



1258 - Structure, excitation, and proper motions in the symmetric HH212 jet

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
HH212 NIRCam imaging				
	1	HH212 mosaic (Position 1)	NIRCam Imaging	(2) HH212-POS1
	2	HH212 mosaic (Position 2)	NIRCam Imaging	(3) HH212-POS2

ABSTRACT

We will carry out NIRCam imaging covering the highly-symmetric young outflow HH212 over a field of ~ 6.1 arcmin x 3.5 arcmin. In shocked H₂, the jet is ~ 4 arcmin long. We will take images in six filters: two lines of shocked molecular hydrogen ($v=1-0$ S(1) at 2.12 microns, F212N; $v=0-0$ S(9) at 4.69 microns, F470N) & corresponding line+continuum filters (F210M & F460M), one line of CO (F466N), & one intermediate wavelength which includes another shocked H₂ line & continuum ($v=1-0$ S(0) at 3.23 microns, F335M).

Since our discovery of the jet in 1994, we have been conducting a variety of near-infrared and millimetre studies, and the JWST data will advance this work in four key ways:

First, the spatial resolution in the 2.12 micron line images will be ~ 5 x better than our best ground-based data (seeing limited at $\sim 0.3''$), and thus allow us to resolve small-scale shock details throughout the flow, from the inner knots to the large outer bowshocks.

Second, the 2022 date of the observations will add a further 15 years to the long baseline proper motion study (the last detailed VLT imaging was in 2007), and thus roughly double the precision and lower the detection threshold of the measurements of plane-of-the sky motions in the outflow.

Third, the complementary LW imaging in the H2 line at 4.69 micron will give a direct indication of the extinction in the flow by comparison with the 2.12 micron line: assuming an excitation temperature of $\sim 2000\text{K}$, the 2.12 micron/4.69 micron line ratio should be ~ 3 , although extinction may make the ratio smaller. The larger LW pixels will also help bring the effective sensitivities closer together.

Four, to test for CO emission in the outflow.

Version 4, submitted 2022-09-11

OBSERVING DESCRIPTION

We will carry out NIRCam imaging covering the highly-symmetric young outflow HH212 over a field of ~ 6.1 arcmin x 3.5 arcmin. In shocked H2, the jet is ~ 4 arcmin long. We will take images in six filters: two lines of shocked molecular hydrogen ($v=1-0$ S(1) at 2.12 microns, F212N; $v=0-0$ S(9) at 4.69 microns, F470N) & corresponding line+continuum filters (F210M & F460M), one line of CO (F466N), & one intermediate wavelength which includes another shocked H2 line & continuum ($v=1-0$ S(0) at 3.23 microns, F335M).

HH212 is an elongated protostellar outflow roughly 4 arcmin long, aligned at a PA of roughly 22 degrees E of N. It is symmetric in the inner parts, but there is one additional large bowshock to the SW. Hence the nominal mosaic centre is offset with respect to the central protostar to ensure that the whole jet is covered.

The aim is to make a full-covered mosaic of the jet in eight filters (SW: F201M, F212N, F212N, F164N; LW: F335M, F460M, F466N, F470N) with a mosaic & dither scheme designed to fill in the inter-SCA and inter-module gaps. The SHALLOW4 read-out mode is used with NGRPS=3, with 3 primary dithers & 2 sub-pixel dithers to yield an on-source integration time of 902 sec per position.

To align NIRCam's A & B modules perfectly along the jet axis, $V3PA = 292$ degrees is needed.

A combination of primary dithering INTRAMODULEX with 6 primary dithers and a small ROWS=1, COLUMNS=2 mosaic is then used to map the jet. The INTRAMODULEX primary dither fills the inter-SCA gaps both transverse to and along the flow. The 2 COLUMNS with an overlap of 84%

ensure that the large inter-module gap is filled along the length of the jet.

