



## 4735 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Cycle: 3, Proposal Category: GO

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>
<b>Dr. Nathan Ross Sandford (PI) (CSA Member)</b>	<b>University of Toronto</b>
Dr. Daniel R. Weisz (CoI) (US Admin CoI)	University of California - Berkeley
Katie Sharpe (CoI)	University of California - Berkeley
Sal Wanying Fu (CoI)	University of California - Berkeley
Prof. David Weinberg (CoI)	The Ohio State University
Neige Frankel (CoI) (CSA Member)	Canadian Institute for Theoretical Astrophysics
Dr. Jo Bovy (CoI) (CSA Member)	University of Toronto
Dr. Andrew Eugene Dolphin (CoI)	Raytheon Company
Dr. Hans-Walter R Rix (CoI) (ESA Member)	Max Planck Institute for Astronomy
Dr. Alessandro Savino (CoI)	University of California - Berkeley
Dr. Meredith Durbin (CoI)	University of California - Berkeley

### OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
M31-Field1				
	1	Field1-PA18.5590-Phas eII-v3	NIRSpec MultiObject Spectroscopy	(12) M31-Phase2-MSA-Catalog-1
	3	Field1-Pre-Imaging	NIRCam Imaging	(2) M31-MSA-Catalog-1
M31-Field2				
	2	Field2-PA20.5132-Phas eII-v3	NIRSpec MultiObject Spectroscopy	(13) M31-Phase2-MSA-Catalog-2
	4	Field2-Pre-Imaging	NIRCam Imaging	(3) M31-MSA-Catalog-2
NGC 6171				

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
	5	NGC6171-PA239.6722-PhaseII-v4	NIRSpec MultiObject Spectroscopy	(15) NGC6171-Phase2-MSA-Catalog-v2

## ABSTRACT

We propose to use JWST/NIRSpec's unique capabilities to measure detailed chemical abundance patterns for hundreds of resolved red giant branch (RGB) stars in the inner regions ( $R < 14$  kpc) of M31's disk. We will target 2 fields at  $R \sim 3$  and 8 kpc, where the chemistry of stars encode information of both M31's in situ star formation and accretion history. Combined with an archival field at  $\sim 18$  kpc, these observations will provide a combined sample of  $>300$  M31 RGB stars for which  $[\text{Fe}/\text{H}]$ ,  $[\alpha/\text{Fe}]$ , and 8 other individual elements will be measured (Si, C, Mg, O, N, Ni, Mn, and Ti) to  $<0.1$  dex precision. These elements trace a variety of enrichment mechanisms, timescales, and nucleosynthetic pathways enabling science which, to date, has only been possible in the Milky Way. We will use these detailed abundance patterns to pursue a broad array of science including confirming the presence (or absence) of M31's  $[\alpha/\text{Fe}]$ -bimodality, mapping radial abundance trends, and measuring the efficiency of radial orbit migration and disk heating in M31. We will use parallel NIRCcam imaging to construct the deepest color-magnitude diagrams to date in M31's inner disk, from which we will measure the age-metallicity relationship back to 4-5 Gyr ago and search for evidence of an intense burst of star formation 2-4 Gyr ago. This program will fundamentally transform our understanding of M31 and other Lstar galaxies while further establishing NIRSpec as a premier facility for extragalactic stellar spectroscopy.

## OBSERVING DESCRIPTION

In this program, we will obtain NIRSpec MOS of  $\sim 200$  red giant branch (RGB) stars across two fields in M31's inner disk. The two targeted fields, located at radii of  $\sim 3$  and 8 kpc, were chosen to 1) fall within the PHAT multi-band imaging survey's footprint, 2) compliment existing NIRSpec observations at  $R \sim 18$  kpc, 3) avoid regions of high extinction or star formation, and 4) include a bright foreground star for wide aperture target acquisition (WATA) should it be necessary. In each field, we fill our masks preferentially with the brightest stars on the upper RGB ( $20.5 < F814W < 22$ ), which will have the highest S/N and most precise abundance. Imposing tight ( $<55$  mas) slit-centering constraints, we are able to target  $\sim 100$  RGB stars in each field. The remainder of the mask is filled with  $\sim 60$  "blank sky" shutters where we know no stars with  $F814W < 23$  exist in order to sample the background and unresolved disk of M31.

