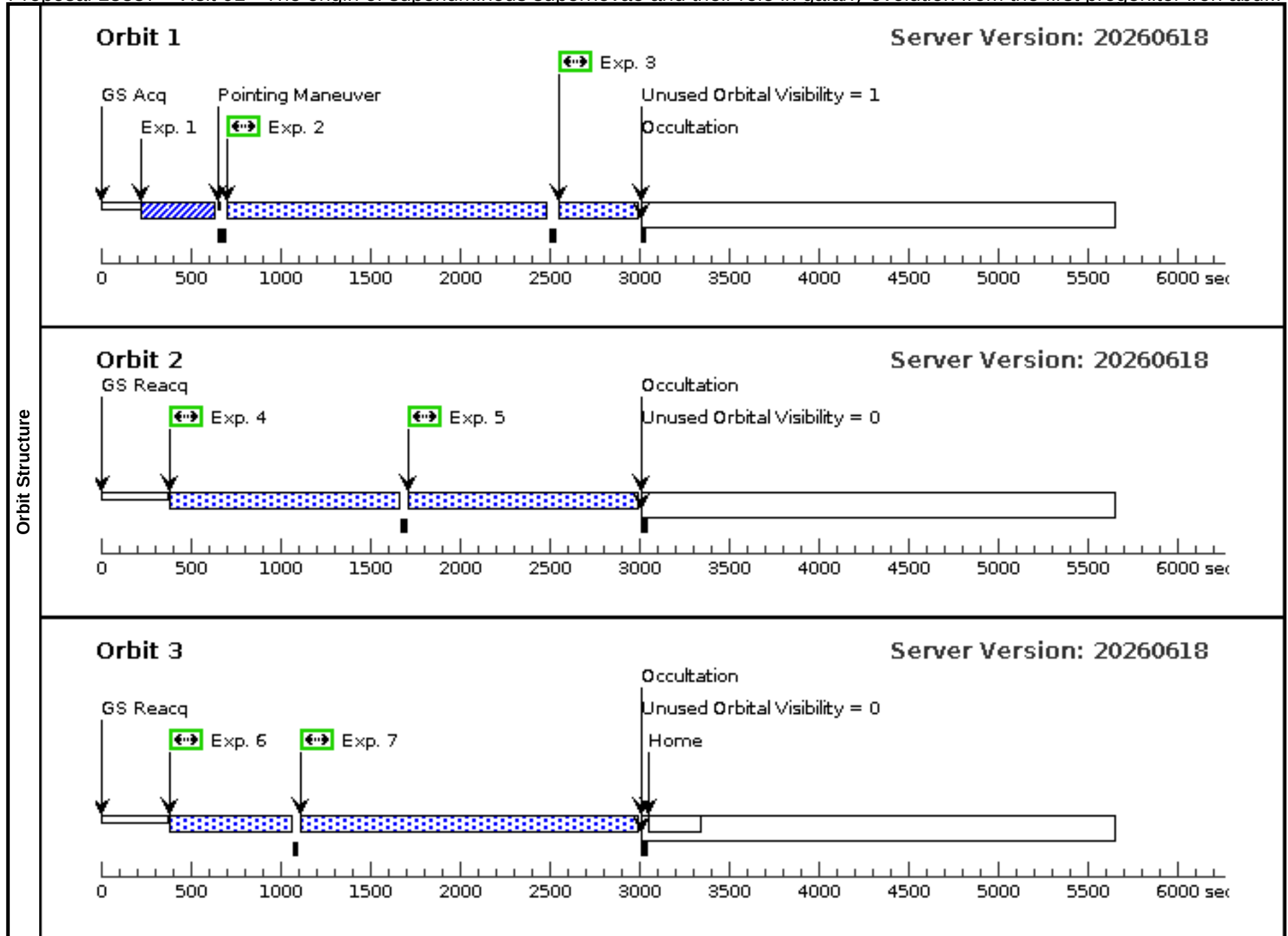
Proposal 18387 (STScI Edit Number: 0, Created: Monday, August 17, 2026, 11:01:05AM Eastern Standard Time) - Overview
coordinates is sufficient.

