



12510 - From photosphere to nebula: the time evolution of a gravitationally lensed, hydrogen-poor superluminous supernova at $z \sim 2$

Cycle: 4, Proposal Category: DD

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Maggie Luhua Li (PI)	California Institute of Technology
Dr. Lin Yan (CoI) (CoPI) (Contact)	California Institute of Technology
Dr. Joel Pearson Johansson (CoI) (ESA Member)	Stockholm University
Prof. Ariel Goobar (CoI) (ESA Member)	Stockholm University
Dr. Steve Schulze (CoI)	Northwestern University
Dr. Ragnhild Lunnan (CoI) (ESA Member)	Stockholm University
Dr. Yu-jing Qin (CoI)	California Institute of Technology
Dr. Daniel Perley (CoI) (ESA Member)	Liverpool John Moores University
Dr. Mansi Kasliwal (CoI)	California Institute of Technology

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Epoch 1				
	1	NIRSpec IFU	NIRSpec IFU Spectroscopy	(1) SN2025wny_A_Gal1

ABSTRACT

Superluminous supernovae (SLSNe) are powerful probes of low-metallicity massive stars, which are expected to be abundant at high redshift. However, the current sample of SLSNe—especially high- z SLSNe—is extremely limited. SN2025wny is a hydrogen-poor SLSN (SLSN-I) at $z=2.011$ that provides the first opportunity to overcome this limitation. SN2025wny is strongly lensed ($\sim 50x$) by two foreground galaxies; this, together with its intrinsically high SLSN-I luminosity and slow time evolution, presents the first opportunity to obtain multi-wavelength spectra and

photometry of a high- z SLSNe from its photospheric to nebular phases. We propose JWST NIRSpec IFU, NIRSpec Fixed-Slit, and NIRCам observations to track SN2025wny's rest-frame optical evolution to late times. These observations will directly link SN2025wny to the well-studied local SLSN-I population and establish the first robust spectral templates of a high- z SLSN-I, providing a critical reference for identifying and analyzing high- z SLSNe in the upcoming Roman era.

OBSERVING DESCRIPTION

We request 13.5 total hours (including overheads) of JWST NIRSpec IFU, NIRSpec Fixed-Slit (FS), and NIRCам observations of SN2025wny. The specific details of our observation planning are included in the ETC notebooks #287637, 287527, 287531. These observations should span SN2025wny's remaining Cycle 4 and Cycle 5 visibility windows. In the first epoch (18 Feb. to 10 Apr. 2026), we wish to use NIRSpec IFU with the medium-resolution filter-grating pairs G140M/F100LP, G235M/F170LP, and G395M/F290LP. We request the NRSIRS2 readout mode with 12 groups, 1 integration, and a 4-point-dither.

In the second epoch (03 Oct. to 24 Nov. 2026), we propose using NIRSpec FS with PRISM/Clear, the FULL subarray, S200A1 slit, NRSIRS2RAPID readout pattern, 80 groups, 1 integration, and 3 primary dithers with no subpixel dithers. We wish to perform target acquisition method using the Offset_TA target, WATA TA method, SUB32 subarray, F110W filter, and NRSRAPIDD6 readout pattern. In this epoch, we also request NIRCам Imaging on the SN2025wny_A target, using ALL modules, the FULL subarray, INTRAMODULEBOX dither with 2 primary dithers, and SMALL-GRID-DITHER subpixel dither type with 2 dithers. We request two filter sequences: 1) F115W with F277W and 2) F150W and F277W. Both sequences will use the 4 groups, 1 integration, and the BRIGHT1 readout pattern. The target placement will be on the Module gap with an Offset of (121.0, 35.0) arcsec. The NIRSpec and NIRCам observations in this epoch should be taken in a non-interruptible sequence.

In the third epoch (18 Feb. to 10 Apr. 2027), we request the same instruments, but with different setups. The NIRSpec FS observation should use the NRSIRS2 readout mode with the S200A1 slit, the FULL subarray, 24 groups, 2 integrations, with 3 primary dithers and no subpixel dithers. The NIRCам observation is the same setup as Epoch 2 but should use 10 groups. The NIRSpec and NIRCам observations in this epoch should also be taken in a non-interruptible sequence.

Proposal 12510 - Targets - From photosphere to nebula: the time evolution of a gravitationally lensed, hydrogen-poor superluminous s...

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	SN2025wny_A_Gal1	RA: 07 16 34.4735 (109.1436396d) Dec: +38 21 8.09 (38.35225d) Equinox: J2000 <i>Comments: Observed in Cycle 4 window only.</i> <i>Category=Star</i> <i>Description=[Supernovae]</i>		
	(2)	SN2025wny	RA: 07 16 34.5039 (109.1437662d) Dec: +38 21 8.11 (38.35225d) Equinox: J2000 <i>Comments: Observed in the Cycle 5 windows.</i> <i>Category=Star</i> <i>Description=[Supernovae]</i>		
	(3)	Offset_TA	RA: 07 16 38.0871 (109.1586962d) Dec: +38 20 59.02 (38.34973d) Equinox: J2000 <i>Comments: Observed in the Cycle 5 windows.</i> <i>Category=Star</i> <i>Description=[G stars]</i> <i>Extended=NO</i>	Proper Motion RA: 2.2204048898821234 mas/yr Proper Motion Dec: -3.2165995161293024 mas/yr Parallax: 0.0001" Epoch of Position: 2016	

Proposal 12510 - Observation 1 - From photosphere to nebula: the time evolution of a gravitationally lensed, hydrogen-poor superlumi...

Thu Feb 26 17:00:10 GMT 2026

Observation	<p>Proposal 12510, Observation 1: NIRSpec IFU</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRSpec IFU Spectroscopy</p>											
Diagnostics	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous			
	(1)	SN2025wny_A_Gal1	RA: 07 16 34.4735 (109.1436396d) Dec: +38 21 8.09 (38.35225d) Equinox: J2000									
	<p><i>Comments: Observed in Cycle 4 window only.</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Supernovae]</i></p>											
Template	TA Method						HFF Readout Mode					
	NONE						false					
Dithers	#	Dither Type		Size	Starting Point			Number of Points	Points			
	1	4-POINT-DITHER										
Spectral Elements	#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
	1	G140M/F100LP	NRSIRS2	12	1	false	true	NONE	4	4	3559.689	287637
	2	G235M/F170LP	NRSIRS2	12	1	false	true	NONE	4	4	3559.689	287637
	3	G395M/F290LP	NRSIRS2	12	1	false	true	NONE	4	4	3559.689	287637
Special Requirements	Between Dates 18-FEB-2026:00:00:00 and 10-APR-2026:00:00:00											