



17313 - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

Cycle: 30, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Dr. Kyra Azalee Bostroem (PI) (Contact)	University of Arizona
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Dr. Griffin Hosseinzadeh (CoI)	University of Arizona
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Dr. Michael Jon Lundquist (CoI)	California Association for Research in Astronomy (CARA)
Dr. Nathan Smith (CoI)	University of Arizona
Mr. Yize Dong (CoI)	University of California - Davis
Emily Hoang (CoI)	University of California - Davis
Samuel Wyatt (CoI)	University of Washington
Dr. Jacob Jencson (CoI)	The Johns Hopkins University
Dr. Saurabh W. Jha (CoI)	Rutgers the State University of New Jersey
Dr. Curtis McCully (CoI)	Las Cumbres Observatory Global Telescope Network
Dr. Dale Andrew Howell (CoI)	Las Cumbres Observatory Global Telescope Network
Aravind Pazhayath Ravi (CoI)	University of Texas at Arlington
Dr. Sebastian Gomez (CoI)	Space Telescope Science Institute
Dr. Daichi Hiramatsu (CoI)	Smithsonian Institution Astrophysical Observatory

<i>Name</i>	<i>Institution</i>
Prof. Alex V. Filippenko (CoI)	University of California - Berkeley

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) SN2023IXF CCDFLAT	STIS/CCD	1	13-Jul-2023 09:00:23.0	yes
02	(1) SN2023IXF CCDFLAT	STIS/CCD	1	13-Jul-2023 09:00:24.0	yes
03	(1) SN2023IXF CCDFLAT	STIS/CCD	1	13-Jul-2023 09:00:25.0	yes
04	(1) SN2023IXF CCDFLAT	STIS/CCD	1	13-Jul-2023 09:00:26.0	yes
05	(1) SN2023IXF CCDFLAT	STIS/CCD	1	13-Jul-2023 09:00:27.0	yes

5 Total Orbits Used

ABSTRACT

The 2023 May 19 explosion of SN~2023ixf in the nearby (~6.4 Mpc) spiral galaxy M101 has presented us with a once in an HST-lifetime chance to get a comprehensive NUV to NIR dataset of an interacting core collapse supernova. This disruptive DDT ToO will be complementary to an already approved Cycle 30 ToO proposal which has been triggered on this object, and will take over observations 10 days after explosion (ie May 29) and will persist over 5 epochs to 50 days post-explosion. With only a handful of core-collapse supernovae observed in the ultraviolet with HST, and almost all within 3 weeks of explosion, this proposal fills a crucial gap in our knowledge of the evolution of core-collapse supernovae in the ultraviolet. Only with HST can this be done, and only with a SN that is this close can we probe the UV far into time periods when the flux has normally faded significantly.

