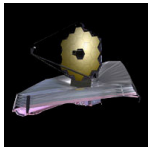

8391 - A Triad Mystery: Deciphering a Triple Broad-Line Radio AGN System at Kpc Separation with JWST

Cycle: 4, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
NIRSpec				
	1	J1423-CoreA	NIRSpec IFU Spectroscopy	(1) J1423-CoreA
	2	J1423-CoreB	NIRSpec IFU Spectroscopy	(2) J1423-CoreB
	3	J1423-CoreC	NIRSpec IFU Spectroscopy	(3) J1423-CoreC
NIRCam				
	4	J1423+6358	NIRCam Imaging	(1) J1423-CoreA

ABSTRACT

We propose NIRSpec IFU and NIRCam imaging to conclusively establish the triple AGN nature of a galaxy merger, theoretically predicted but never before discovered --- until now. Ancillary multi-wavelength observations (e.g., X-ray, optical, and radio) have provided promising evidence that suggest the presence of a triple broad-line and radio-emitting AGN within an ongoing merger system at z = 0.13; however, definitive confirmation requires further proof in the dust-obscured gas close to the supermassive black holes. The combination of unparalleled sensitivity and spatial resolution of JWST is vital for resolving the closely separated nuclei and detecting the broad component of H recombination line or highly ionized

line emission. With NIRSpec IFU data, we will validate the triple AGN nature, estimate black hole masses, and resolve the gas kinematics that resulted from the triple merger dynamics; on the other hand, NIRCam will deliver multi-band, high-resolution images, enabling an unprecedented decomposition of the AGNs and their host galaxy in this complex merger and chracterization of the resolved spectral energy distributions. JWST will deliver this final piece of the puzzle to the Triad Mystery and reveal the first triple AGN system at kiloparsec separations, which will serve as the benchmark for future searches and investigations of three-body merger systems.

OBSERVING DESCRIPTION

This proposal requests 6.0-hour NIRSpec IFU and 3.3-hour NIRCam imaging observations on a triple-AGN. We propose a separate NIRSpec IFU pointing on each nucleus with the G235H/F170LP grating/filter to resolve the broad Pa emission line, which is the identifier of AGN activity. For core A and B, we adopt 60 groups/integration and 1 integration/exposure, which yields the total exposure time of 3560 s for the 4-point dithering and an SNR of ~20 at the wavelength of Pa emission line. For the brighter core C, we adopt 45 groups/integration and 1 integration/exposure to achieve a similar SNR with a total 2684 s exposure time. The total charged time of NIRSpec was 21769 s (~6.0 hr) but reduced to 4.1 hours after running Smart Accounting.

We also propose NIRCam imaging observations with F277W, F356W, and F444W filters in short-wavelength channel and F277W, F356W, and F444W in long-wavelength channel to perform host galaxy decomposition and SED fitting. We choose to use only module B without primary dithering as the FoV of a single detector is sufficient for the triple AGN system. We employ a standard subpixel dither with the subpixel position N = 4 to enhance the PSF sampling and mitigate bad pixels. Adopting 5 groups/integration and 1 integration/exposure, the total exposure time is 2061 s for four exposures per filter, and the SNR is above 200 for all six bands with the MEDIUM8 readout pattern, sufficient for the host galaxy decomposition. The total charged time for NIRCam is 11758 s (~3.3 hr) including the overhead time.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	J1423-CoreA	RA: 14 23 14.3927 (215.8099696d) Dec: +63 58 3.74 (63.96771d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the NED database. *Category=Galaxy* *Description=[Active galactic nuclei, Active galaxies]* *Extended=YES*				
(2)	J1423-CoreB	RA: 14 23 14.6904 (215.8112100d) Dec: +63 58 5.02 (63.96806d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the NED database. *Category=Galaxy* *Description=[Active galactic nuclei, Active galaxies]* *Extended=YES*				
(3)	J1423-CoreC	RA: 14 23 13.5120 (215.8063000d) Dec: +63 58 8.04 (63.96890d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the NED database. *Category=Galaxy* *Description=[Active galactic nuclei, Active galaxies]* *Extended=YES*				

Observation

Proposal 8391, Observation 1: J1423-CoreA

Tue Feb 03 22:01:51 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

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)	J1423-CoreA	RA: 14 23 14.3927 (215.8099696d) Dec: +63 58 3.74 (63.96771d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=Galaxy
Description=[Active galactic nuclei, Active galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G235H/F170LP	NRSIRS2RAPID	60	1	false	true	NONE	4	4	3559.689	223202.6

Observation

Proposal 8391, Observation 2: J1423-CoreB

Tue Feb 03 22:01:51 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

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)	J1423-CoreB	RA: 14 23 14.6904 (215.8112100d) Dec: +63 58 5.02 (63.96806d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=Galaxy
Description=[Active galactic nuclei, Active galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G235H/F170LP	NRSIRS2RAPID	60	1	false	true	NONE	4	4	3559.689	223202.7

Observation

Proposal 8391, Observation 3: J1423-CoreC

Tue Feb 03 22:01:51 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	J1423-CoreC	RA: 14 23 13.5120 (215.8063000d) Dec: +63 58 8.04 (63.96890d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=Galaxy
Description=[Active galactic nuclei, Active galaxies]
Extended=YES

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-DITHER				

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	G235H/F170LP	NRSIRS2RAPID	45	1	false	true	NONE	4	4	2684.356	223202.8

Observation

Proposal 8391, Observation 4: J1423+6358

Tue Feb 03 22:01:51 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Diagnostics

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	J1423-CoreA	RA: 14 23 14.3927 (215.8099696d) Dec: +63 58 3.74 (63.96771d) Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=Galaxy
Description=[Active galactic nuclei, Active galaxies]
Extended=YES

Template

Module	Subarray
B	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		4

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
1	F070W	F277W	MEDIUM8	5	1	4	4	2061.46	223202.17
2	F115W	F356W	MEDIUM8	5	1	4	4	2061.46	223202.16
3	F200W	F444W	MEDIUM8	5	1	4	4	2061.46	223202.15

Special Requirements

Offset 38.0 arcsec, 38.0 arcsec