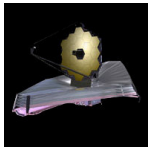

4611 - Baselines: Revealing the central extended emision of Circinus with interferometric mode

Cycle: 3, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
Dr. Enrique Lopez-Rodriguez (PI)	**Stanford University**
Dr. Robert Nikutta (CoI)	NOIRLab - (AZ)
Julien Girard (CoI)	Space Telescope Science Institute
Dr. Ryan M Lau (CoI)	NOIRLab - (AZ)
Deepashri Thatte (CoI)	Space Telescope Science Institute
Dr. Matthew J Hankins (CoI)	Arkansas Tech University
Dr. Joel Sanchez Bermudez (CoI)	Universidad Nacional Autonoma de Mexico (UNAM)
Dra. Omaira Gonzalez-Martin (CoI)	Institute of Radio Astronomy and Astrophysics - UNAM
Dr. Ismael Garcia Bernete (CoI) (ESA Member)	University of Oxford

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Circinus: NIRISS AMI				
	1	Circinus PA1	NIRISS Aperture Masking Interferometry	(1) Circinus
	2	HD119164 PA1	NIRISS Aperture Masking Interferometry	(2) HD119164
	3	Circinus PA2	NIRISS Aperture Masking Interferometry	(1) Circinus
	4	HD119164 PA2	NIRISS Aperture Masking Interferometry	(2) HD119164
	5	Circinus PA3	NIRISS Aperture Masking Interferometry	(1) Circinus
	6	HD119164 PA3	NIRISS Aperture Masking Interferometry	(2) HD119164

ABSTRACT

The dusty and molecular torus is one of the most elusive structures in active galactic nuclei (AGN), yet its importance is unequivocal for understanding the effects of accretion and feedback during galaxy evolution and provides constraints for theoretical models of galaxy formation. NIR observations are sensitive to the hot dust (1500-500K), which traces the inner edge of the torus, and/or the base of torus walls or dusty winds. Surprisingly, the measured 3-5um excess emission in AGN since first observed in the early ’90s still remains a mystery. This observed NIR excess is thought to arise from hot dusty winds, hot graphite dust within the torus and the broad line region, and/or residual starlight from the host galaxy. Thus, the identification of the physical structure and/or mechanism producing the NIR excess will allow us to connect the accretion disk with the reservoir of gas feeding it.

JWST NIRISS Aperture Masking Interferometry (AMI) can provide resolved 3.8-4.8um images of the dusty environments within the central 10 pc in nearby Seyfert galaxies. NIRISS AMI improves the angular resolution by a factor of two (0.07" vs. 0.14" at 4.3um), while minimizing the PSF artifacts shown by NIRCAM. The possibility of unveiling the hot (1500-500 K) dusty material within the central 0.1” of AGN relies on making NIRISS AMI a user-friendly and standard observing mode of JWST for the AGN community. This proposal requests 3.8-4.8um NIRISS AMI observations to provide unprecedented 1.8-2.2pc-scale resolved observations of the central 10pc in Circinus. These observations will reveal the location and physical properties of the NIR excess emission measured in Seyfert galaxies.

OBSERVING DESCRIPTION

Steps per visit:

- PSF (HD 119164):
  - set NRM in AMIBRIGHT, NISRAPID, and F480M
  - perform target acquisition
  - set SUB80 detection readout in NISRAPID mode (dither: NONE) - Take exposure at F480M
  - Take exposure at F430M
  - Take exposure at F380M
- Circinus:
  - NRM in AMIBRIGHT, NISRAPID, and F480M
  - perform target acquisition
  - set SUB80 detection readout in NISRAPID mode (dither: NONE) - Take exposure at F480M
  - Take exposure at F430M

- Take exposure at F380M
- The PSF is observed using the same sequence as the science target. The observation of the PSF is linked with science target observations using GROUP NON-INITTERRUPTIVE special requirement.

These steps will be performed at three different PAs, in the sequence: - Visit 1 at PA1
- Visit 2 at PA2 = PA1 + 45+/-15deg.
- Visit 3 at PA3 = PA1 + 90+/-15deg.
- These observations are linked using V3 PA Offset special requirement.

The observations will use the AMI-specific SUB80 80x80 subarray with the NISRAPID readout patterns. The target and calibrator will be observed without dithers. The maximum fraction of saturation is 0.07 and 0.17 for PSF and target, respectively during the target acquisition.

NOTE about Offsets using AMIBRIGHT: The JWST Documentation (https://jwst-docs.stsci.edu/jwst-near- infrared-imager-and-slitless-spectrograph/niriss-observing-strategies/niriss-ami-recommended- strategies#NIRISSAMIRecommendedStrategies-TargetAcquisition) mentions that there is an offset when using AMIBRIGHT from the central pixel. The recommendation is 'to place a target in the pixel center for the F480M filter after using the AMIBRIGHT TA mode, a user can add an OFFSET special requirement of -0.0045 arcsec in X, +0.013 arcsec in Y. Alternately, a single OFFSET of +0.013 arcsec in Y applied to an observation using multiple filters would improve target centering overall'.
--> Our observations use multiple filters, we are requesting a single offset of +0.013 arcsec in Y to apply to the observations of the PSF and Circinus.