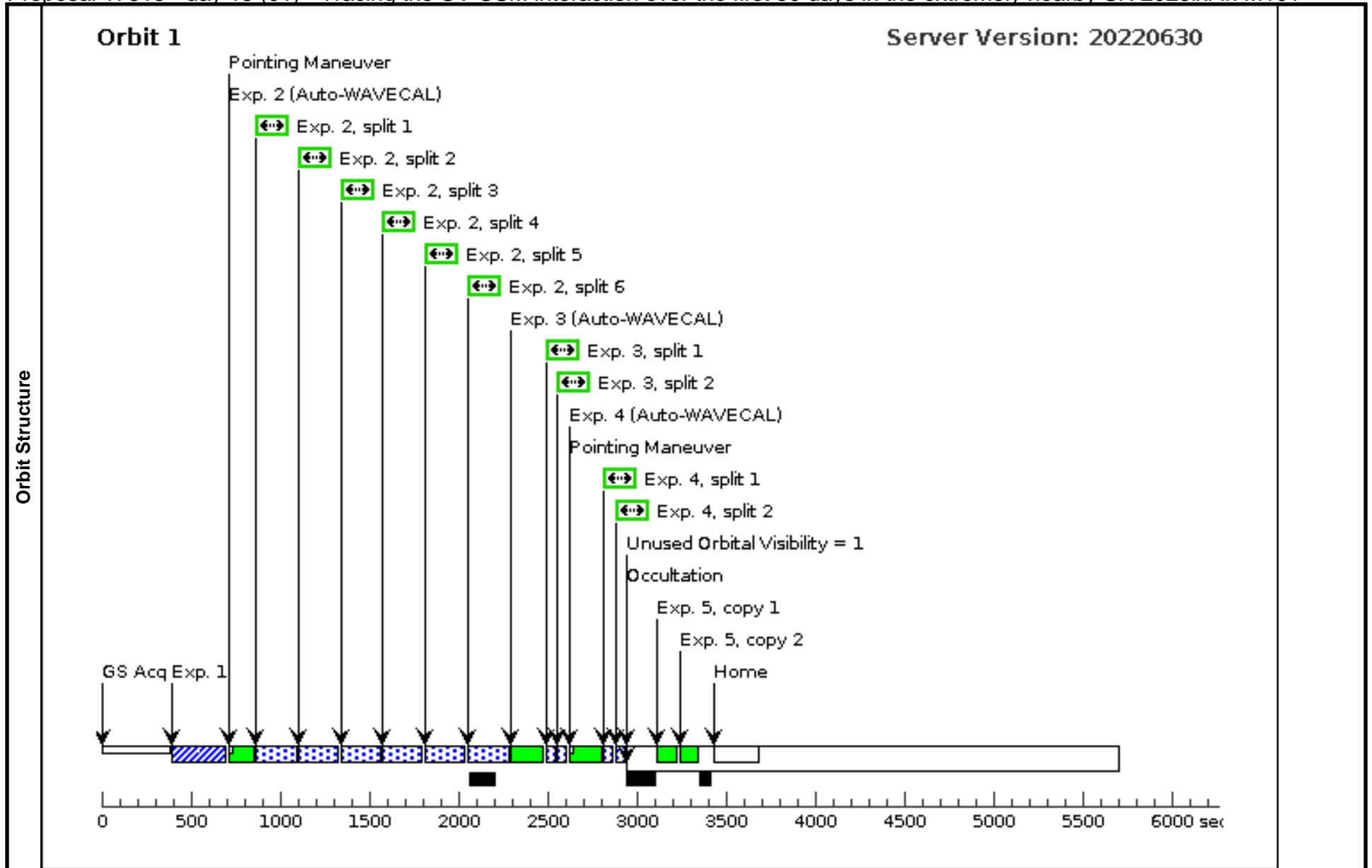
OBSERVING DESCRIPTION

This program is to obtain NUV-NIR spectra with the G230LB, G430L, and G750L gratings of SN 2023ixf, 15, 20, 30, and 50 days after explosion. These epochs correspond to Jun 2, Jun 7, Jun 17, and Jul 7, 2023. Given the current brightness we will use the 52x0.2 arcsec slit at the E1 position for

Proposal 17313 (STScI Edit Number: 4, Created: Thursday, July 13, 2023 at 8:00:28 AM Eastern Standard Time) - Overview
G230LB and G430L and the central position for better fringing for the G750L.

Proposal 17313 - day 15 (01) - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