MSA target acquisition (MSATA) is preferred as it provides the best pointing accuracy and minimizes slit losses. However, if the M31 disk fields prove too crowded for MSATA, we have ensured a bright ( $14 < F814W < 15$ ) foreground star with Gaia photometry is available for WATA. In either case, we request confirmation imaging to quantify slit losses and improve the fidelity of RV measurements. Because the PHAT survey was conducted  $\sim 10$  years ago, we require NIRCcam pre-imaging for reliable astrometry for targetting and acquisition. This is especially important if

WATA must be used for acquisition. Pre-imaging will be taken in the F150W and F277W filters, utilising the FULLBOX 8NIRSPEC dither pattern and the BRIGHT1 readout pattern with 2 integration per dither and 5 groups per integration.

NIRSpec observations will be taken with the G140H/F100LP disperser-filter pair, providing 0.97-1.82 micron spectral coverage at  $R \sim 4000$ . At this modest resolution, measuring precise elemental abundances ( $<0.1$  dex) can be done with spectra of  $S/N > 30$  per pixel at 1.4 micron, which can be achieved for our faintest primary stars in  $\sim 5$  hours of integration. We will obtain 6 exposures split across a 3-point nod in both the dispersion and cross-dispersion directions (to mitigate detector effects and cosmic rays) and a sub-pixel dither in the dispersion direction (to improve spectral sampling). Each exposure will consist of 3 integrations of 14 groups, using the NRSIRS2 readout pattern. The median  $S/N$  of our primary sample will be  $\sim 60$  per pixel at 1.4 micron.

We will also take NIRSpec observations in the MW globular cluster NGC 6171 ( $[Fe/H] = -1.0$ ) using identical spectroscopic configuration, nod/dither patterns, and confirmation imaging strategy to validate and, if necessary, calibrate our measurement in M31. For these observations, we adopt a single MSA configuration and take 6 exposures, each with 1 integration of 4 groups. We will observe  $\sim 30$  stars brighter than  $F814W < 18$  for validation of our chemical abundance measurements against previous high-resolution spectroscopic studies and  $\sim 70$  fainter stars  $22 < F814W < 21$  (which won't saturate confirmation imaging) for quantifying the systematic velocity uncertainties associated with our observing strategy. We will achieve  $S/N > 100$  (5) per pixel at 1.4 micron for the bright (faint) sample. Targets will be selected from recent archival HST/ACS imaging.

NIRCam parallels will be acquired for the M31 observation in adjacent low-extinction regions of the disk to construct a robust SFH of M31's inner disk. To reach the 4 (5) Gyr MSTO in Field 1 (2), we obtain 6 sets of 3-point dithers split 2:1 between the F090W and F150W SW filters. Each exposure consist of 4 integrations and 4 groups/integration using the SHALLOW4 readout pattern. In the LW channel, we will obtain exposures split evenly between the F356W and F444W filters, which will be crowding limited at  $m=24$ . Orientation constraints ensure that all NIRSpec and NIRCam fields overlap with low-extinction regions of the PHAT survey footprint.

# Proposal 4735 - Targets - A Closer Look at the Formation and Evolution of M31's Inner Disk

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	M31-MSA-Catalog-1	RA: 00 43 45.5850 (10.9399375d) Dec: +41 31 55.46 (41.53207d) Equinox: J2000		
<i>Comments: Needs to be updated after pre-imaging.</i> <i>Description=[]</i>				
(3)	M31-MSA-Catalog-2	RA: 00 44 22.7879 (11.0949496d) Dec: +41 43 44.97 (41.72916d) Equinox: J2000		
<i>Comments: Needs to be updated after pre-imaging.</i> <i>Description=[]</i>				
(5)	WATA-Field1	RA: 00 43 52.8389 (10.9701621d) Dec: +41 32 25.34 (41.54037d) Equinox: J2000	Proper Motion RA: -2.752 mas/yr Proper Motion Dec: -3.444 mas/yr Epoch of Position: 2016	
<i>Comments: Gaia source: 381295312375701760</i> <i>Gmag = 15.267078</i>  <i>To be used for WATA in Field 1 if necessary.</i>  <i>This object was generated by the targetselector and retrieved from the 2MASS database.</i> <i>Magnitude and proper motions from Gaia DR3.</i> <i>Category=Star</i> <i>Description=[G stars]</i> <i>Extended=NO</i>				
(6)	WATA-Field2	RA: 00 44 29.6393 (11.1234971d) Dec: +41 44 2.69 (41.73408d) Equinox: J2000	Proper Motion RA: -0.664 mas/yr Proper Motion Dec: -0.993 mas/yr Epoch of Position: 2016	
<i>Comments: Gaia source: 381302837158390656</i> <i>Gmag = 15.387359</i>  <i>To be used for WATA in Field 2 if necessary.</i>  <i>This object was generated by the targetselector and retrieved from the 2MASS database.</i> <i>Magnitude and proper motions from Gaia DR3.</i> <i>Category=Star</i> <i>Description=[G stars]</i> <i>Extended=NO</i>				
(12)	M31-Phase2-MSA-Catalog-1	RA: 00 43 45.6964 (10.9404017d) Dec: +41 31 46.22 (41.52951d) Equinox: J2000		
<i>Comments:</i> <i>Description=[]</i>				
(13)	M31-Phase2-MSA-Catalog-2	RA: 00 44 22.7255 (11.0946896d) Dec: +41 43 32.60 (41.72572d) Equinox: J2000		
<i>Comments:</i> <i>Description=[]</i>				
(14)	NGC6171-Phase2-MSA-Catalog	RA: 16 32 31.8327 (248.1326363d) Dec: -13 03 13.60 (-13.05378d) Equinox: J2000		
<i>Comments:</i> <i>Description=[]</i>				