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Visit	Proposal 18387, Visit 01					Mon Aug 17 16:01:05 GMT 2026
	Diagnostic Status: Warning					
	Scientific Instruments: COS/FUV, COS/NUV					
	Special Requirements: (none)					
Diagnostics	(Exposure 2 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 3 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 4 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 5 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 6 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 7 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	PTF12DAM-HOST	RA: 14 24 46.2129 (216.1925538d)		V=19	Reference Frame: ICRS
			Dec: +46 13 48.66 (46.23018d)		GALEX FUV = 20.1	
			Equinox: J2000			
	Comments: Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=YES					

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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Acquisition (COS.ta.236 1909)	(1) PTF12DAM-HO ST	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				100 Secs (100 Secs) [==>]	
	2	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1000 Secs (1591 Secs) [==>1591.0 Secs]	[1]
	3	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			300 Secs (391 Secs) [==>391.0 Secs]	[1]
	4	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1226 Secs) [==>1226.0 Secs]	[2]
	5	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1226 Secs) [==>1226.0 Secs]	[2]
	6	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			500 Secs (631 Secs) [==>631.0 Secs]	[3]
	7	(COS.sp.231 3031)	(1) PTF12DAM-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1200 Secs (1831 Secs) [==>1831.0 Secs]	[3]

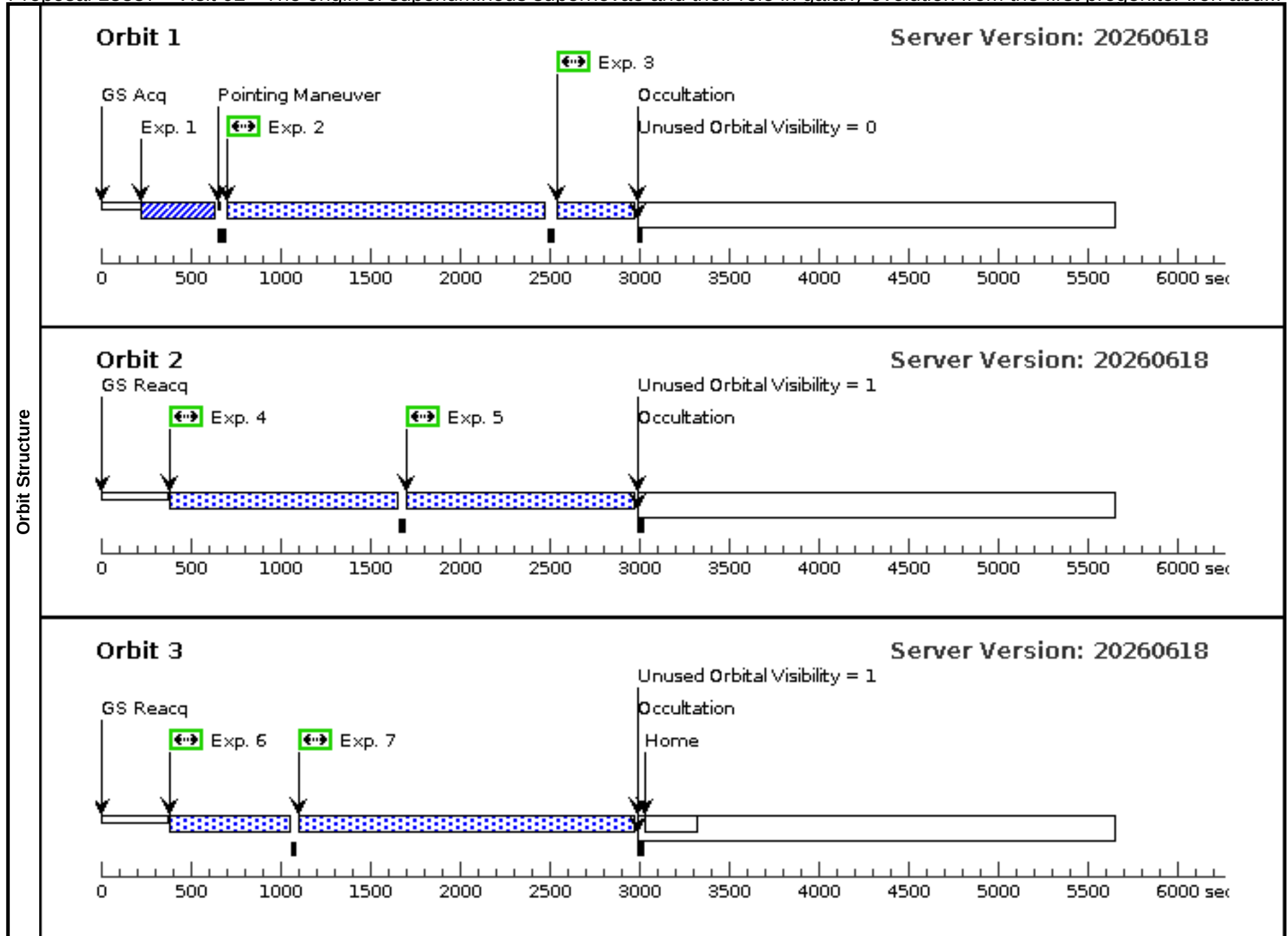


Proposal 18387 - Visit 02 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abu...