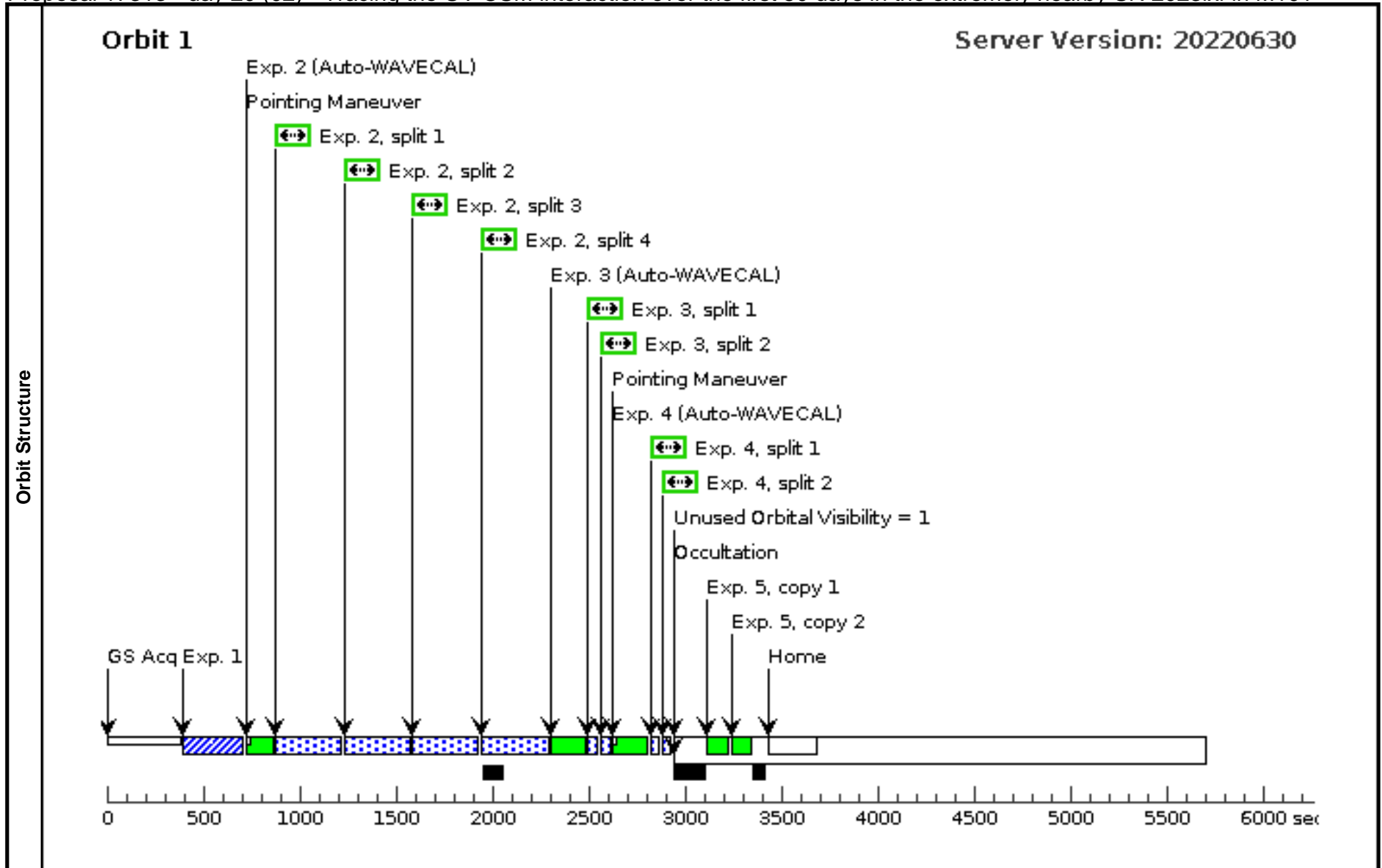
Visit	Proposal 17313, day 15 (01), completed Thu Jul 13 13:00:28 GMT 2023 Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: SCHED 100%; BETWEEN 31-MAY-2023:00:00:00 AND 03-JUN-2023:00:00:00; TOO RESPONSE TIME 5.0D <i>Comments: This is the first visit in the series. Ideal execution date is Jun 2, 15 days after explosion. Supernovae evolve on the order of days in the UV at this phase.</i>												
	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>SN2023IXF</td> <td>RA: 14 03 38.5640 (210.9106833d) Dec: +54 18 42.00 (54.31167d) Equinox: J2000</td> <td></td> <td>V=13.9+/-0.3</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <p><i>Comments:</i> Category=EXT-STAR Description=[CIRCUMSTELLAR MATTER, SUPERNOVA, SUPERNOVA TYPE II]</p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	SN2023IXF	RA: 14 03 38.5640 (210.9106833d) Dec: +54 18 42.00 (54.31167d) Equinox: J2000		V=13.9+/-0.3
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous								
(1)	SN2023IXF	RA: 14 03 38.5640 (210.9106833d) Dec: +54 18 42.00 (54.31167d) Equinox: J2000		V=13.9+/-0.3	Reference Frame: ICRS								
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit			