The same mosaic is made at two positions separated by $\sim 65''$ perpendicular to the jet axis, to ensure that the jet does not fall in the lower S/N inter-SCA gaps, and to increase the overall field, maximising the number of stars detected for accurate registration and proper motion measurements. The full coverage is then approximately 6.1 arcmin along the jet and 3.5 arcmin transverse to it.

No separate nearby blank sky observations are planned.

Proposal 1258 - Targets - Structure, excitation, and proper motions in the symmetric HH212 jet

	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
Fixed Targets	(2)	HH212-POS1	RA: 05 43 48.4931 (85.9520546d) Dec: -01 02 59.11 (-1.04975d) Equinox: J2000		
	<i>Comments:</i> Category=Unidentified Description=[Infrared sources] Extended=YES				
Fixed Targets	(3)	HH212-POS2	RA: 05 43 52.4673 (85.9686138d) Dec: -01 03 22.18 (-1.05616d) Equinox: J2000		
	<i>Comments:</i> Category=Unidentified Description=[Infrared sources] Extended=YES				

Proposal 1258 - Observation 1 - Structure, excitation, and proper motions in the symmetric HH212 jet

Tue Sep 20 22:00:55 GMT 2022

Observation	Proposal 1258, Observation 1: HH212 mosaic (Position 1) Diagnostic Status: Warning Observing Template: NIRCcam Imaging									
	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 1:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.									
Diagnosics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections			Miscellaneous			
	(2)	HH212-POS1	RA: 05 43 48.4931 (85.9520546d) Dec: -01 02 59.11 (-1.04975d) Equinox: J2000							
Comments: Category=Unidentified Description=[Infrared sources] Extended=YES										
Template	Module				Subarray					
	ALL				FULL					
Mosaic	Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order			
	1	2	95.0	84.0	0.0	0.0	DEFAULT			
Dithers	#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions				
	1	INTRAMODULEX	6	STANDARD		1				
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F212N	F470N+F444W	SHALLOW4	3	1	6	6	901.889	
	2	F212N	F466N+F444W	SHALLOW4	3	1	6	6	901.889	
	3	F164N+F150W2	F335M	SHALLOW4	3	1	6	6	901.889	
	4	F210M	F460M	SHALLOW4	3	1	6	6	901.889	

Proposal 1258 - Observation 1 - Structure, excitation, and proper motions in the symmetric HH212 jet

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 292 to 292 Degrees (V3 292.0713531 to 292.0713531)
Visits Same PA

Group Observations 1, 2, Non-interruptible

Proposal 1258 - Observation 2 - Structure, excitation, and proper motions in the symmetric HH212 jet

Tue Sep 20 22:00:55 GMT 2022

Observation	<p>Proposal 1258, Observation 2: HH212 mosaic (Position 2) Diagnostic Status: Warning Observing Template: NIRCcam Imaging</p>									
Diagnostics	<p>(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run. (Visit 2:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections			Miscellaneous			
	(3)	HH212-POS2	RA: 05 43 52.4673 (85.9686138d) Dec: -01 03 22.18 (-1.05616d) Equinox: J2000							
	<p><i>Comments:</i> Category=Unidentified Description=[Infrared sources] Extended=YES</p>									
Template	Module				Subarray					
	ALL				FULL					
Mosaic	Rows	Columns	Row Overlap %	Column Overlap %	Row shift	Column shift	Tile Order			
	1	2	95.0	84.0	0.0	0.0	DEFAULT			
Dithers	#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions				
	1	INTRAMODULEX	6	STANDARD		1				
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
	1	F212N	F470N+F444W	SHALLOW4	3	1	6	6	901.889	
	2	F212N	F466N+F444W	SHALLOW4	3	1	6	6	901.889	
	3	F164N+F150W2	F335M	SHALLOW4	3	1	6	6	901.889	
	4	F210M	F460M	SHALLOW4	3	1	6	6	901.889	

Proposal 1258 - Observation 2 - Structure, excitation, and proper motions in the symmetric HH212 jet

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 292 to 292 Degrees (V3 292.0713531 to 292.0713531)
Visits Same PA

Group Observations 1, 2, Non-interruptible