



# 2560 - Solving the globular clusters multiple population enigma through JWST

Cycle: 1, Proposal Category: GO

## INVESTIGATORS

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## OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	13	new150622a	NIRSpec MultiObject Spectroscopy	(7) CATALOGUE-120722E
	16	Apr23_2	NIRSpec MultiObject Spectroscopy	(8) CATALOGUE-120722E-OCT22
	17	Aug23_5 (Obs 17)	NIRSpec MultiObject Spectroscopy	(8) CATALOGUE-120722E-OCT22

## ABSTRACT

Since its discovery, the multiple population phenomenon is an enigma in the field of stellar populations. We propose combined spectroscopic and photometric JWST observations that will finally solve this long-standing issue.

So far, two competing scenarios are available: 1) multiple bursts of star formation; 2) accretion of material onto existing stars. In the first scenario the

population pattern is expected to be identical for stars with different masses, while the accretion scenario should result in substantially more pronounced chemical differences and fractions of second population stars at higher-masses. The exploration of the M dwarf realm and the comparison of the multiple population properties in this very-low mass regime with those of red giants will shed light on the origin of this enigmatic phenomenon.

The NIRSpec+NIRCam facilities will provide the unique opportunity to gather spectra and precise photometric diagrams of faint M dwarfs in GCs, not easily accessible to other facilities. Our spectral synthesis and simulated diagrams suggest that the requested data, combined with HST UV archival images, will allow us to infer the O abundance range in the M dwarfs, which will be compared to that observed among red giants, and precise mass functions of multiple populations from  $\sim 0.8$  solar masses towards the H-burning limit.

These first JWST observations will be a milestone in our understanding of such an eluding phenomenon, and a step forward for many closely related issues, e.g. star formation in dense early environments, stellar evolution and nucleosynthesis, the role of proto-clusters in the cosmic reionization and the contribution of GCs to the Milky Way Halo.

## **OBSERVING DESCRIPTION**

The goal of this proposal is an investigation of M dwarfs in the globular cluster 47 Tucanae to shed light on the formation scenarios of multiple stellar populations. We will take advantage of NIRSpec+NIRCam parallel observations to derive the oxygen abundance range in the M dwarf stars from spectroscopy and mass functions from a high precision color-magnitude diagram.

We have chosen the NIRSpec and NIRCam fields of view to be located at similar radial distances from the cluster center. The NIRSpec field of view overlaps with the HST field from GO11453, for which we have already a deep color-magnitude diagram based on the filters F110W and F160W which allow us a proper selection of the spectroscopic targets.

The NIRCam fields partially overlap with the HST field from GO12580, from which we have the UV filters F336W and F275W. The UV CMD will allow us to identify multiple populations and extend their mass functions up to the upper main sequence and the red-giant branch.

Proposal 2560 - Targets - Solving the globular clusters multiple population enigma through JWST

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous	
	(6)	CATALOGUEE	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000			
	<i>Comments:</i> <i>Description=[]</i>					
	(7)	CATALOGUE-120722E	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000			
<i>Comments:</i> <i>Description=[]</i>						
(8)	CATALOGUE-120722E- OCT22	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000				
<i>Comments:</i> <i>Description=[]</i>						

<b>Observation</b>	<p><b>Proposal 2560, Observation 13: new150622a</b></p> <p><b>Diagnostic Status: Error</b></p> <p>Observing Template: NIRSpec MultiObject Spectroscopy</p> <p>Coordinated Parallel Template(s): NIRCам Imaging</p>
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# Proposal 2560 - Observation 13 - Solving the globular clusters multiple population enigma through JWST