	1	TA (STIS.ta.1857469)	(1) SN2023IXF	STIS/CCD, ACQ, F25ND3	MIRROR				2.5 Secs (2.5 Secs) [==>]	[1]			
	<i>Comments: TA calculated for S/N of 40 at current brightness (STIS.ta.1857482), checked that this will not come close to saturation at max potential brightness. Expected brightness is V=10.8</i>												
	2	G230LB (STIS.sp.1857627)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=6			1158 Secs (1158 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)] [==>(Split 5)] [==>(Split 6)]	[1]			
	3	G430L (STIS.sp.1857508)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2			36 Secs (36 Secs) [==>(Split 1)] [==>(Split 2)]	[1]			
	<i>Comments: 24s per exposure is 60% saturation of reaches maximum brightness of V=10mag, if expected V=10.8 S/N is still 211 @ central wavelength and S/N of 175 if it stays at current V=11.2</i>												
4	G750L (STIS.sp.1857494)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=2			28 Secs (28 Secs) [==>(Split 1)] [==>(Split 2)]	[1]				
<i>Comments: 24s per exposure is 60% saturation of reaches maximum brightness of V=10mag, if expected V=10.8 S/N is still 120 @ central wavelength and S/N of 100 if it stays at current V=11.2</i>													
5	Fringe Flat	CCDFLAT	STIS/CCD, ACCUM, 0.3X0.09	G750L 7751 A				[==>(Copy 1)] [==>(Copy 2)]	[1]				



