



## 4531 - HH211 Kinematics

Cycle: 3, 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>
HH211-NIRCAM-second epoch				
	1	NIRCAM 2nd epoch i maging of HH211	NIRCam Imaging	(1) HH211NIRCAM

**ABSTRACT**

This project is a combined effort of MIRI GTO team (PI G. Wright, WRIGHT\_4035-4036) and Dr. M. McCaughrean GTO (PI. McCaughrean, MCCAUGHREAN\_0401-0409, MCCAUGHREAN\_0501). Note that the original 0.5 hrs allocated time has been extended to 1.78 hrs, which includes 1.28 hrs from Dr. McCaughrean GTO and 0.5 hrs from Wright GTO. Drs. Wright and McCaughrean can confirm the new settings.

Outflows from young stars are dynamically complex systems. The velocities observed are a function not only of the outflow’s expansion into the surrounding cloud but also internal interactions, for example shocks caused by faster material catching up with slower gas and dust in the outflow ahead of it. Mapping the 3-D velocity structure can be done through a combination of radial velocity studies and proper motion (i.e. tangential velocities) monitoring.

While velocity studies have been carried out of the outflows from the least embedded young stars, considerably less is understood about the dynamics of outflows from the most embedded phase, which have yet to accrete much of their mass. Moreover, when proper motion data is available, e.g., with ALMA, it tends to be confined to the region closest to the source, and limited to reformed molecular species such as SiO, or it informs us about the outer outflows/winds (swept up material) and not the jet itself (matter ejected by the protostar).

We already have first epoch (from August 2022) dramatic high spatial resolution data for the molecular jet outflow from HH 211 and a variety of newly discovered embedded jets outflows in its vicinity, driven by nearby protostars.

Due to its high resolution, a second epoch NIRCAM set of images now, will reveal not only the tangential velocities of this system in unprecedented detail but also potentially subtle variations in brightness due to line cooling or heating. The analysis of ESO VLT data (H2 images at 2.12 m, taken 20 yrs ago) and our new JWST data already indicates tangential velocities of up to 100 km/s (or ~66 milliarcsec/yr; note that the system is almost edge-on, and so radial velocities are not important). This data however suffers from a factor of 10 poorer resolution, i.e., information is only available for “gross” structures and is confined to the farthest and less embedded jet.

The intention then is to map again the whole HH211 jet (and the many other protostellar jets in the FoV) using the NIRCAM F212N, F470N, 210M, F460M filters covering the H2 2.12- and 4.7-micron lines as well asof broad band filters (F150W+F356W and F200W+F444W) to get the best measurement of the continuum nebulosity in the region, providing an overall view of the flow and its interactions with its environment. Total requested time is then 1.78 hrs.

2024-12-30: Filter settings changed to F212N+F470N, F200W+F444W, F210M+F466N following discussions between team members

### **OBSERVING DESCRIPTION**

We will use same settings and pointing as for the first epoch NIRCAM imaging.

We aim at a second epoch narrow- and broad-band imaging of the whole HH211 jet (and the many other protostellar jets in the FoV) using the NIRCAM F212N, F470N, filters covering the H2 2.12- and 4.7-micron lines as well as a combination of broad band filters (F150W+F356W and F200W+F444W) to get the best measurement of the continuum nebulosity in the region, providing an overall view of the flow and its interactions with its environment.

The total exposure times of the two sets is 644s, 644s and 301s respectively. Total requested time is then 1.78 hrs.

# Proposal 4531 - Targets - HH211 Kinematics

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	HH211NIRCAM	RA: 03 43 56.4000 (55.9850000d) Dec: +32 01 55.10 (32.03197d) Equinox: J2000		
<i>Comments:</i> Category= <i>Unidentified</i> Description= <i>[Blank field]</i>					

Proposal 4531 - Observation 1 - HH211 Kinematics

Tue Dec 31 17:00:16 GMT 2024

<b>Observation</b>	<p><b>Proposal 4531, Observation 1: NIRCAM 2nd epoch imaging of HH211</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRCAM Imaging</p>									
<b>Diagnostics</b>	(Visit 1:1) 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>		
	(1)	HH211NIRCAM	RA: 03 43 56.4000 (55.9850000d) Dec: +32 01 55.10 (32.03197d) Equinox: J2000							
	<p><i>Comments:</i>                  Category=Unidentified                  Description=[Blank field]</p>									
<b>Template</b>	<b>Module</b>		<b>Subarray</b>			<b>Target Placement</b>				
	ALL		FULL			Module Gap				
<b>Dithers</b>	<b>#</b>	<b>Primary Dither Type</b>		<b>Primary Dithers</b>	<b>Subpixel Dither Type</b>		<b>Dither Size</b>	<b>Subpixel Positions</b>		
	1	INTRAMODULEX		4	STANDARD			1		
<b>Spectral Elements</b>	<b>#</b>	<b>Short Filter</b>	<b>Long Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Dithers</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	F212N	F470N+F444W	BRIGHT1	8	1	4	4	644.206	
	2	F200W	F444W	BRIGHT1	4	1	4	4	300.63	
	3	F210M	F466N+F444W	BRIGHT1	4	1	4	4	300.63	
<b>Special Requirements</b>	<p>Aperture PA Range 72 to 82 Degrees (V3 72.07457694 to 82.07457694)</p> <p>Aperture PA Range 250 to 260 Degrees (V3 250.07457694 to 260.07457694)</p>									