Fixed Targets

## Proposal 4735 - Targets - A Closer Look at the Formation and Evolution of M31's Inner Disk

(15)	NGC6171-Phase2-MSA- Catalog-v2	RA: 16 32 31.8327 (248.1326363d) Dec: -13 03 13.58 (-13.05377d) Equinox: J2000
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*Comments:*  
*Description=[]*

# Proposal 4735 - Observation 1 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Wed Jun 18 19:03:05 GMT 2025

<b>Observation</b>	<b>Proposal 4735, Observation 1: Field1-PA18.5590-PhaseII-v3</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRSpec MultiObject Spectroscopy Coordinated Parallel Template(s): NIRCcam Imaging <i>Comments: Primary science observations for inner M31 field (R ~ 3 kpc).</i>  <i>Confirmation images and MSATA images will be used to measure the precise location of stars in their slits.</i>  <i>Data excess is justified by 1) the need to acquire robust photometry (5 or more groups per integration) and avoid saturation in the NIRCcam parallels.</i>  <i>MAZ scheduling is justified by the need to take these observations after NIRCcam pre-imaging has been acquired.</i>																																																											
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<b>Acquisition</b>	<table border="1"> <thead> <tr> <th>NIRSpec MultiObject Spectroscopy</th> <th>Reference Star Bin</th> <th>Target</th> <th>Filter</th> <th>MSA Configuration</th> <th>Readout Pattern</th> <th>Groups/Int</th> <th>Integrations/Exp</th> <th>Total Integrations</th> <th>Total Exposure Time</th> <th>ETC Wkbk.Calc ID</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Filter: F110W; Readout: NRSRAPID; 8 sources in 4 quads; [ Optimal TA Accuracy ]</td> <td>SAME</td> <td>F110W</td> <td>Auto Acq MSA Config</td> <td>NRSRAPID</td> <td>3</td> <td>1</td> <td>4</td> <td>171.788</td> <td></td> </tr> </tbody> </table>										NIRSpec MultiObject Spectroscopy	Reference Star Bin	Target	Filter	MSA Configuration	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID	1	Filter: F110W; Readout: NRSRAPID; 8 sources in 4 quads; [ Optimal TA Accuracy ]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788																													
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<b>Template</b>	<b>NIRSpec MultiObject Spectroscopy</b>					<b>NIRCcam Imaging</b>																																																						
	TA Method: MSATA HFF Readout Mode: false Obtain Confirmation Images: After Target ACQ and New MSA Config Science Aperture: MSA Center Primary Candidate List: Field1-RGB (149382 sources) Filler Candidate List: Field1-AGB (6431 sources) Spectral Overlap Map: jwst-nirspec-g140h Spectral Overlap Threshold: 1.5					Module: ALL Subarray: FULL																																																						
<b>Reference Stars</b>	<table border="1"> <thead> <tr> <th>Visit</th> <th>ID</th> <th>RA</th> <th>Dec</th> <th>Magnitude</th> <th>Visit</th> <th>ID</th> <th>RA</th> <th>Dec</th> <th>Magnitude</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>477</td> <td>10.918238</td> <td>41.522442</td> <td>19.776949765846467</td> <td>1</td> <td>187361</td> <td>10.958900</td> <td>41.549450</td> <td>19.76194976584647</td> </tr> <tr> <td>1</td> <td>94666</td> <td>10.964503</td> <td>41.502380</td> <td>19.764949765846467</td> <td>1</td> <td>285114</td> <td>10.975112</td> <td>41.551379</td> <td>19.753949765846468</td> </tr> <tr> <td>1</td> <td>95630</td> <td>10.956232</td> <td>41.499599</td> <td>19.76194976584647</td> <td>1</td> <td>285359</td> <td>10.963887</td> <td>41.544066</td> <td>19.76394976584647</td> </tr> <tr> <td>1</td> <td>187250</td> <td>10.936024</td> <td>41.553354</td> <td>19.77794976584647</td> <td>1</td> <td>285364</td> <td>10.981752</td> <td>41.529764</td> <td>19.765949765846468</td> </tr> </tbody> </table>										