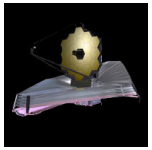

8712 - Unlocking the Secrets of NGC 2808's Multiple Populations

Cycle: 4, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
Dr. Massimo Griggio (PI)	**Space Telescope Science Institute**
Dr. Andrea Bellini (CoI) (US Admin CoI)	Space Telescope Science Institute
Dr. Mattia Libralato (CoI) (ESA Member)	INAF - Osservatorio Astronomico di Padova
Dr. Enrico Vesperini (CoI)	Indiana University System
Dr. Domenico Nardiello (CoI) (ESA Member)	Universita degli Studi di Padova
Dr. Luigi R. Bedin (CoI) (ESA Member)	INAF - Osservatorio Astronomico di Padova
Dr. Jay Anderson (CoI)	Space Telescope Science Institute
Dr. Maurizio Salaris (CoI) (ESA Member)	Liverpool John Moores University
Dr. Santi Cassisi (CoI) (ESA Member)	INAF - Osservatorio Astronomico d'Abruzzo

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1		NIRCam Imaging	(1) NGC-2808-F1-D1
	2		NIRCam Imaging	(2) NGC-2808-F1-D2
	3		NIRCam Imaging	(3) NGC-2808-F2-D1
	4		NIRCam Imaging	(4) NGC-2808-F2-D2

ABSTRACT

This proposal aims to investigate the internal kinematics of multiple stellar populations within the Galactic globular cluster NGC 2808, focusing on two strategically selected outer fields to observe main-sequence stars down to the very low mass regime.

The presence of multiple populations in globular clusters still poses significant questions about their formation and evolution, which can be addressed

by comparing present-day kinematics with predictions from formation models. Looking at the internal kinematics of a globular cluster as a whole, ignoring its stellar populations, is a naive and too-simplistic approach. The kinematic and dynamical histories of a globular cluster are intertwined with those of their populations and only a complete modeling of the population internal motions can let us understand these stellar fossils.
By leveraging the advanced astrometric capabilities of the James Webb Space Telescope, we will measure kinematic properties of the different stellar populations, which contain key information reagarding the formation scenarios. High-precision proper motions of stars across a broad mass range and various radial distances will allow us to measure the degree of energy equipartition and mass segregation among the subpopulations.
Our observations will complement existing photometric and spectroscopic studies, providing critical insights into the dynamics and formation processes of NGC 2808, and thereby advancing our understanding of the phenomenon of multiple populations.

OBSERVING DESCRIPTION

We propose to use JWST in imaging mode with NIRCam (and in parallel with NIRISS) to obtain high-precision photometry and astrometry of very low mass stars in NGC 2808.
High S/N in individual exposures is required to allow us to identify the different subpopulations in the color-magnitude diagram and to measure high-precision proper motions.
We plan to acquire multiple dithered images to remove residuals in the geometric distortion of the detectors, to account for the spatial and temporal variability of the PSFs, and to calibrate the local photometric zero points.
Proper motions will be derived by leveraging the large amount of HST observations of NGC 2808 in the archive.
We chose NIRCam F115W and F300M since they provide optimal separation between the subpopulations in the mass range that we are going to probe.
NIRISS parallel fields in F115W and F277W will provide auxiliary data at large radial distances from the cluster center that can be used for ancillary science investigations.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NGC-2808-F1-D1	RA: 09 11 45.0000 (137.9375000d) Dec: -64 55 10.00 (-64.91944d) Equinox: J2000	Proper Motion RA: 1.02 mas/yr Proper Motion Dec: 0.28 mas/yr Parallax: 1.12E-4" Epoch of Position: 2000	
		Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.* *Category=Stellar Cluster* *Description=[Globular star clusters]*		
(2)	NGC-2808-F1-D2	RA: 09 11 46.1925 (137.9424687d) Dec: -64 55 7.30 (-64.91869d) Equinox: J2000	Proper Motion RA: 1.02 mas/yr Proper Motion Dec: 0.28 mas/yr Parallax: 1.12E-4" Epoch of Position: 2000	
		Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.* *Category=Stellar Cluster* *Description=[Globular star clusters]*		
(3)	NGC-2808-F2-D1	RA: 09 12 49.8684 (138.2077850d) Dec: -64 51 21.59 (-64.85600d) Equinox: J2000	Proper Motion RA: 1.02 mas/yr Proper Motion Dec: 0.28 mas/yr Parallax: 1.12E-4" Epoch of Position: 2000	
		Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.* *Category=Stellar Cluster* *Description=[Globular star clusters]*		
(4)	NGC-2808-F2-D2	RA: 09 12 50.8046 (138.2116858d) Dec: -64 51 26.59 (-64.85739d) Equinox: J2000	Proper Motion RA: 1.02 mas/yr Proper Motion Dec: 0.28 mas/yr Parallax: 1.12E-4" Epoch of Position: 2000	
		Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.* *Category=Stellar Cluster* *Description=[Globular star clusters]*		