	<p>(new150622a (Obs 13)) Warning (Form): Config c2 (#18) has 2 master background shutters affected by failed open or closed shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#19) has 1 primary slit traces affected by failed open shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#19) has 1 primary slits affected by failed closed shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#19) has 2 master background shutters affected by failed open or closed shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#20) has 1 primary slit traces affected by failed open shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#20) has 1 primary slits affected by failed closed shutters.</p> <p>(new150622a (Obs 13)) Warning (Form): Config c2 (#20) has 2 master background shutters affected by failed open or closed shutters.</p> <p>(Visit 13:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>		
	(7)	CATALOGUE-120722E	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000								
	<i>Comments:</i> Description=[]										
<b>Acquisition</b>	<b>NIRSpec MultiObject Spectroscopy</b>	<b>Reference Star Bin</b>	<b>Target</b>	<b>Filter</b>	<b>MSA Configuration</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	Filter: F110W; Readout: NRSRAPID; 8 sources in 2 quads; [ Optimal TA Accuracy ]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
<b>Template</b>	<b>NIRSpec MultiObject Spectroscopy</b>					<b>NIRCam Imaging</b>					
	TA Method: MSATA Obtain Confirmation Images: No Science Aperture: MSA Center Primary Candidate List: new (907 sources) Filler Candidate List: null Spectral Overlap Map: jwst-nirspec-g235m Spectral Overlap Threshold: 1.5					Module: ALL Subarray: FULL Target Placement: Module Gap					
<b>Reference Stars</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	
	1	10876	5.643403	-72.084816	20.0585	1	27245	5.708003	-72.066635	19.9437	
	1	14655	5.627738	-72.080744	20.0744	1	29271	5.675902	-72.063324	19.9679	
	1	17196	5.601903	-72.078694	19.9906	1	33927	5.713650	-72.058025	20.0020	
	1	18418	5.603177	-72.077185	20.0137	1	35967	5.695093	-72.056361	19.9936	
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>									
	1	NONE									

Proposal 2560 - Observation 13 - Solving the globular clusters multiple population enigma through JWST

	NIRSpec MultiObject Spectroscopy	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 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	2	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	3	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	4	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	5	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	6	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	7	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	8	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	9	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	10	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6293114583333 33 Degrees - 72.057309722222 21 Degrees	53.981466653029 6			2	2	2363.4
	11	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	12	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	13	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	14	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4

Proposal 2560 - Observation 13 - Solving the globular clusters multiple population enigma through JWST

	NIRSpec MultiObject Spectroscopy	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	15	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	16	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	17	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	18	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	19	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	20	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6151179583333 33 Degrees - 72.051301111111 12 Degrees	53.994982327919			2	2	2363.4
	NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID	
<b>Spectral Elements</b>	1	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	2	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	3	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	4	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	5	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	6	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	7	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	8	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	9	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	10	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	11	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	12	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	13	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	14	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	15	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	16	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	17	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	18	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	19	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	20	F115W	F322W2	DEEP8	3	2	4	2	2082.933		

## Proposal 2560 - Observation 13 - Solving the globular clusters multiple population enigma through JWST

### Special Requirements

Aperture PA Range 20 to 90 Degrees (V3 241.42543030000002 to 311.4254303)  
Aperture PA Range 230 to 300 Degrees (V3 91.4254303 to 161.4254303)  
No Parallel Attachments  
MSA Scheduled Aperture PA 53.9452 to 53.9452 Degrees (V3 275.37064 to 275.37064)

<b>Observation</b>	<p><b>Proposal 2560, Observation 16: Apr23_2</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRSpec MultiObject Spectroscopy Coordinated Parallel Template(s): NIRCам Imaging</p>
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Proposal 2560 - Observation 16 - Solving the globular clusters multiple population enigma through JWST

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections				Miscellaneous			
	(8)	CATALOGUE-120722E-OCT22	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000								
<i>Comments:</i> Description=[]											
Acquisition	NIRSpec MultiObject Spectroscopy	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	Filter: F110W; Readout: NRSRAPID; 8 sources in 4 quads; [ Optimal TA Accuracy ]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
Template	NIRSpec MultiObject Spectroscopy					NIRCam Imaging					
	TA Method: MSATA Obtain Confirmation Images: No Science Aperture: MSA Center Primary Candidate List: Oct22e (925 sources) Filler Candidate List: null Spectral Overlap Map: jwst-nirspec-g235m Spectral Overlap Threshold: 1.5					Module: ALL Subarray: FULL Target Placement: Module Gap					
Reference Stars	Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	
	1	8662	5.664175	-72.088135	20.1877	1	23044	5.600678	-72.071840	20.4793	
	1	11109	5.675112	-72.085560	20.0584	1	24922	5.631175	-72.069436	20.1443	
	1	14655	5.627738	-72.080744	20.0744	1	33927	5.713650	-72.058025	20.0020	
	1	20987	5.589480	-72.074112	20.0148	1	39948	5.665163	-72.050937	20.3635	
Dithers	#	Dither Type									
	1	NONE									

Proposal 2560 - Observation 16 - Solving the globular clusters multiple population enigma through JWST

	NIRSpec MultiObject Spectroscopy	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 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	2	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	3	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	4	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	5	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	6	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	7	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	8	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	9	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	10	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.6765219999999 99 Degrees - 72.064890555555 56 Degrees	25.645330046623 27			2	2	2363.4
	11	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	12	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	13	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	14	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4