Proposal 4611 - Targets - Baselines: Revealing the central extended emision of Circinus with interferometric mode

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Circinus	RA: 14 13 9.9060 (213.2912750d) Dec: -65 20 20.47 (-65.33902d) Equinox: J2000	Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Galaxy* *Description=[Active galactic nuclei, Seyfert galaxies]* *Extended=YES*				
(2)	HD119164	RA: 13 43 14.4239 (205.8100996d) Dec: -61 42 32.63 (-61.70906d) Equinox: J2000	Proper Motion RA: -8.83 mas/yr Proper Motion Dec: -4.272999899512797 mas/yr Epoch of Position: 2000	
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. *Category=Calibration* *Description=[Photometric, Point spread function, Target acquisition test, Telescope/sky background]* *Extended=NO*				

Observation

Proposal 4611, Observation 1: Circinus PA1

Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

Diagnostics

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

(Circinus PA1 (Obs 1)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Circinus	RA: 14 13 9.9060 (213.2912750d) Dec: -65 20 20.47 (-65.33902d) Equinox: J2000	Epoch of Position: 2000	

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

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

HD119164 PA1 (Obs 2) (PSF Reference; Filters [F380M, F430M, F480M])

Additional Justification: false

Special Requirements	No Parallel Attachments Group Observations 1, 2, Non-interruptible V3 PA Offset 3 from 1 by 30 to 60 Degrees (Same offsets in Aperture) V3 PA Offset 5 from 1 by 75 to 105 Degrees (Same offsets in Aperture)

Observation

Proposal 4611, Observation 2: HD119164 PA1

Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

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)	HD119164	RA: 13 43 14.4239 (205.8100996d)	Proper Motion RA: -8.83 mas/yr	
		Dec: -61 42 32.63 (-61.70906d)	Proper Motion Dec: -4.272999899512797 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Calibration
Description=[Photometric, Point spread function, Target acquisition test, Telescope/sky background]
Extended=NO

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

PSF Reference: true

Special Requirements	
	No Parallel Attachments Group Observations 1, 2, Non-interruptible

Observation

Proposal 4611, Observation 3: Circinus PA2 Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

Diagnostics

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

(Circinus PA2 (Obs 3)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Circinus	RA: 14 13 9.9060 (213.2912750d) Dec: -65 20 20.47 (-65.33902d) Equinox: J2000	Epoch of Position: 2000	

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

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

HD119164 PA2 (Obs 4) (PSF Reference; Filters [F380M, F430M, F480M])

Additional Justification: false

Special Requirements	No Parallel Attachments Group Observations 3, 4, Non-interruptible V3 PA Offset 3 from 1 by 30 to 60 Degrees (Same offsets in Aperture) V3 PA Offset 5 from 3 by 30 to 60 Degrees (Same offsets in Aperture)

Observation

Proposal 4611, Observation 4: HD119164 PA2

Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

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
(2)	HD119164	RA: 13 43 14.4239 (205.8100996d)	Proper Motion RA: -8.83 mas/yr	
		Dec: -61 42 32.63 (-61.70906d)	Proper Motion Dec: -4.272999899512797 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Calibration
Description=[Photometric, Point spread function, Target acquisition test, Telescope/sky background]
Extended=NO

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

PSF Reference: true

Special Requirements	
	No Parallel Attachments Group Observations 3, 4, Non-interruptible

Observation

Proposal 4611, Observation 5: Circinus PA3

Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

Diagnostics

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Circinus PA3 (Obs 5)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	Circinus	RA: 14 13 9.9060 (213.2912750d) Dec: -65 20 20.47 (-65.33902d) Equinox: J2000	Epoch of Position: 2000	

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

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

HD119164 PA3 (Obs 6) (PSF Reference; Filters [F380M, F430M, F480M])

Additional Justification: false

Special Requirements	No Parallel Attachments Group Observations 5, 6, Non-interruptible V3 PA Offset 5 from 1 by 75 to 105 Degrees (Same offsets in Aperture) V3 PA Offset 5 from 3 by 30 to 60 Degrees (Same offsets in Aperture)

Observation

Proposal 4611, Observation 6: HD119164 PA3

Thu Jun 20 20:00:11 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRISS Aperture Masking Interferometry

Diagnostics

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	HD119164	RA: 13 43 14.4239 (205.8100996d)	Proper Motion RA: -8.83 mas/yr	
		Dec: -61 42 32.63 (-61.70906d)	Proper Motion Dec: -4.272999899512797 mas/yr	
		Equinox: J2000	Epoch of Position: 2000	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Calibration
Description=[Photometric, Point spread function, Target acquisition test, Telescope/sky background]
Extended=NO

Acquisition

#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	AMIBRIGHT	F480M	NISRAPID	3	1	1	0.202	133619

Template

Subarray	Direct Image
SUB80	false

Dithers

#	Primary Dithers	Subpixel Positions
1	NONE	NONE

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F480M	NISRAPID	4	145	1	145	57.664	133619
2	F380M	NISRAPID	4	338	1	338	134.416	133619
3	F430M	NISRAPID	5	190	1	190	89.893	133619

PSF References

PSF Reference: true

Special Requirements	
	No Parallel Attachments Group Observations 5, 6, Non-interruptible