Visit	ID	RA	Dec	Magnitude	Visit	ID	RA	Dec	Magnitude	1	477	10.918238	41.522442	19.776949765846467	1	187361	10.958900	41.549450	19.76194976584647	1	94666	10.964503	41.502380	19.764949765846467	1	285114	10.975112	41.551379	19.753949765846468	1	95630	10.956232	41.499599	19.76194976584647	1	285359	10.963887	41.544066	19.76394976584647	1	187250	10.936024	41.553354	19.77794976584647	1	285364	10.981752	41.529764	19.765949765846468
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Proposal 4735 - Observation 1 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Dithers	Dither Type										
	#	3-POINT-WITH-NIRCam-SIZE1									
Confirmation	NIRSpec MultiObject Spectroscopy	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time				
	1	c1	NRSIRS2RAPID	2	1	3	131.3				
	2	c2	NRSIRS2RAPID	2	1	3	131.3				
	3	c3	NRSIRS2RAPID	2	1	3	131.3				
Spectral Elements	NIRSpec MultiObject Spectroscopy	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	1	1 (G140H/F100LP)	c1		10.941860458333 334 Degrees 41.5307525 Degrees	18.559974486500 64	-0.1		3	3	3545.1
	2	1 (G140H/F100LP)	c1		10.941860458333 334 Degrees 41.5307525 Degrees	18.559962035257 428	0.1		3	3	3545.1
	3	1 (G140H/F100LP)	c2		10.941828833333 334 Degrees 41.530915555555 55 Degrees	18.559953835624 31	-0.1		3	3	3545.1
	4	1 (G140H/F100LP)	c2		10.941828833333 334 Degrees 41.530915555555 55 Degrees	18.559941384308 033	0.1		3	3	3545.1
	5	1 (G140H/F100LP)	c3		10.94179725 Degrees 41.531078333333 33 Degrees	18.559933211612 982	-0.1		3	3	3545.1
	6	1 (G140H/F100LP)	c3		10.94179725 Degrees 41.531078333333 33 Degrees	18.559920760223 836	0.1		3	3	3545.1
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	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	2	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	3	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	4	F090W	F444W	SHALLOW4	7	3	9	3	3349.872		
	5	F150W	F444W	SHALLOW4	7	3	9	3	3349.872		
	6	F150W	F444W	SHALLOW4	7	3	9	3	3349.872		

## Proposal 4735 - Observation 1 - A Closer Look at the Formation and Evolution of M31's Inner Disk

### Special Requirements

Aperture PA Range 250 to 25 Degrees (V3 111.4254303 to 246.42543030000002)  
No Parallel Attachments  
MSA Scheduled Aperture PA 18.5590 to 18.5590 Degrees (V3 239.98442 to 239.98442)  
1 After 3 by 60.0 Days to <None specified>

Proposal 4735 - Observation 3 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Wed Jun 18 19:03:05 GMT 2025

<b>Observation</b>	<p><b>Proposal 4735, Observation 3: Field1-Pre-Imaging</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRCcam Imaging</p> <p><i>Comments: Necessary pre-imaging for primary science observations.</i></p>									
<b>Diagnostics</b>	<p>(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 3:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>									
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>		<b>Miscellaneous</b>		
	(2)	M31-MSA-Catalog-1	RA: 00 43 45.5850 (10.9399375d) Dec: +41 31 55.46 (41.53207d) Equinox: J2000							
	<p><i>Comments: Needs to be updated after pre-imaging.</i></p> <p>Description=[]</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	FULLBOX		8NIRSPEC		STANDARD			2	
<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	F150W	F277W	BRIGHT1	7	1	16	16	2233.248	
<b>Special Requirements</b>	<p>Sequence Visits within 53.0 Days Visits Same PA</p> <p>1 After 3 by 60.0 Days to &lt;None specified&gt;</p>									