Proposal 2560 - Observation 16 - Solving the globular clusters multiple population enigma through JWST

	NIRSpec MultiObject Spectroscopy	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	15	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	16	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	17	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	18	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	19	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	20	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6547619583333 32 Degrees - 72.061677222222 22 Degrees	25.666044629445 02			2	2	2363.4
	NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID	
<b>Spectral Elements</b>	1	F115W	F322W2	DEEP8	1	10	20	2	1911.145		
	2	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	3	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	4	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	5	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	6	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	7	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	8	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	9	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	10	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	11	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	12	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	13	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	14	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	15	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	16	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	17	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	18	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	19	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	20	F115W	F322W2	DEEP8	3	2	4	2	2082.933		

Proposal 2560 - Observation 16 - Solving the globular clusters multiple population enigma through JWST

Special Requirements

No Parallel Attachments  
MSA Scheduled Aperture PA 25.6458 to 25.6458 Degrees (V3 247.07121 to 247.07121)

Proposal 2560 - Observation 17 - Solving the globular clusters multiple population enigma through JWST

Mon Aug 07 15:02:16 GMT 2023

<b>Observation</b>	<b>Proposal 2560, Observation 17: Aug23_5 (Obs 17)</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRSpec MultiObject Spectroscopy Coordinated Parallel Template(s): NIRCam Imaging										
	(Visit 17:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>		
	(8)	CATALOGUE-120722E-OCT22	RA: 00 22 42.2498 (5.6760408d) Dec: -72 04 8.96 (-72.06916d) Equinox: J2000								
<i>Comments: Description=[]</i>											
<b>Acquisition</b>	<b>NIRSpec MultiObject Spectroscopy</b>	<b>Reference Star Bin</b>	<b>Target</b>	<b>Filter</b>	<b>MSA Configuration</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wbk.Calc ID</b>
	1	Filter: F110W; Readout: NRSRAPID; 8 sources in 4 quads; [ Optimal TA Accuracy ]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
<b>Template</b>	<b>NIRSpec MultiObject Spectroscopy</b>					<b>NIRCam Imaging</b>					
	TA Method: MSATA Obtain Confirmation Images: No Science Aperture: MSA Center Primary Candidate List: Oct22e (925 sources) Filler Candidate List: null Spectral Overlap Map: jwst-nirspec-g235m Spectral Overlap Threshold: 1.5					Module: ALL Subarray: FULL Target Placement: Module Gap					
<b>Reference Stars</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	
	1	8662	5.664175	-72.088135	20.1877	1	32892	5.640471	-72.060557	19.9052	
	1	9931	5.656401	-72.087070	20.7335	1	33927	5.713650	-72.058025	20.0020	
	1	20987	5.589480	-72.074112	20.0148	1	36565	5.665388	-72.055219	20.6391	
	1	32586	5.616948	-72.059539	20.5265	1	38941	5.626715	-72.051289	20.8111	
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>									
	1	NONE									

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	NIRSpec MultiObject Spectroscopy	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 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	2	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	3	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	4	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	5	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	6	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	7	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	8	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	9	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	10	1 (G235M/F170LP)	c1	2 Shutter Slitlet	5.64609425 Degrees - 72.072476388888 9 Degrees	129.27094230520 942			2	2	2363.4
	11	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	12	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	13	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	14	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4

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	NIRSpec MultiObject Spectroscopy	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	15	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	16	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	17	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	18	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	19	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	20	1 (G235M/F170LP)	c2	2 Shutter Slitlet	5.6613754583333 336 Degrees - 72.066723333333 36 Degrees	129.25641427487 605			2	2	2363.4
	NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID	
<b>Spectral Elements</b>	1	F115W	F322W2	DEEP8	1	10	20	2	1911.145		
	2	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	3	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	4	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	5	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	6	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	7	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	8	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	9	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	10	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	11	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	12	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	13	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	14	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	15	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	16	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	17	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	18	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	19	F115W	F322W2	DEEP8	3	2	4	2	2082.933		
	20	F115W	F322W2	DEEP8	3	2	4	2	2082.933		

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### Special Requirements

Aperture PA Range 68.5745697 to 293.5745697 Degrees (V3 290.0 to 155.0)  
No Parallel Attachments  
MSA Scheduled Aperture PA 129.2425 to 129.2425 Degrees (V3 350.6679 to 350.6679)