Proposal 17313 - day 20 (02) - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

Thu Jul 13 13:00:28 GMT 2023

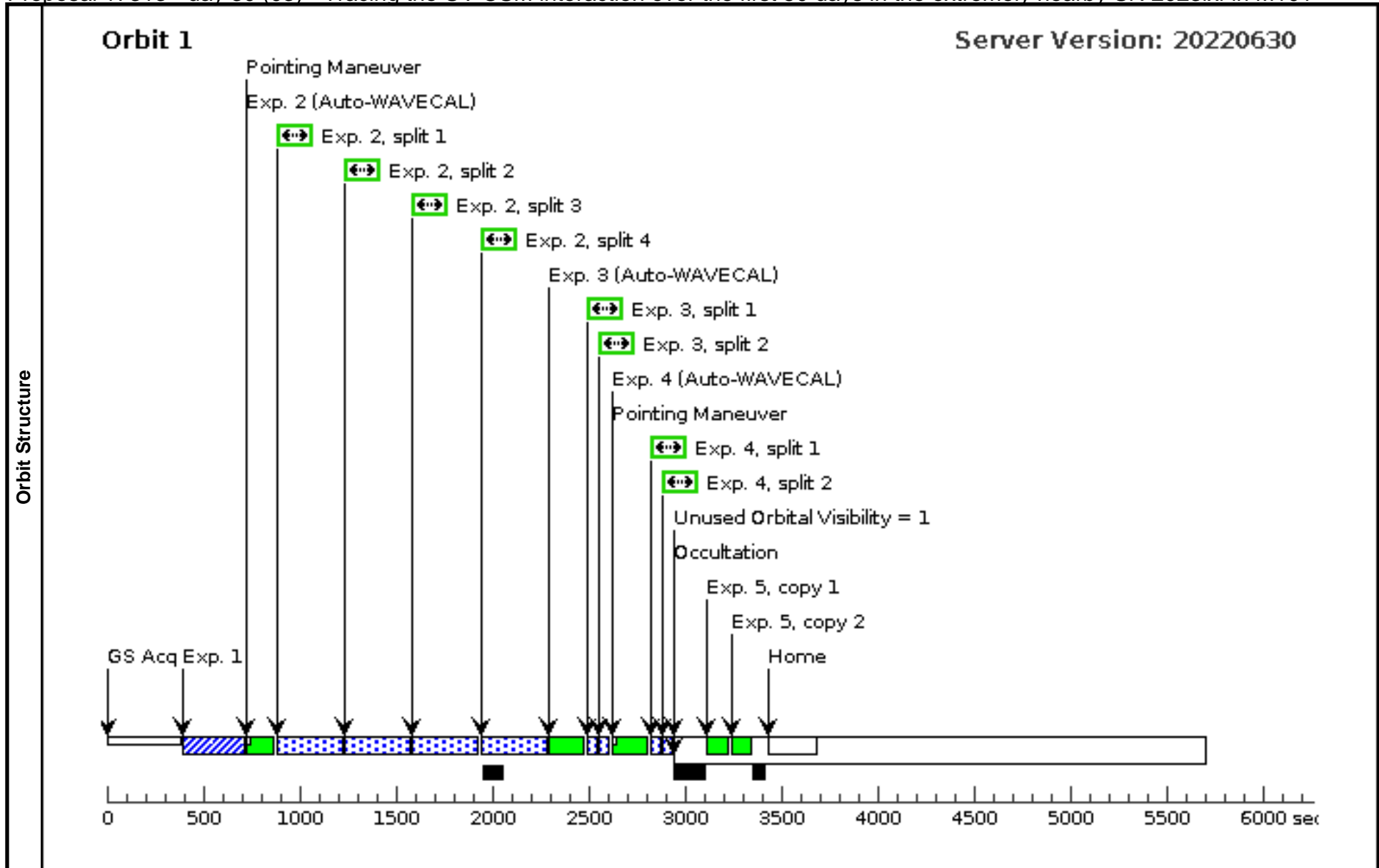
Visit	Proposal 17313, day 20 (02), completed Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: SCHED 100%; AFTER 01 BY 4 D TO 6 D; TOO RESPONSE TIME 5.0D Comments: This is the second visit in the series. It should execute on Jun 7, 20 days after explosion. Supernovae evolve on the order of days in the UV at this phase. Expected brightness is $V=11.2$, maximum brightness $V=10$																					
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#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																	
(1)	SN2023IXF	RA: 14 03 38.5640 (210.9106833d) Dec: +54 18 42.00 (54.31167d) Equinox: J2000		$V=13.9\pm 0.3$	Reference Frame: ICRS																	
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit												
	1	TA (STIS.ta.185 7545)	(1) SN2023IXF	STIS/CCD, ACQ, F25ND3	MIRROR				5 Secs (5 Secs) [==>]	[1]												
	Comments: TA calculated for S/N of 60 at current brightness $V=11.2$																					
	2	G230LB (STIS.sp.18 57560)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=4			1244 Secs (1244 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]												
	3	G430L (STIS.sp.18 57554)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2			32 Secs (32 Secs) [==>(Split 1)] [==>(Split 2)]	[1]												
	Comments: Estimated brightness at this epoch is $V=11.2$; $S/N\sim 100$ per exposure																					
4	G750L (STIS.sp.18 57555)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=2			24 Secs (24 Secs) [==>(Split 1)] [==>(Split 2)]	[1]													
Comments: Estimated brightness at this epoch is $V=11.2$; $S/N\sim 66$																						
5	Fringe Flat	CCDFLAT	STIS/CCD, ACCUM, 0.3X0.09	G750L 7751 A				[==>(Copy 1)] [==>(Copy 2)]	[1]													