Visit	Proposal 18387, Visit 02					Mon Aug 17 16:01:05 GMT 2026
	Diagnostic Status: Warning					
	Scientific Instruments: COS/FUV, COS/NUV					
	Special Requirements: (none)					
Diagnostics	(Exposure 2 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 3 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 4 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 5 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 6 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 7 (Visit 02)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	SN2020TCW-HOST	RA: 15 28 17.1792 (232.0715800d) Dec: +39 56 50.57 (39.94738d) Equinox: J2000		V=19 GALEX FUV = 19.2	Reference Frame: ICRS
	Comments: Category=GALAXY Description=[DWARF COMPACT, STARBURST] Extended=YES					

Proposal 18387 - Visit 02 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abu...

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Acquisition (COS.ta.236 1909)	(2) SN2020TCW-H OST	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				100 Secs (100 Secs) [==>]	[1]
	2	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1000 Secs (1582 Secs) [==>1582.0 Secs]	[1]
	3	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			300 Secs (382 Secs) [==>382.0 Secs]	[1]
	4	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1216 Secs) [==>1216.0 Secs]	[2]
	5	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1216 Secs) [==>1216.0 Secs]	[2]
	6	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			500 Secs (621 Secs) [==>621.0 Secs]	[3]
	7	(COS.sp.231 3031)	(2) SN2020TCW-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1200 Secs (1821 Secs) [==>1821.0 Secs]	[3]

