



# 1268 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

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>
Observation Folder				
	1	MRK231-Nuc-MIRI	MIRI Medium Resolution Spectroscopy	(1) MRK231-NUC-MIRI
	2	MRK231-bg-MIRI	MIRI Medium Resolution Spectroscopy	(2) MRK231-BACKGROUND
	3	MRK231-Nuc-NIRSpec	NIRSpec IFU Spectroscopy	(4) MRK231-NUC-NIRSPEC
	4	MRK231-Shell-NIRSpec	NIRSpec IFU Spectroscopy	(3) MRK231-SHELL

## ABSTRACT

This is the MIRI+NIRSpec combined IFU spectroscopic observation of the nearest quasar Mrk231, tracing multiple diagnostics of the ISM (ionized gas, molecular hot/warm gas, and dust features) with the goal of characterizing the physical properties of the circumnuclear region (SF, stellar population, ISM properties) and of the quasar-driven outflow.

This proposal is associated with:

NIRSpec IFU Proposal ID: FERRUIT\_4510 and FERRUIT\_4511

MIRI Proposal ID: WRIGHT\_7505 and WRIGHT\_7506

## **OBSERVING DESCRIPTION**

NIRSpec observations:

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This part corresponds to NIRSpec IFU Proposal ID: FERRUIT\_4510 and FERRUIT\_4511

(NIRSpec contact Roberto Maiolino)

The NIRSpec IFU observation is performed both on the nucleus and on the an outflow shell located to the south of the nucleus.

Observations all obtained in all three bands, at high resolution to sample multiple spectra features distributed between 1 and 5 $\mu$ m.

For each position we adopt 4 dither positions.

No Target Acquisition is performed in this case: point-and-shoot should have a pointing accuracy good enough for our goals.

MIRI observations:

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This part corresponds to MIRI Proposal ID: WRIGHT\_7505 and WRIGHT\_7506

(MIRI contact Almudena Alonso-Herrero)

Observation is done in all four channels.

We plan fast target acquisition.

Only the nucleus of Mrk231 is targeted (no observation on the southern shell), with a 4 points dither.

However, we also obtain an offset position to sample the background, with only one position (no dithers)

Proposal 1268 - Targets - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	MRK231-NUC-MIRI	RA: 12 56 14.2344 (194.0593100d) Dec: +56 52 25.25 (56.87368d) Equinox: J2000		
<p><i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>  <i>Category=Galaxy</i>  <i>Description=[Infrared galaxies]</i>  <i>Extended=YES</i></p>				
(2)	MRK231-BACKGROUND	RA: 12 56 10.9000 (194.0454167d) Dec: +56 52 35.50 (56.87653d) Equinox: J2000		
<p><i>Comments:</i>  <i>Category=Calibration</i>  <i>Description=[Telescope/sky background]</i>  <i>Extended=YES</i></p>				
(3)	MRK231-SHELL	RA: 12 56 14.0660 (194.0586083d) Dec: +56 52 21.38 (56.87261d) Equinox: J2000		
<p><i>Comments: Southern shell</i>  <i>Category=Galaxy</i>  <i>Description=[Active galactic nuclei]</i></p>				
(4)	MRK231-NUC-NIRSPEC	RA: 12 56 14.2344 (194.0593100d) Dec: +56 52 25.25 (56.87368d) Equinox: J2000		
<p><i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>  <i>Category=Galaxy</i>  <i>Description=[Infrared galaxies]</i>  <i>Extended=YES</i></p>				

Fixed Targets

Proposal 1268 - Observation 1 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Tue Mar 14 23:01:22 GMT 2023