Proposal 17313 - day 30 (03) - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

Thu Jul 13 13:00:28 GMT 2023

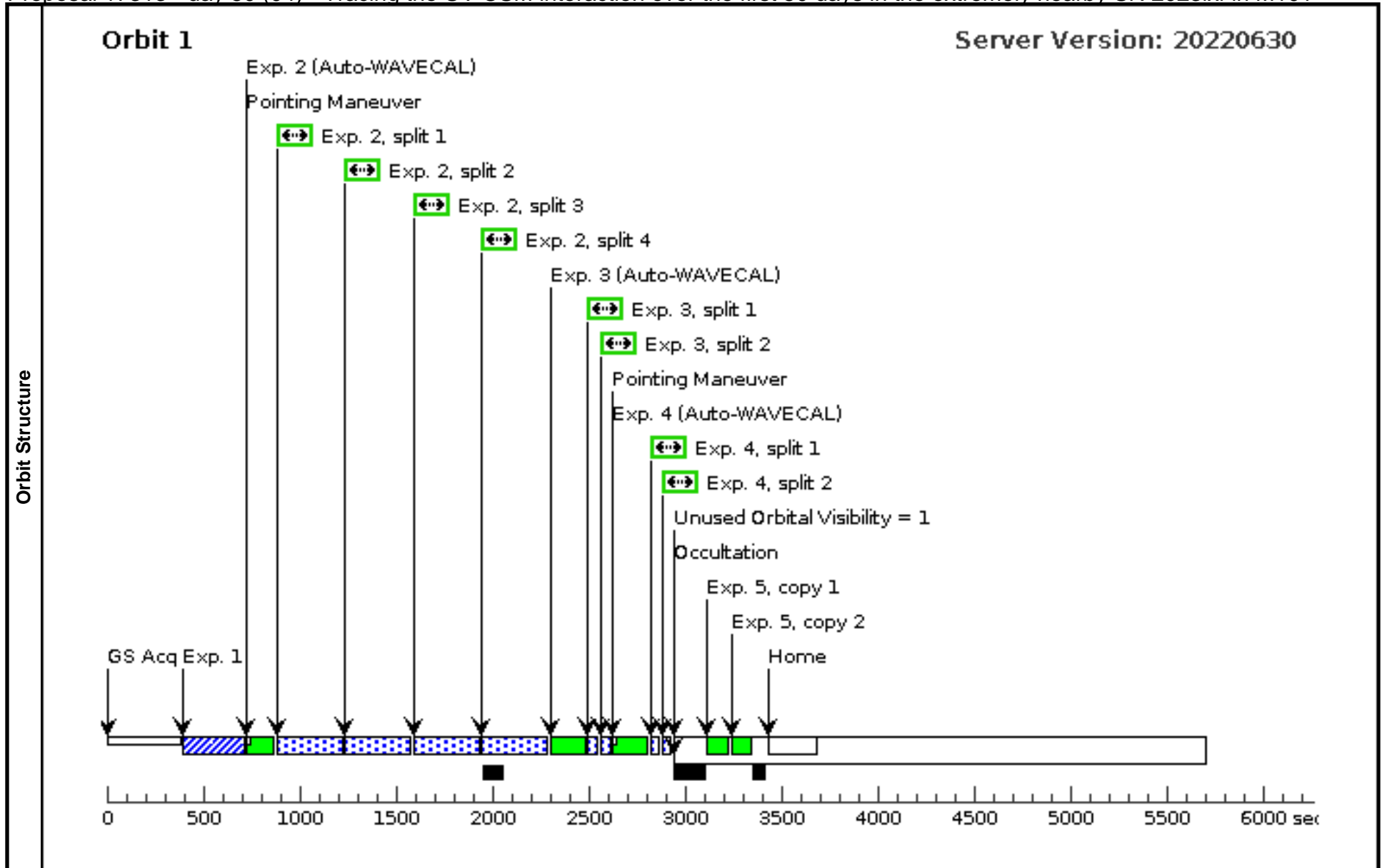
Visit	Proposal 17313, day 30 (03), completed Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: SCHED 100%; BETWEEN 12-JUN-2023:00:18:29 AND 22-JUN-2023:05:18:29; TOO RESPONSE TIME 5.0D Comments: This is the third visit in the series. It should execute on Jun 17, 30 days after explosion. Supernovae evolve on the order of days in the UV at this phase. Expected brightness is $V=12.3$, maximum brightness $V=10$. Brightness at this phase is very uncertain - we will monitor and update exposure times as necessary																																																																																																				
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Proposal 17313 - day 50 (04) - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