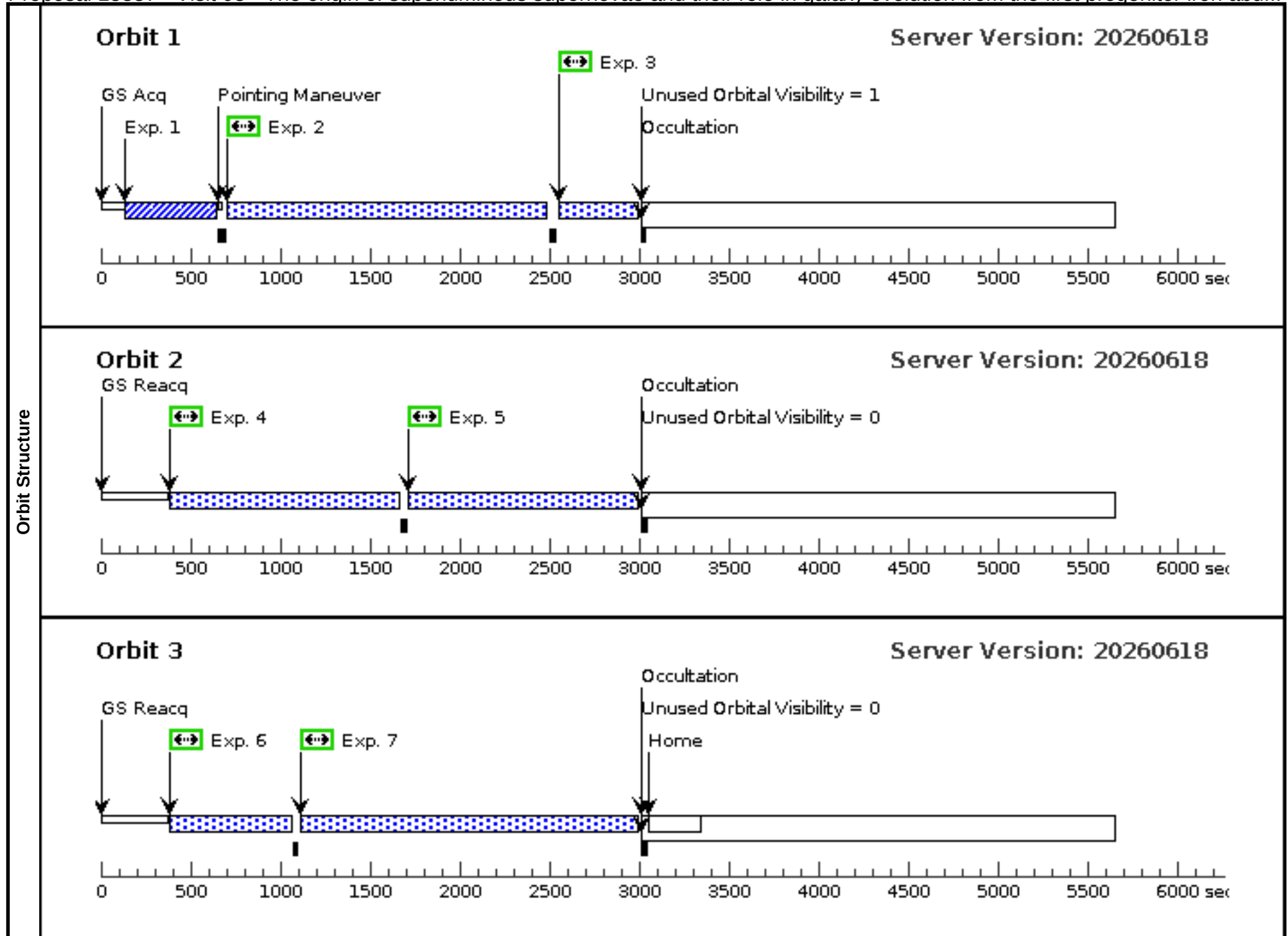


Proposal 18387 - Visit 03 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abu...

Visit	Proposal 18387, Visit 03					Mon Aug 17 16:01:05 GMT 2026
	Diagnostic Status: Warning					
	Scientific Instruments: COS/FUV, COS/NUV					
	Special Requirements: (none)					
Diagnostics	(Exposure 2 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 3 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 4 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 5 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 6 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 7 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(3)	SN2017EGM-HOST	RA: 10 19 5.6201 (154.7734171d) Dec: +46 27 14.08 (46.45391d) Equinox: J2000		V=14.3 GALEX FUV = 16.2 (integrated)	Reference Frame: ICRS
	Comments: Category=GALAXY Description=[SPIRAL, STAR FORMING REGION] Extended=YES					
	(5)	SN2017EGM-HOST-OFFSET	RA: 10 19 5.1274 (154.7713642d) Dec: +46 27 14.69 (46.45408d) Equinox: J2000		V=14.3 GALEX FUV = 16.2 (integrated)	Reference Frame: ICRS
	Comments: Category=GALAXY Description=[NUCLEUS] Extended=YES					

Proposal 18387 - Visit 03 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abu...

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Acquisition (COS.ta.236 1909)	(5) SN2017EGM-H OST-OFFSET	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				100 Secs (100 Secs) [==>]	[1]
	2	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1000 Secs (1591 Secs) [==>1591.0 Secs]	[1]
	3	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			300 Secs (391 Secs) [==>391.0 Secs]	[1]
	4	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1226 Secs) [==>1226.0 Secs]	[2]
	5	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1226 Secs) [==>1226.0 Secs]	[2]
	6	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			500 Secs (631 Secs) [==>631.0 Secs]	[3]
	7	(COS.sp.231 3031)	(3) SN2017EGM-H OST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1200 Secs (1831 Secs) [==>1831.0 Secs]	[3]



Proposal 18387 - Visit 04 - The origin of superluminous supernovae and their role in galaxy evolution from the first progenitor iron abu...

Visit	Proposal 18387, Visit 04					Mon Aug 17 16:01:05 GMT 2026
	Diagnostic Status: Warning					
	Scientific Instruments: COS/FUV, COS/NUV					
	Special Requirements: (none)					
Diagnostics	(Exposure 2 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 3 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 4 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 5 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 6 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
	(Exposure 7 (Visit 04)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(4)	SN2018BSZ-HOST	RA: 16 09 38.9189 (242.4121621d) Dec: -32 03 42.48 (-32.06180d) Equinox: J2000		V=16 GALEX FUV = 19.2	Reference Frame: ICRS
Fixed Targets	Comments:					
	Category=GALAXY					
	Description=[DWARF COMPACT, STAR FORMING REGION]					
	Extended=YES					

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Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Acquisition (COS.ta.236 1909)	(4) SN2018BSZ-HO ST	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				100 Secs (100 Secs) [==>]	[1]
	2	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=1; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1000 Secs (1579 Secs) [==>1579.0 Secs]	[1]
	3	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			300 Secs (379 Secs) [==>379.0 Secs]	[1]
	4	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=2; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1214 Secs) [==>1214.0 Secs]	[2]
	5	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1300 Secs (1214 Secs) [==>1214.0 Secs]	[2]
	6	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=3; LIFETIME-POS=L P11; BUFFER-TIME=95 00			500 Secs (619 Secs) [==>619.0 Secs]	[3]
	7	(COS.sp.231 3031)	(4) SN2018BSZ-HO ST	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=4; LIFETIME-POS=L P11; BUFFER-TIME=95 00			1200 Secs (1819 Secs) [==>1819.0 Secs]	[3]