<b>Observation</b>	<b>Proposal 1268, Observation 1: MRK231-Nuc-MIRI</b> <b>Diagnostic Status: Warning</b> Observing Template: MIRI Medium Resolution Spectroscopy Background Observations:[MRK231-bg-MIRI (Obs 2)]												
	(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.												
<b>Fixed Targets</b>	#	Name	Target Coordinates		Targ. Coord. Corrections				Miscellaneous				
	(1)	MRK231-NUC-MIRI	RA: 12 56 14.2344 (194.0593100d) Dec: +56 52 25.25 (56.87368d) Equinox: J2000										
Comments: This object was generated by the targetselector and retrieved from the NED database. Category=Galaxy Description=[Infrared galaxies] Extended=YES													
<b>Acquisition</b>	#	Target											
	1	NONE											
<b>Template</b>	AcqFilter	Primary Channel			Simultaneous Imaging				Imager Subarray				
	F560W	ALL			YES				SUB256				
<b>Dithers</b>	#	Dither Type			Optimized For				Direction				
	1	4-Point			EXTENDED SOURCE				NEGATIVE				
<b>Spectral Elements</b>	#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/E xp	Exposures/Dit h	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1		IMAGER	F1130W	FASTR1	11	4	1	Dither 1	4	16	56.31	
	1	LONG(C)	MRSLONG		FASTR1	11	4	1	Dither 1	4	16	521.708	
	1	LONG(C)	MRSSHORT		FASTR1	11	4	1	Dither 1	4	16	521.708	
	2		IMAGER	F770W	FASTR1	11	4	1	Dither 1	4	16	56.31	
	2	MEDIUM(B)	MRSLONG		FASTR1	11	4	1	Dither 1	4	16	521.708	
	2	MEDIUM(B)	MRSSHORT		FASTR1	11	4	1	Dither 1	4	16	521.708	
	3		IMAGER	F560W	FASTR1	11	4	1	Dither 1	4	16	56.31	
	3	SHORT(A)	MRSLONG		FASTR1	11	4	1	Dither 1	4	16	521.708	
	3	SHORT(A)	MRSSHORT		FASTR1	11	4	1	Dither 1	4	16	521.708	

Proposal 1268 - Observation 1 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Special Requirements

Sequence Observations 1, 2, Non-interruptible  
Sequence Observations 1, 2, 3, 4 within 30 Days

Proposal 1268 - Observation 2 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Tue Mar 14 23:01:22 GMT 2023

<b>Observation</b>	<b>Proposal 1268, Observation 2: MRK231-bg-MIRI</b> <b>Diagnostic Status: Warning</b> Observing Template: MIRI Medium Resolution Spectroscopy Background Observation For: [MRK231-Nuc-MIRI (Obs 1)]												
	(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.												
<b>Fixed Targets</b>	#	<b>Name</b>	<b>Target Coordinates</b>				<b>Targ. Coord. Corrections</b>			<b>Miscellaneous</b>			
	(2)	MRK231-BACKGROUND	RA: 12 56 10.9000 (194.0454167d) Dec: +56 52 35.50 (56.87653d) Equinox: J2000										
<i>Comments:</i> <i>Category=Calibration</i> <i>Description=[Telescope/sky background]</i> <i>Extended=YES</i>													
<b>Acquisition</b>	#	<b>Target</b>											
	1	NONE											
<b>Template</b>	<b>AcqFilter</b>	<b>Primary Channel</b>				<b>Simultaneous Imaging</b>			<b>Imager Subarray</b>				
	F560W	ALL				YES			SUB256				
<b>Dithers</b>	#	<b>Dither Type</b>				<b>Optimized For</b>			<b>Direction</b>				
	1	2-Point				EXTENDED SOURCE			NEGATIVE				
<b>Spectral Elements</b>	#	<b>Wavelength Range</b>	<b>Detector</b>	<b>Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/E xp</b>	<b>Exposures/Dit h</b>	<b>Dither</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1		IMAGER	F1130W	FASTR1	11	4	1	Dither 1	2	8	28.155	
	1	LONG(C)	MRSLONG		FASTR1	11	4	1	Dither 1	2	8	260.854	
	1	LONG(C)	MRSSHORT		FASTR1	11	4	1	Dither 1	2	8	260.854	
	2		IMAGER	F770W	FASTR1	11	4	1	Dither 1	2	8	28.155	
	2	MEDIUM(B)	MRSLONG		FASTR1	11	4	1	Dither 1	2	8	260.854	
	2	MEDIUM(B)	MRSSHORT		FASTR1	11	4	1	Dither 1	2	8	260.854	
	3		IMAGER	F560W	FASTR1	11	4	1	Dither 1	2	8	28.155	
	3	SHORT(A)	MRSLONG		FASTR1	11	4	1	Dither 1	2	8	260.854	
	3	SHORT(A)	MRSSHORT		FASTR1	11	4	1	Dither 1	2	8	260.854	

