



8317 - The Return of the Giants: Constraining the TP-AGB Phase across Cosmic Time

Cycle: 4, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	wout_with_fillers	NIRSpec MultiObject Spectroscopy	(4) NSE_wout_prism_suspense_resubm

ABSTRACT

The thermally pulsing asymptotic giant branch (TP-AGB) phase plays a critical role in shaping the spectral energy distributions of galaxies, particularly at near-infrared wavelengths. However, the treatment of TP-AGB stars in stellar population synthesis (SPS) models remains highly uncertain. Existing models are calibrated using stars in the Milky Way and nearby galaxies, which do not fully capture the diversity of stellar environments in terms of age and metallicity. As a result, different SPS models handle the TP-AGB phase differently, potentially leading to significant systematic uncertainties in the stellar masses and other population properties of distant galaxies.

In this proposal, we aim to improve the treatment of TP-AGB stars by leveraging data from the public JWST-SUSPENSE program, which obtained ultradeep, medium-resolution spectra of quiescent galaxies at redshifts 1–3. These spectra enable robust age and metallicity measurements for 15 such galaxies. Additionally, the galaxies span a range of ages and metallicities, capturing the phases where TP-AGB stars are most dominant (0.6–2 Gyr). We propose to observe these galaxies for 5 hours with the JWST/NIRSpec prism (0.6–5.3 μ m) to assess the contribution of TP-AGB stars as a function of age and metallicity. The prism mode provides sufficient resolution to detect the broad spectral features characteristic of TP-AGB stars. By comparing the spectra with multiple SPS models and tuning TP-AGB parameters, we will constrain this evolutionary phase. The resulting improved TP-AGB treatment will directly impact galaxy evolution studies, yielding more accurate stellar population properties of galaxies across cosmic time.

OBSERVING DESCRIPTION

A primary goal of this program is to take NIRSpec-MSA PRISM R=100 spectra to measure TP-AGB features in 15 relatively bright quiescent galaxies at $1 < z < 3$. The galaxies have previously been observed with NIRSpec-MSA and the G140M-F100LP dispersion-filter combination by the JWST Cycle 1 SUSPENSE program (2110), and already have robust measurements of the ages and metallicities, needed to address the science goals of this program. We will also target fainter quiescent galaxies and star-forming galaxies at similar and higher redshifts, with priority given to targets already observed by the SUSPENSE program. HST images (F160W and F814W) have been used for the astrometry, and thus no pre-imaging is needed. This strategy was successfully applied for the 2110 program, targeting the same field. For the final mask design we will also include the public COSMOS-Web imaging.

We will use 3-shutter slits and a (custom) 2-position nodding pattern. For primary targets we extend the slits to 4 or 5 shutters, where possible. Our

JWST Proposal 8317 (Created: Wednesday, March 4, 2026, 12:00:19PM Eastern Standard Time) - Overview

current mask design does allow targets in areas affected by open shutters. Our field can be observed for a limited PA range (64-85 degrees and 234-254 degrees). Our optimal PA would be close to the PA of the 2110 program (71.6174), but nearly all other allowed PAs also target nearly all primary galaxies.

We plan to observe this pointing/configuration for nearly 5 hr, consisting of 8 exposures of 2218 seconds each, with 15 groups per integration and 2 integrations per exposure. Thus, there are 4 exposures for each nod position. We will use the NRSIRS2 read-out mode. Total integration time is 4.9 hr.

Proposal 8317 - Targets - The Return of the Giants: Constraining the TP-AGB Phase across Cosmic Time

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(4)	NSE_wout_prism_suspense_re subm	RA: 10 02 1.2680 (150.5052833d) Dec: +02 27 37.48 (2.46041d) Equinox: J2000		
	<i>Comments:</i> Description=[]				

Proposal 8317 - Observation 1 - The Return of the Giants: Constraining the TP-AGB Phase across Cosmic Time

Wed Mar 04 17:00:19 GMT 2026

Observation	Proposal 8317, Observation 1: wout_with_fillers Diagnostic Status: Warning Observing Template: NIRSpec MultiObject Spectroscopy										
	(wout_with_fillers (Obs 1)) Warning (Form): Config c1 (#1) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c1 (#2) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c1 (#3) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c1 (#4) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#5) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#5) has 1 primary slits affected by failed closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#6) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#6) has 1 primary slits affected by failed closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#7) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#7) has 1 primary slits affected by failed closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#8) has 1 master background shutters affected by failed open or closed shutters. (wout_with_fillers (Obs 1)) Warning (Form): Config c2 (#8) has 1 primary slits affected by failed closed shutters. (Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 1:1) Warning (Form): The recommended value is 8 Reference Stars for this template.										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous			
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<i>Comments: Description=[]</i>											
Acquisition	#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
	1	Filter: F110W; Readout: NRSRAPID; 7 sources in 4 quads; [Optimal TA Accuracy]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
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	After Target ACQ and New MSA Config	MSA Center	Primary Targets (19 sources)		jwst-nirspec-prism	1.5			
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	127812	150.493484	2.441285	19.82486	1	130156	150.518254	2.479494	21.0	
	1	127964	150.487997	2.445011	21.52331	1	561455	150.502160	2.436037	20.23045	
	1	128758	150.518706	2.457130	20.01692	1	562733	150.497130	2.447806	20.5519	
	1	129618	150.482390	2.471464	20.57308						

Proposal 8317 - Observation 1 - The Return of the Giants: Constraining the TP-AGB Phase across Cosmic Time

Confirmation	#	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time
		1	c1	NRSIRS2	4	1	1
	2	c2	NRSIRS2	4	1	1	306.367

Spectral Elements	#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	1	1 (PRISM/CLEAR)	c1		150.50562916666 667 Degrees 2.4631083333333 335 Degrees	246.99950340707 318		1.0	1	2	2217.511
	2	1 (PRISM/CLEAR)	c1		150.50562916666 667 Degrees 2.4631083333333 335 Degrees	246.99951463992 67		-1.0	1	2	2217.511
	3	1 (PRISM/CLEAR)	c1		150.50562916666 667 Degrees 2.4631083333333 335 Degrees	246.99951463992 67		-1.0	1	2	2217.511
	4	1 (PRISM/CLEAR)	c1		150.50562916666 667 Degrees 2.4631083333333 335 Degrees	246.99950340707 318		1.0	1	2	2217.511
	5	1 (PRISM/CLEAR)	c2		150.50589041666 666 Degrees 2.4624927777777 78 Degrees	246.99951565757 922		1.0	1	2	2217.511
	6	1 (PRISM/CLEAR)	c2		150.50589041666 666 Degrees 2.4624927777777 78 Degrees	246.99952688752 208		-1.0	1	2	2217.511
	7	1 (PRISM/CLEAR)	c2		150.50589041666 666 Degrees 2.4624927777777 78 Degrees	246.99952688752 208		-1.0	1	2	2217.511
	8	1 (PRISM/CLEAR)	c2		150.50589041666 666 Degrees 2.4624927777777 78 Degrees	246.99951565757 922		1.0	1	2	2217.511

Special Requirements	MSA Scheduled Aperture PA 246.9995 to 246.9995 Degrees (V3 108.42493 to 108.42493)										