Thu Jul 13 13:00:28 GMT 2023

Visit	Proposal 17313, day 50 (04), completed Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: SCHED 100%; BETWEEN 03-JUL-2023:00:00:00 AND 12-JUL-2023:00:00:00; TOO RESPONSE TIME 5.0D Comments: This is the fourth visit in the series. It should execute on Jul 7, 50 days after explosion. Supernovae evolve on the order of days in the UV at this phase. Expected brightness is $V=12.3$, maximum brightness $V=10$. Brightness at this phase is very uncertain - we will monitor and update exposure times as necessary																																																																																																				
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Exposures	<table border="1"> <thead> <tr> <th>#</th> <th>Label (ETC Run)</th> <th>Target</th> <th>Config,Mode,Aperture</th> <th>Spectral Els.</th> <th>Opt. Params.</th> <th>Special Reqs.</th> <th>Groups</th> <th>Exp. Time (Total)/[Actual Dur.]</th> <th>Orbit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TA (STIS.ta.185 7561)</td> <td>(1) SN2023IXF</td> <td>STIS/CCD, ACQ, F25ND3</td> <td>MIRROR</td> <td></td> <td></td> <td></td> <td>7 Secs (7 Secs) [==>]</td> <td>[1]</td> </tr> <tr> <td colspan="10">Comments: TA calculated for S/N of 40 at brightness $V=12.3$</td> </tr> <tr> <td>2</td> <td>G230LB (STIS.sp.18 57565)</td> <td>(1) SN2023IXF</td> <td>STIS/CCD, ACCUM, 52X0.2E1</td> <td>G230LB 2375 A</td> <td>CR-SPLIT=4</td> <td></td> <td></td> <td>1236 Secs (1236 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]</td> <td>[1]</td> </tr> <tr> <td colspan="10">Comments: Estimated brightness at this epoch is $V=12.3$; S/N~10 per exposure</td> </tr> <tr> <td>3</td> <td>G430L (STIS.sp.18 57564)</td> <td>(1) SN2023IXF</td> <td>STIS/CCD, ACCUM, 52X0.2E1</td> <td>G430L 4300 A</td> <td>CR-SPLIT=2</td> <td></td> <td></td> <td>32 Secs (32 Secs) [==>(Split 1)] [==>(Split 2)]</td> <td>[1]</td> </tr> <tr> <td colspan="10">Comments: Estimated brightness at this epoch is $V=12.3$; S/N~65 per exposure</td> </tr> <tr> <td>4</td> <td>G750L (STIS.sp.18 57563)</td> <td>(1) SN2023IXF</td> <td>STIS/CCD, ACCUM, 52X0.2</td> <td>G750L 7751 A</td> <td>CR-SPLIT=2</td> <td></td> <td></td> <td>24 Secs (24 Secs) [==>(Split 1)] [==>(Split 2)]</td> <td>[1]</td> </tr> <tr> <td colspan="10">Comments: Estimated brightness at this epoch is $V=12.3$; S/N~45</td> </tr> <tr> <td>5</td> <td>Fringe Flat</td> <td>CCDFLAT</td> <td>STIS/CCD, ACCUM, 0.3X0.09</td> <td>G750L 7751 A</td> <td></td> <td></td> <td></td> <td>[==>(Copy 1)] [==>(Copy 2)]</td> <td>[1]</td> </tr> </tbody> </table>	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	1	TA (STIS.ta.185 7561)	(1) SN2023IXF	STIS/CCD, ACQ, F25ND3	MIRROR				7 Secs (7 Secs) [==>]	[1]	Comments: TA calculated for S/N of 40 at brightness $V=12.3$										2	G230LB (STIS.sp.18 57565)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=4			1236 Secs (1236 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	Comments: Estimated brightness at this epoch is $V=12.3$; S/N~10 per exposure										3	G430L (STIS.sp.18 57564)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=2			32 Secs (32 Secs) [==>(Split 1)] [==>(Split 2)]	[1]	Comments: Estimated brightness at this epoch is $V=12.3$; S/N~65 per exposure										4	G750L (STIS.sp.18 57563)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2	G750L 7751 A	CR-SPLIT=2			24 Secs (24 Secs) [==>(Split 1)] [==>(Split 2)]	[1]	Comments: Estimated brightness at this epoch is $V=12.3$; S/N~45										5	Fringe Flat	CCDFLAT	STIS/CCD, ACCUM, 0.3X0.09	G750L 7751 A				[==>(Copy 1)] [==>(Copy 2)]	[1]
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Proposal 17313 - late plateau (05) - Tracing the UV CSM interaction over the first 50 days in the extremely nearby SN 2023ixf in M101

Thu Jul 13 13:00:28 GMT 2023

Visit	Proposal 17313, late plateau (05) Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD Special Requirements: SCHED 100%; TOO RESPONSE TIME 5.0D <i>Comments: This is a repeat of Visit 4 due to GS failure. It should be executed as soon as possible as this is a time varying source and the UV is fading with time</i>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SN2023IXF	RA: 14 03 38.5640 (210.9106833d) Dec: +54 18 42.00 (54.31167d) Equinox: J2000		V=13.9+/-0.3	Reference Frame: ICRS				
	<i>Comments:</i> Category=EXT-STAR Description=[CIRCUMSTELLAR MATTER, SUPERNOVA, SUPERNOVA TYPE II]									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	TA (STIS.ta.185 7561)	(1) SN2023IXF	STIS/CCD, ACQ, F25ND3	MIRROR				7 Secs (7 Secs) [==>]	[1]
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	2	G230LB (STIS.sp.18 57565)	(1) SN2023IXF	STIS/CCD, ACCUM, 52X0.2E1	G230LB 2375 A	CR-SPLIT=4			1236 Secs (1236 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]
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