# Proposal 4735 - Observation 2 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Wed Jun 18 19:03:05 GMT 2025

<b>Observation</b>	<b>Proposal 4735, Observation 2: Field2-PA20.5132-PhaseII-v3</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRSpec MultiObject Spectroscopy Coordinated Parallel Template(s): NIRCcam Imaging <i>Comments: Primary science observations for middle M31 field (R ~ 8 kpc).</i>  <i>Confirmation images and MSATA images will be used to measure the precise location of stars in their slits.</i>  <i>Data excess is justified by 1) the need to acquire robust photometry (5 or more groups per integration) and avoid saturation in the NIRCcam parallels.</i>  <i>MAZ scheduling is justified by the need to take these observations after NIRCcam pre-imaging has been acquired.</i>																																																												
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(13)	M31-Phase2-MSA-Catalog-2	RA: 00 44 22.7255 (11.0946896d) Dec: +41 43 32.60 (41.72572d) Equinox: J2000																																																											
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Proposal 4735 - Observation 2 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Dithers	Dither Type										
	#	3-POINT-WITH-NIRCam-SIZE1									
Confirmation	NIRSpec MultiObject Spectroscopy	Confirmation Type	Conf. Readout Pattern	Conf. Groups/Int	Conf. Integrations/Exp	Conf. Total Integrations	Conf. Total Exposure Time				
	1	c1	NRSIRS2RAPID	2	1	3	131.3				
	2	c2	NRSIRS2RAPID	2	1	3	131.3				
	3	c3	NRSIRS2RAPID	2	1	3	131.3				
Spectral Elements	NIRSpec MultiObject Spectroscopy	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
	1	1 (G140H/F100LP)	c1		11.095279041666 664 Degrees 41.723301944444 444 Degrees	20.513593724829 274	-0.1		3	3	3545.1
	2	1 (G140H/F100LP)	c1		11.095279041666 664 Degrees 41.723301944444 444 Degrees	20.513581340166 274	0.1		3	3	3545.1
	3	1 (G140H/F100LP)	c2		11.095254791666 665 Degrees 41.723465833333 336 Degrees	20.513577906120 272	-0.1		3	3	3545.1
	4	1 (G140H/F100LP)	c2		11.095254791666 665 Degrees 41.723465833333 336 Degrees	20.513565521384 248	0.1		3	3	3545.1
	5	1 (G140H/F100LP)	c3		11.095230583333 333 Degrees 41.723629444444 45 Degrees	20.513562114383 486	-0.1		3	3	3545.1
	6	1 (G140H/F100LP)	c3		11.095230583333 333 Degrees 41.723629444444 45 Degrees	20.513549729574 88	0.1		3	3	3545.1
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	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	2	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	3	F090W	F356W	SHALLOW4	7	3	9	3	3349.872		
	4	F090W	F444W	SHALLOW4	7	3	9	3	3349.872		
	5	F150W	F444W	SHALLOW4	7	3	9	3	3349.872		
	6	F150W	F444W	SHALLOW4	7	3	9	3	3349.872		

## Proposal 4735 - Observation 2 - A Closer Look at the Formation and Evolution of M31's Inner Disk

### Special Requirements

Aperture PA Range 330 to 75 Degrees (V3 191.4254303 to 296.4254303)  
No Parallel Attachments  
MSA Scheduled Aperture PA 20.5132 to 20.5132 Degrees (V3 241.9386 to 241.9386)  
2 After 4 by 60.0 Days to <None specified>

Proposal 4735 - Observation 4 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Wed Jun 18 19:03:05 GMT 2025

<b>Observation</b>	<p><b>Proposal 4735, Observation 4: Field2-Pre-Imaging</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRCcam Imaging</p> <p><i>Comments: Necessary pre-imaging for primary science observations.</i></p>									
<b>Diagnostics</b>	<p>(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 4:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>									
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>		<b>Miscellaneous</b>		
	(3)	M31-MSA-Catalog-2	RA: 00 44 22.7879 (11.0949496d) Dec: +41 43 44.97 (41.72916d) Equinox: J2000							
	<p><i>Comments: Needs to be updated after pre-imaging.</i></p> <p>Description=[]</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	FULLBOX		8NIRSPEC	STANDARD			2		
<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	F150W	F277W	BRIGHT1	7	1	16	16	2233.248	
<b>Special Requirements</b>	<p>Sequence Visits within 53.0 Days Visits Same PA</p> <p>2 After 4 by 60.0 Days to &lt;None specified&gt;</p>									

