



5019 - The prevalence of TP-AGB stars in the near-IR rest-frame spectra of high redshift quenched galaxies: implications for spectral synthesis models and galaxy evolution

Cycle: 3, Proposal Category: GO

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Ms. Shiyng LU (PI)	Nanjing University School of Astronomy and Space Science
Dr. Emanuele Daddi (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)
Dr. Mark Dickinson (CoI) (US Admin CoI)	NOIRLab - (AZ)
Dr. Pablo Arrabal Haro (CoI)	NASA Goddard Space Flight Center
Prof. Claudia Maraston (CoI) (ESA Member)	University of Portsmouth
Prof. Raphael Gobat (CoI)	Pontificia Universidad Catolica de Valparaiso
Dr. Carlos Gomez-Guijarro (CoI) (ESA Member)	CEA/DSM/Irfu/Service d'Astrophysique - Laboratoire AIM
Dr. Chiara D'Eugenio (CoI) (ESA Member)	Instituto de Astrofisica de Canarias
Prof. Mauro Giavalisco (CoI)	University of Massachusetts - Amherst
Prof. Steven L. Finkelstein (CoI)	University of Texas at Austin
Dr. Benjamin Magnelli (CoI) (ESA Member)	Commissariat a l'Energie Atomique (CEA)

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	7	Shiyng_PA324.3029_Midpoint_10x10_0.1_simplified	NIRSpec MultiObject Spectroscopy	(6) Merged_EGS_cat_v1_shiyng

ABSTRACT

A two decade-long debate has not yet settled on the impact of TP-AGB stars in the near-IR rest-frame spectra of quiescent galaxies in the distant Universe. Wildly varying model-treatment of this uncertain but hyper-luminous stellar phase results in major discrepancies in their inferred stellar masses, ages, and star-formation histories, preventing a solid description of the evolution of this crucial class of galaxies and the overall understanding of the quenching process. JWST has the unique power to finally settle the debate, revealing (or not) the distinct spectral features that betray TP-AGB stars in galaxies' near-IR rest-frame spectra. A single massive ($2 \times 10^{10} M_{\text{sun}}$) quiescent galaxy from the archive at $z=1.086$, serendipitously observed with NIRSpec+PRISM, has surprisingly revealed a plethora of strong TP-AGB features, including those of C- and O-type stars. The features observed in this galaxy's spectrum are incompatible with AGB-poor models, but even current AGB-strong models (from Maraston et al.) are incapable of returning acceptable fits and reproducing all features. We propose to dedicate one NIRSpec pointing of 2.5h (4.6h with overheads) to observe as primary targets >10 similarly bright quiescent galaxies, spanning a larger range of masses (10^{10} – $10^{11.5}$), redshifts ($1 < z < 2.5$), stellar ages and metallicities. Fainter quiescent galaxies and luminous non quiescent galaxies at the same redshifts will be used as fillers. These observations will deliver a unique database to start grasping the phenomenology of TP-AGB stars in distant galaxies, and tune future generations of models to finally have accurate predictive power on key stellar population parameters.

OBSERVING DESCRIPTION

This proposal is taking NIRSpec spectra of quiescent galaxies at $z > 1$ in a single pointing, using the PRISM.

Proposal 5019 - Targets - The prevalence of TP-AGB stars in the near-IR rest-frame spectra of high redshift quenched galaxies: implic...

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(6)	Merged_EGS_cat_v1_shiying	RA: 14 19 48.2949 (214.9512287d)		
			Dec: +52 53 48.83 (52.89690d)		
			Equinox: J2000		
		<i>Comments:</i>			
		<i>Description=[]</i>			

Proposal 5019 - Observation 7 - The prevalence of TP-AGB stars in the near-IR rest-frame spectra of high redshift quenched galaxies:...

Mon Feb 17 14:00:40 GMT 2025

Observation	Proposal 5019, Observation 7: Shiyong_PA324.3029_Midpoint_10x10_0.1_simplified Diagnostic Status: Warning Observing Template: NIRSpec MultiObject Spectroscopy										
	(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous		
	(6)	Merged_EGS_cat_v1_shiyong	RA: 14 19 48.2949 (214.9512287d) Dec: +52 53 48.83 (52.89690d) Equinox: J2000								
<i>Comments: Description=[]</i>											
Acquisition	#	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	Filter: F140X; Readout: NRSRAPIDD6; 8 sources in 4 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	primary_targets (1578 sources)	filler_targets (126173 sources)	jwst-nirspec-prism	1.5			
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	8117	214.959840	52.867803	23.28500	1	20834	214.890315	52.882947	22.83100	
	1	9660	214.935881	52.858936	24.18800	1	22429	214.916721	52.911235	23.67600	
	1	11097	214.906077	52.844399	22.50400	1	24425	214.879283	52.894144	22.95900	
	1	11760	214.908337	52.849239	23.21600	1	154291	214.965864	52.885554	23.96800	
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	3 Shutter Slitlet	214.91879479166 667 Degrees 52.882125555555 554 Degrees	324.27707474218 204			3	9	9322.301

Proposal 5019 - Observation 7 - The prevalence of TP-AGB stars in the near-IR rest-frame spectra of high redshift quenched galaxies:...

Special Requirements

MSA Scheduled Aperture PA 324.3029 to 324.3029 Degrees (V3 185.72829 to 185.72829)