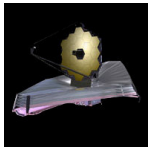

1190 - Embedded Cluster Survey

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1	embedded cluster imaging 1	NIRCam Imaging	(1) NGC-2024
	2	embedded cluster imaging 2	NIRCam Imaging	(1) NGC-2024
	3	embedded cluster imaging 3	NIRCam Imaging	(1) NGC-2024

ABSTRACT

We propose to obtain a complete census of planetary mass objects between 2-20 Mjupiter in the embedded young cluster NGC 2024. These data will enable us to: a) constrain the low mass end of the IMF; and b) search for evidence of gas giant planets that may have been ejected in the early dynamical history of the cluster evolution. We will use a multi-filter survey of both broad-band filters (to assess luminosity, extintion, and the presense of circumstellar dust disks) as well as intermediate band filters (to constrain temperature and surface gravity). We expect a sample of 50-100 candidate planetary mass objects for which we will obtain follow-up NIRSPEC characterization spectra. Assessment of C/O ratios based on

retrieval analysis of the spectra could reveal planetary mass objects that likely formed in a circumstellar disk rather than the ISM.

OBSERVING DESCRIPTION

We will observe one carefully selected embedded young cluster from among nearby star forming regions within 1 kpc to probe the IMF down to the lowest masses where compact objects can collapse from the ISM. Estimates for this range from < 3 MJup to > 10 MJup overlapping the range of planetary masses. Observations such as these will place powerful constraints on very low mass end of the IMF putting theories to the test. We will obtain multiband imaging of the cluster NGC 2024 wellmatched to the NIRCam field of view to disentangle intrinsic color, extinction, and the presence (or absence) of circumstellar disks enabling construction of monochromatic luminosity functions corrected for reddening and free (to a large extent) from disk excess in order to estimate stellar mass distributions to < 2 MJup. This program will also identify giant planets ejected through dynamical interactions as well as very low mass brown dwarfs for characterization through followup spectroscopy with NIRSpec (to be done separately from the NIRCam GTO program). Comparing observed C/O ratios based on spectral retrieval applied to the characterization spectra could enable us to distinguish some objects as ejected planets compared to those formed directly from the ISM.

NGC 2024 will be observed using F070W, F115W, F356W, and F444W to estimate Teff, individual Av, and identify disk emission or not. Intermediateband filters (e.g. F140M, F182M, F360M, and F430M) will be observed to assess temperature and constrain surface gravity. Each filter pair will be observed for two hours.

Proposal 1190 - Targets - Embedded Cluster Survey

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NGC-2024	RA: 05 41 41.7600 (85.4240000d) Dec: -01 54 33.30 (-1.90925d) Equinox: J2000		

Comments:
Category=Stellar Cluster
Description=[Open star clusters, Young star clusters]
Extended=YES

Observation

Proposal 1190, Observation 1: embedded cluster imaging 1

Tue Oct 26 20:00:14 GMT 2021

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 1:1) Warning (Form): Data Excess over lower threshold

(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-2024	RA: 05 41 41.7600 (85.4240000d) Dec: -01 54 33.30 (-1.90925d) Equinox: J2000		

Comments:
Category=Stellar Cluster
Description=[Open star clusters, Young star clusters]
Extended=YES

Template

Module	Subarray
ALL	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		7

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F140M	F360M	SHALLOW2	3	5	35	7	4810.073	
2	F182M	F430M	SHALLOW2	3	5	35	7	4810.073	

Special Requirements

Aperture PA Range 84.05 to 94.05 Degrees (V3 84.16255124 to 94.16255124)

Sequence Observations 1, 2, 3 within 24 Hours
Same Aperture PA 1, 2, 3

Observation

Proposal 1190, Observation 2: embedded cluster imaging 2

Tue Oct 26 20:00:14 GMT 2021

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 2:1) Warning (Form): Data Excess over lower threshold

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NGC-2024	RA: 05 41 41.7600 (85.4240000d) Dec: -01 54 33.30 (-1.90925d) Equinox: J2000		

Comments:
Category=Stellar Cluster
Description=[Open star clusters, Young star clusters]
Extended=YES

Template

Module	Subarray
ALL	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		3

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F140M	F360M	SHALLOW2	3	6	18	3	2480.194	
2	F182M	F430M	SHALLOW2	3	6	18	3	2480.194	
3	F070W	F356W	SHALLOW2	3	6	18	3	2480.194	
4	F115W	F444W	SHALLOW2	3	6	18	3	2480.194	

Special Requirements

Sequence Observations 1, 2, 3 within 24 Hours
Same Aperture PA 1, 2, 3

Observation

Proposal 1190, Observation 3: embedded cluster imaging 3

Tue Oct 26 20:00:14 GMT 2021

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 3:1) Warning (Form): Data Excess over lower threshold

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	NGC-2024	RA: 05 41 41.7600 (85.4240000d) Dec: -01 54 33.30 (-1.90925d) Equinox: J2000		

Comments:
Category=Stellar Cluster
Description=[Open star clusters, Young star clusters]
Extended=YES

Template

Module	Subarray
ALL	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		7

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F070W	F356W	SHALLOW2	3	5	35	7	4810.073	
2	F115W	F444W	SHALLOW2	3	5	35	7	4810.073	

Special Requirements

Sequence Observations 1, 2, 3 within 24 Hours
Same Aperture PA 1, 2, 3