Proposal 4735 - Observation 5 - A Closer Look at the Formation and Evolution of M31's Inner Disk

Wed Jun 18 19:03:05 GMT 2025

<b>Observation</b>	<b>Proposal 4735, Observation 5: NGC6171-PA239.6722-PhaseII-v4</b> <b>Diagnostic Status: Warning</b> Observing Template: NIRSpec MultiObject Spectroscopy <i>Comments: Validation/Calibration observations for NIRSpec chemical abundances and radial velocities.</i> <i>It is important that these observations follow the same nod/dither/acquisition strategy as the primary science observations.</i>										
	(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.										
<b>Diagnosics</b>											
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>			<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>		
	(15)	NGC6171-Phase2-MSA-Catalog-v2	RA: 16 32 31.8327 (248.1326363d) Dec: -13 03 13.58 (-13.05377d) Equinox: J2000								
<i>Comments: Description=[]</i>											
<b>Acquisition</b>	<b>#</b>	<b>Reference Star Bin</b>	<b>Target</b>	<b>Filter</b>	<b>MSA Configuration</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	Filter: F110W; Readout: NRSRAPID; 8 sources in 3 quads; [ Optimal TA Accuracy ]	SAME	F110W	Auto Acq MSA Config	NRSRAPID	3	1	4	171.788	
<b>Template</b>	<b>TA Method</b>	<b>HFF Readout Mode</b>	<b>Obtain Confirmation Images</b>	<b>Science Aperture</b>	<b>Primary Candidate List</b>	<b>Filler Candidate List</b>	<b>Spectral Overlap Map</b>	<b>Spectral Overlap Threshold</b>			
	MSATA	false	After Target ACQ and New MSA Config	MSA Center	NGC6171-Primary (976 sources)	NGC6171-Filler (10037 sources)	jwst-nirspec-g140h	1.5			
<b>Reference Stars</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	<b>Visit</b>	<b>ID</b>	<b>RA</b>	<b>Dec</b>	<b>Magnitude</b>	
	1	854	248.116978	-13.068278	19.84798934264966	1	4350	248.119242	-13.067157	19.883948286459876	
	1	2480	248.107938	-13.032712	19.858906595805855	1	10011	248.146421	-13.032137	20.041267437016838	
	1	2483	248.108231	-13.031963	19.991903928657848	1	11015	248.103889	-13.056649	19.770522484622397	
	1	2943	248.139568	-13.036424	19.88086791308068	1	11026	248.106093	-13.038288	20.061929493402715	
<b>Confirmation</b>	<b>#</b>	<b>Confirmation Type</b>		<b>Conf. Readout Pattern</b>	<b>Conf. Groups/Int</b>	<b>Conf. Integrations/Exp</b>		<b>Conf. Total Integrations</b>	<b>Conf. Total Exposure Time</b>		
	1	c1		NRSIRS2RAPID	2	1		1	43.767		
	2	c2		NRSIRS2RAPID	2	1		1	43.767		
	3	c3		NRSIRS2RAPID	2	1		1	43.767		

Proposal 4735 - Observation 5 - A Closer Look at the Formation and Evolution of M31's Inner Disk

	#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
<b>Spectral Elements</b>	1	1 (G140H/F100LP)	c1		248.12174512500 005 Degrees - 13.037533611111 087 Degrees	239.67463209546 978	-0.1		1	1	379.311
	2	1 (G140H/F100LP)	c1		248.12174512500 005 Degrees - 13.037533611111 087 Degrees	239.67463038277 975	0.1		1	1	379.311
	3	1 (G140H/F100LP)	c2		248.12165341666 667 Degrees - 13.037671944444 469 Degrees	239.67465311638 77	-0.1		1	1	379.311
	4	1 (G140H/F100LP)	c2		248.12165341666 667 Degrees - 13.037671944444 469 Degrees	239.67465140367 972	0.1		1	1	379.311
	5	1 (G140H/F100LP)	c3		248.12156166666 67 Degrees - 13.037810277777 794 Degrees	239.67467414678 384	-0.1		1	1	379.311
	6	1 (G140H/F100LP)	c3		248.12156166666 67 Degrees - 13.037810277777 794 Degrees	239.67467243405 784	0.1		1	1	379.311
<b>Special Requirements</b>	MSA Scheduled Aperture PA 239.6722 to 239.6722 Degrees (V3 101.097626 to 101.097626)										