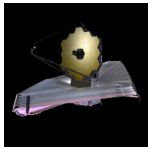

3907 - Unveiling the Early Stages of Massive Binary Formation with JWST

Cycle: 2, Proposal Category: GO

INVESTIGATORS

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Dr. Matthew De Furio (CoI)	University of Texas at Austin
Prof. Zhi-Yun Li (CoI) (US Admin CoI)	The University of Virginia

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
NIRCam for SOMA sources				
	1	NIRCAM IRAS07299	NIRCam Imaging	(1) IRAS07299
	2	NIRCAM G339	NIRCam Imaging	(2) G339.88-1.26

ABSTRACT

Most of massive stars are born in binary systems, therefore understanding massive binary formation is crucial for understanding massive star formation in general. Observational studies of massive forming binaries in the embedded phase are still very limited. JWST provides a new, unique

window to study such systems. We propose JWST/NIRCam observations of two forming massive binaries, which are the closest-separation embedded-phase massive forming binaries identified to date. We aim to: 1) directly image the massive binaries utilizing the high resolution and sensitivity of JWST, and characterize the stellar properties and accretion status of individual members in these systems; 2) map the extended emissions of the outflow cavities, to determine the cavity geometries and heated dust distributions, especially in the innermost regions. 3) probe the low-mass young stellar objects (YSOs) forming along with the massive binaries, placing massive binary formation into the context of star cluster formation. To achive the last goal, we also propose joint ALMA observation in 0.85 mm, to significantly improve the detection sensitivities of cold dust structures of the YSOs to achieve of a complete census of the low-mass YSO populations around these massive binaries. These observations will generate important constraints on theories of massive star formation, binary formation, and star cluster formation.

OBSERVING DESCRIPTION

This programme will observe high mass star forming regions with NIRCam to characterise massive protostars, the protocluster environment, and the stellar content down to the substellar regime. It will use a single pointing with a 6 dither pattern and observe in three SW plus LW filters pairs (F162M+F150W2 plus F405N+F444W, F182M plus F470N+F444W, F200W plus F356W). These filters will reveal the stellar population, spatial distribution, and outflow activity in the regions.
No extra special calibrations are needed.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	IRAS07299	RA: 07 32 9.7860 (113.0407750d) Dec: -16 58 12.15 (-16.97004d) Equinox: J2000		
Comments: *Category=Star* *Description=[Ejecta, Young stellar objects]* *Extended=YES*				
(2)	G339.88-1.26	RA: 16 52 4.6630 (253.0194292d) Dec: -46 08 33.88 (-46.14274d) Equinox: J2000		
Comments: *Category=Star* *Description=[Ejecta, Young stellar objects]* *Extended=YES*				

Observation

Proposal 3907, Observation 1: NIRCAM IRAS07299 Tue Oct 31 18:00:13 GMT 2023

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)	IRAS07299	RA: 07 32 9.7860 (113.0407750d) Dec: -16 58 12.15 (-16.97004d) Equinox: J2000		

Comments:
Category=Star
Description=[Ejecta, Young stellar objects]
Extended=YES

Template

NIRCam Imaging	NIRISS Imaging
Module: ALL	
Subarray: FULL	
Target Placement: B Short (on B4)	

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	6TIGHT		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	F162M+F150W2	F405N+F444W	SHALLOW2	6	1	6	6	1739.357	
2	F212N	F470N+F444W	SHALLOW2	6	1	6	6	1739.357	
3	F182M	F480M	SHALLOW2	6	1	6	6	1739.357	
4	F115W	F360M	SHALLOW2	3	1	6	6	773.047	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F158M		NIS	6	1	6	6	1610.516	
2	F356W		NIS	6	1	6	6	1610.516	
3	F480M		NIS	6	1	6	6	1610.516	
4	F200W		NIS	2	1	6	6	579.786	

Special Requirements	
	Aperture PA Range 24.05583529 to 114.05583529 Degrees (V3 24.0 to 114.0) Aperture PA Range 122.05583529 to 138.05583529 Degrees (V3 122.0 to 138.0) Aperture PA Range 145.05583529 to 155.05583529 Degrees (V3 145.0 to 155.0) Aperture PA Range 165.05583529 to 192.05583529 Degrees (V3 165.0 to 192.0) Aperture PA Range 199.05583529 to 202.05583529 Degrees (V3 199.0 to 202.0) Aperture PA Range 213.05583529 to 214.05583529 Degrees (V3 213.0 to 214.0) Aperture PA Range 226.05583529 to 234.05583529 Degrees (V3 226.0 to 234.0) Aperture PA Range 240.05583529 to 257.05583529 Degrees (V3 240.0 to 257.0) Aperture PA Range 262.05583529 to 282.05583529 Degrees (V3 262.0 to 282.0) Aperture PA Range 293.05583529 to 299.05583529 Degrees (V3 293.0 to 299.0) Aperture PA Range 309.05583529 to 18.05583529 Degrees (V3 309.0 to 18.0) No Parallel Attachments Fiducial Point Override NRCBS_FULL

Observation

Proposal 3907, Observation 2: NIRCAM G339

Tue Oct 31 18:00:13 GMT 2023

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)	G339.88-1.26	RA: 16 52 4.6630 (253.0194292d) Dec: -46 08 33.88 (-46.14274d) Equinox: J2000		

Comments:
Category=Star
Description=[Ejecta, Young stellar objects]
Extended=YES

Template

NIRCam Imaging

Module: ALL

Subarray: FULL

Target Placement: B Short (on B4)

NIRISS Imaging

Dithers

#	Primary Dither Type	Primary Dithers	Dither Size	Subpixel Positions	Coordinated Parallel Subpixel Selector	Dither Direct Images Primes
1	FULLBOX	6TIGHT		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	F162M+F150W2	F405N+F444W	SHALLOW2	6	1	6	6	1739.357	
2	F212N	F470N+F444W	SHALLOW2	6	1	6	6	1739.357	
3	F182M	F480M	SHALLOW2	6	1	6	6	1739.357	
4	F115W	F360M	SHALLOW2	3	1	6	6	773.047	

Spectral Elements

NIRISS Imaging	Filter	Grism	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F158M		NIS	6	1	6	6	1610.516	
2	F356W		NIS	6	1	6	6	1610.516	
3	F480M		NIS	6	1	6	6	1610.516	
4	F200W		NIS	2	1	6	6	579.786	

Special Requirements	
	Aperture PA Range 31.05583529 to 158.05583529 Degrees (V3 31.0 to 158.0) Aperture PA Range 172.05583529 to 173.05583529 Degrees (V3 172.0 to 173.0) Aperture PA Range 177.05583529 to 206.05583529 Degrees (V3 177.0 to 206.0) Aperture PA Range 216.05583529 to 21.05583529 Degrees (V3 216.0 to 21.0) No Parallel Attachments Fiducial Point Override NRCBS_FULL