Observation

Proposal 8712, Observation 1 Thu Jun 05 23:00:21 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Coordinated Parallel Template(s): NIRISS Imaging

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)	NGC-2808-F1-D1	RA: 09 11 45.0000 (137.9375000d)	Proper Motion RA: 1.02 mas/yr	
		Dec: -64 55 10.00 (-64.91944d)	Proper Motion Dec: 0.28 mas/yr	
		Equinox: J2000	Parallax: 1.12E-4"	
			Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Stellar Cluster
Description=[Globular star clusters]

Template

NIRCam Imaging	NIRISS Imaging
Module: ALL	
Subarray: FULL	
Target Placement: Module Gap	

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	2TIGHTGAPS		1	NIRCam Only	NO_DITHERING

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F300M	MEDIUM8	6	4	8	2	5046.282	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W		NIS	11	5	2	10	4831.546	

Special Requirements	
	Aperture PA Range 39.92542306 to 59.92542306 Degrees (V3 40.0 to 60.0) Aperture PA Range 219.92542306 to 239.92542306 Degrees (V3 220.0 to 240.0) No Parallel Attachments Same V3 PA 1, 2

Observation

Proposal 8712, Observation 2 Thu Jun 05 23:00:21 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Coordinated Parallel Template(s): NIRISS Imaging

Diagnostics

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	NGC-2808-F1-D2	RA: 09 11 46.1925 (137.9424687d)	Proper Motion RA: 1.02 mas/yr	
		Dec: -64 55 7.30 (-64.91869d)	Proper Motion Dec: 0.28 mas/yr	
		Equinox: J2000	Parallax: 1.12E-4"	
			Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Stellar Cluster
Description=[Globular star clusters]

Template

NIRCam Imaging	NIRISS Imaging
Module: ALL	
Subarray: FULL	
Target Placement: Module Gap	

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	2TIGHTGAPS		1	NIRCam Only	NO_DITHERING

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F300M	MEDIUM8	6	4	8	2	5046.282	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F277W		NIS	11	5	2	10	4831.546	

Special Requirements	
	Aperture PA Range 39.92542306 to 59.92542306 Degrees (V3 40.0 to 60.0) Aperture PA Range 219.92542306 to 239.92542306 Degrees (V3 220.0 to 240.0) No Parallel Attachments Same V3 PA 1, 2

Observation

Proposal 8712, Observation 3 Thu Jun 05 23:00:21 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Coordinated Parallel Template(s): NIRISS Imaging

Diagnostics

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	NGC-2808-F2-D1	RA: 09 12 49.8684 (138.2077850d)	Proper Motion RA: 1.02 mas/yr	
		Dec: -64 51 21.59 (-64.85600d)	Proper Motion Dec: 0.28 mas/yr	
		Equinox: J2000	Parallax: 1.12E-4"	
			Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Stellar Cluster
Description=[Globular star clusters]

Template

NIRCam Imaging	NIRISS Imaging
Module: ALL	
Subarray: FULL	
Target Placement: Module Gap	

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	2TIGHTGAPS		1	NIRCam Only	NO_DITHERING

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F300M	MEDIUM8	6	4	8	2	5046.282	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W		NIS	11	5	2	10	4831.546	

Special Requirements	
	Aperture PA Range 124.92542306 to 159.92542306 Degrees (V3 125.0 to 160.0) Aperture PA Range 304.92542306 to 339.92542306 Degrees (V3 305.0 to 340.0) No Parallel Attachments Same V3 PA 3, 4

Observation

Proposal 8712, Observation 4 Thu Jun 05 23:00:21 GMT 2025

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Coordinated Parallel Template(s): NIRISS Imaging

Diagnostics

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(4)	NGC-2808-F2-D2	RA: 09 12 50.8046 (138.2116858d)	Proper Motion RA: 1.02 mas/yr	
		Dec: -64 51 26.59 (-64.85739d)	Proper Motion Dec: 0.28 mas/yr	
		Equinox: J2000	Parallax: 1.12E-4"	
			Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=Stellar Cluster
Description=[Globular star clusters]

Template

NIRCam Imaging	NIRISS Imaging
Module: ALL	
Subarray: FULL	
Target Placement: Module Gap	

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	2TIGHTGAPS		1	NIRCam Only	NO_DITHERING

Spectral Elements

NIRCam Imaging	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F115W	F300M	MEDIUM8	6	4	8	2	5046.282	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F277W		NIS	11	5	2	10	4831.546	

Special Requirements	
	Aperture PA Range 124.92542306 to 159.92542306 Degrees (V3 125.0 to 160.0) Aperture PA Range 304.92542306 to 339.92542306 Degrees (V3 305.0 to 340.0) No Parallel Attachments Same V3 PA 3, 4