Proposal 1268 - Observation 2 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Special Requirements

Sequence Observations 1, 2, Non-interruptible  
Sequence Observations 1, 2, 3, 4 within 30 Days

Proposal 1268 - Observation 3 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Tue Mar 14 23:01:22 GMT 2023

<b>Observation</b>	<p><b>Proposal 1268, Observation 3: MRK231-Nuc-NIRSpec</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRSpec IFU Spectroscopy</p>											
<b>Diagnostics</b>	(Visit 3:1) 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>			
	(4)	MRK231-NUC-NIRSPEC	RA: 12 56 14.2344 (194.0593100d) Dec: +56 52 25.25 (56.87368d) Equinox: J2000									
	<p><i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Infrared galaxies]</i></p> <p><i>Extended=YES</i></p>											
<b>Template</b>	<b>TA Method</b>											
	NONE											
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>		<b>Size</b>	<b>Starting Point</b>			<b>Number of Points</b>	<b>Points</b>			
	1	4-POINT-DITHER										
<b>Spectral Elements</b>	<b>#</b>	<b>Grating/Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Leakcal</b>	<b>Dither</b>	<b>Autocal</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	G140H/F100LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
	2	G235H/F170LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
	3	G395H/F290LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
<b>Special Requirements</b>	Sequence Observations 1, 2, 3, 4 within 30 Days											

Proposal 1268 - Observation 4 - NIRSpec & MIRI Integral-Field Spectroscopy of the Nucleus of Mrk 231

Tue Mar 14 23:01:22 GMT 2023

<b>Observation</b>	<p><b>Proposal 1268, Observation 4: MRK231-Shell-NIRSpec</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Observing Template: NIRSpec IFU Spectroscopy</p>											
<b>Diagnostics</b>	(Visit 4:1) 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>			
	(3)	MRK231-SHELL	RA: 12 56 14.0660 (194.0586083d) Dec: +56 52 21.38 (56.87261d) Equinox: J2000									
	<p><i>Comments: Southern shell</i></p> <p><i>Category=Galaxy</i></p> <p><i>Description=[Active galactic nuclei]</i></p>											
<b>Template</b>	<b>TA Method</b>											
	NONE											
<b>Dithers</b>	<b>#</b>	<b>Dither Type</b>		<b>Size</b>	<b>Starting Point</b>			<b>Number of Points</b>	<b>Points</b>			
	1	4-POINT-DITHER										
<b>Spectral Elements</b>	<b>#</b>	<b>Grating/Filter</b>	<b>Readout Pattern</b>	<b>Groups/Int</b>	<b>Integrations/Exp</b>	<b>Leakcal</b>	<b>Dither</b>	<b>Autocal</b>	<b>Total Dithers</b>	<b>Total Integrations</b>	<b>Total Exposure Time</b>	<b>ETC Wkbk.Calc ID</b>
	1	G140H/F100LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
	2	G235H/F170LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
	3	G395H/F290LP	NRSIRS2RAPI D	15	1	false	true	NONE	4	4	933.689	
<b>Special Requirements</b>	Sequence Observations 1, 2, 3, 4 within 30 Days											