



8792 - Unlocking the massive stars behind the most spectacular fireworks displays in the early Universe

Cycle: 4, Proposal Category: GO

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Dr. Peter Senchyna (PI)	Carnegie Institution of Washington
Prof. Daniel P. Stark (CoI)	University of California - Berkeley
Dr. Michael Topping (CoI)	University of Arizona
Dr. Zuyi Chen (CoI) (ESA Member)	University of Copenhagen, Niels Bohr Institute
Adele Plat (CoI) (ESA Member)	Ecole Polytechnique Federale de Lausanne
Dr. Hakim Atek (CoI) (ESA Member)	CNRS, Institut d'Astrophysique de Paris
Prof. John Chisholm (CoI)	University of Texas at Austin
Dr. Danielle Berg (CoI)	University of Texas at Austin

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	a163_pnew3_catv6all_unconstrainedwopen	NIRSpec MultiObject Spectroscopy	(12) glimpse_combined_apr_v6_full

ABSTRACT

Many of the most persistent mysteries about the early Universe are wrapped-up in the debate about how globular cluster abundance patterns were imprinted with the signatures of massive star ejecta. The discovery of a population of galaxies powering extremely prominent emission in highly-ionized, nitrogen-enriched gas at $z > 6$ promises to open an entirely new window onto this puzzle and onto the detailed physics of densely-clustered star formation at Cosmic Dawn; yet conclusions thus far are severely limited by the quality of data available for these objects. Here we propose to construct an extraordinarily deep view onto the FUV spectrum of an exemplary nitrogen-rich burst caught in the reionization era, fortuitously

JWST Proposal 8792 (Created: Monday, August 3, 2026, 1:00:23PM Eastern Standard Time) - Overview

quintuply-lensed by the Abell-S1063 cluster. With a 65 hour stare in G140H, we will capture the first high-fidelity snapshot of the massive stars underlying this emission, testing models for this enrichment by providing constraints on stellar abundances and the presence of very/super-massive stars or stellar populations heavily modified by dense cluster interactions. Simultaneously, we will leverage the rich photometric data for this cluster to fill the MSA with new fainter high-redshift targets, for which we will provide stringent constraints on UV nebular emission and the incidence of these peculiar features to much fainter magnitudes. This lensed galaxy bright enough to be accessible to nebular detections from the ground now represents a singular opportunity for JWST to directly constrain the highly-uncertain primordial massive star populations that underly and confound attempts to model faint nebular emission out to the frontier of Cosmic Dawn.

OBSERVING DESCRIPTION

Our program is built around deep spectroscopy of a quintuply-lensed $z=6.1$ galaxy RXCJ2248-ID. Our science there is dependent upon achieving very high SNR for this galaxy in the restframe far-ultraviolet continuum. To achieve this, we request 65.7 hours science exposure, corresponding to a total charged time of 81.7 hours.

The G140H grating uniquely satisfies our science wavelength (1240-1760Å rest-frame) and spectral resolution ($R>2000$) requirements. The MSA maximizes our signal-to-noise and allows for multiplexing three (and potentially all four) of the images of the primary target simultaneously. The total requested exposure time is based upon ETC calculations for a model spectrum rescaled to match the flux-calibrated lower-resolution JWST spectrum of the median-brightest image. Our simulations suggest that recovering stellar wind feature at high-confidence for an extremely metal-poor stellar population without additional sources will require $\text{SNR}>10$ in the full stack at 1240Å rest, corresponding to >6 in the median image; and a resulting total integration time of 65 hours.

Our goal is to maximize on-source exposure and SNR while minimizing overheads. The ETC indicates that the observations are not background limited or in danger of saturation. Data volume considerations from the APT necessitate that we utilize NRSIRS2 as opposed to NRSIRS2RAPID. Since the primary target clump is effectively unresolved, we plan 3-point nod-in-slitlet observations with a standard 3 shutter slitlet to maximize SNR (the detector gaps will naturally be filled by the inherent offsets between the multiple targeted images). We utilize the maximum-recommended 20 Groups/Int (corresponding to ~ 1500 s) to maximize SNR, and set Integrations/Exp to 6 so that the total exposure duration is just under 10000s. A total of 9 of these exposure sets spread over 3 visits then yields the requested total science integration time of 65.7 hours, with total charged time of 81.7 hours.

Proposal 8792 - Targets - Unlocking the massive stars behind the most spectacular fireworks displays in the early Universe

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(12)	glimpse_combined_apv6_ful	RA: 22 48 48.2886 (342.2012025d)		
		1	Dec: -44 32 18.14 (-44.53837d)		
			Equinox: J2000		
	Comments: Description=[]				

Proposal 8792 - Observation 1 - Unlocking the massive stars behind the most spectacular fireworks displays in the early Universe

Observation	Proposal 8792, Observation 1: a163_pnew3_catv6all_unconstrainedwopen										Mon Aug 03 18:00:23 GMT 2026
	Diagnostic Status: Warning										
	Observing Template: NIRSpec MultiObject Spectroscopy										
	Comments: The special requirement on APA is not strict but preferred; please see text.										
Diagnostics	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
	(Visit 1:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
	(Visit 1:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(12)	glimpse_combined_apr_v6_full	RA: 22 48 48.2886 (342.2012025d)								
			Dec: -44 32 18.14 (-44.53837d)								
			Equinox: J2000								
	Comments: Description=[]										
Acquisition	#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
	1	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
	2	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
	3	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 3 quads; [Optimal TA Accuracy]	SAME	F140X	Auto Acq MSA Config	NRSRAPIDD6	3	1	4	687.153	
Template	TA Method	HFF Readout Mode	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold			
	MSATA	false	No	MSA Center	weighted (2239 sources)	weighted (2239 sources)	jwst-nirspec-g140h	1.5			

Proposal 8792 - Observation 1 - Unlocking the massive stars behind the most spectacular fireworks displays in the early Universe

Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
	1	5013	342.210022	-44.562138	24.2244815826416	1	14644	342.252502	-44.546917	23.360872268676758
	1	5159	342.213379	-44.562313	22.55449104309082	1	18147	342.192963	-44.528191	23.909290313720703
	1	5280	342.214630	-44.562370	22.94540786743164	1	27835	342.194611	-44.532299	22.94435691833496
	1	11532	342.247620	-44.551220	22.38333511352539	1	51674	342.183594	-44.516479	22.34807777404785
	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude
	2	5013	342.210022	-44.562138	24.2244815826416	2	14644	342.252502	-44.546917	23.360872268676758
	2	5159	342.213379	-44.562313	22.55449104309082	2	18147	342.192963	-44.528191	23.909290313720703
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	3	11532	342.247620	-44.551220	22.38333511352539	3	51674	342.183594	-44.516479	22.34807777404785

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	#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
Spectral Elements	1	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	2	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	3	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	4	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	5	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	6	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	7	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	8	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
	9	1 (G140H/F070LP)	c1	3 Shutter Slitlet	342.21369749999 997 Degrees - 44.5385361111111 114 Degrees	162.99125301996 68			3	18	26522.602
Special Requirements	Group Visits within 53.0 Days Aperture PA Range 160 to 163 Degrees (V3 21.4254303 to 24.4254303) Visits Same PA MSA Scheduled Aperture PA 163.0000 to 163.0000 Degrees (V3 24.42543 to 24.42543)										