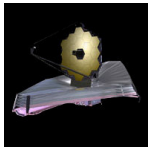

2677 - Mapping the Aromatic Smoke from the Superwind of the Archetypal Starburst M82

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	1		NIRSpec MultiObject Spectroscopy	(1) M-82
	2		NIRSpec MultiObject Spectroscopy	(1) M-82
	3		NIRSpec MultiObject Spectroscopy	(1) M-82
	4	Repeat of Observation 3	NIRSpec MultiObject Spectroscopy	(1) M-82
	11	Repat of Visit 1:1	NIRSpec MultiObject Spectroscopy	(1) M-82

ABSTRACT

The detection of PAH emission in galaxy halos or superwinds provides valuable insight into the destruction and survival of PAHs in hostile environments. The archetypal starburst, superwind galaxy M82 is an ideal laboratory for exploring these processes, not only because of the widespread detection of PAH emission all around the galaxy, but also because of the puzzling spatial variations of the PAH spectral profiles. More specifically, AKARI/IRC low-resolution observations have shown that in the plane of M82 the 3.4 micron aliphatic C--H feature is much weaker than the 3.3 micron aromatic C--H feature; in contrast, in the superwind the 3.4 micron feature supercedes the 3.3 micron feature. This is puzzling because in the harsh superwind environment PAHs would be easily stripped off any aliphatic sidegroups and not expected to show strong aliphatic

emission. Also, if PAHs in the superwind are indeed highly aliphatic as suggested by the strong 3.4 micron emission, it is puzzling why the 6.85 and 7.25 micron aliphatic C--H deformation bands are not seen in the Spitzer/IRS spectra of M82.

We propose to map the PAH emission bands at 3--5 micron on a number of representative regions along the M82 superwind structures with the NIRSpec Mullti-Object Spectroscopy at a spectral resolution R~1000. Combined with the previous Spitzer/IRS spectral mapping of this galaxy at 5--35 micron, we will be able to explore the PAH size and chemical structural (i.e., aromatic vs. aliphatic) properties and their spatial variations in M82 and gain insight into their origin, destruction and survival.

OBSERVING DESCRIPTION

We propose JWST/NIRSpec MOS spectroscopic observations to study the PAH emission features at 3--5 micron on a number of representative regions along the M82 superwind structures, from the center to both the southern and northern halos as well as the outer-edges of the plane. The G395M/F290LP disperser-filter combination is adopted to cover the wavelength range of 2.9--5.1 micron at a spectral resolution of 1000. To increase the sampling efficiency on the sky, the pre-defined long slit MSA configuration on Q4 Field Point 2 is selected. We have introduced ten visits with different spatial offsets and/or position angles to sample the radial profiles of the PAH features along three directions (five visits with V3=200-220 degrees, three visits with V3=270-300 degrees and two visits with V3=230-250 degrees). Depending on the slit location, we use different readout patterns (NRSIRS2RAPID for Visits 1:3, 2:2 and 3:2, and NRSIRS2 for the others) and exposure times for different visits (see details in the Observation Folder in the APT file). There is no need for target acquisition.

Proposal 2677 - Targets - Mapping the Aromatic Smoke from the Superwind of the Archetypal Starburst M82

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Observation

Proposal 2677, Observation 1

Wed Feb 15 00:00:54 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 1:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
NONE	No	Q4 Field Point 2			jwst-nirspec-mr	1.5

Spectral Elements

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
1	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.9899060372659		-800.0	1	2	2946.956
2	1 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.999679605711		-400.0	1	1	1473.478
3	3 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.0			1	1	160.478
4	1 (G395M/F290LP)	Q4 Field Point 2 Long Slit			3.112940968640599E-4		400.0	1	1	1473.478
5	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.010036182958192297		800.0	1	2	2946.956

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 338.493301 to 358.493301 Degrees (V3 199.91752585 to 219.91752585)
Visits Same PA

Observation

Proposal 2677, Observation 2

Wed Feb 15 00:00:54 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(Visit 2:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
NONE	No	Q4 Field Point 2			jwst-nirspec-mr	1.5

Spectral Elements

#	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 (G395M/F290LP)	Q4 Field Point 2 Long Slit			5.484640071242616E-4		450.0	1	2	2946.956
2	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.99999999999994		0.0	1	1	160.478
3	1 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.9994434393069		-450.0	1	2	2946.956

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 48.493301 to 78.493301 Degrees (V3 269.91752585 to 299.91752585)
Visits Same PA

Observation

Proposal 2677, Observation 3 Wed Feb 15 00:00:54 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

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

(Visit 3:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
NONE	No	Q4 Field Point 2			jwst-nirspec-mr	1.5

Spectral Elements

#	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 (G395M/F290LP)	Q4 Field Point 2 Long Slit			5.4846400712426 16E-4		450.0	1	1	1473.478
2	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.0			1	1	160.478

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 8.493301 to 28.493301 Degrees (V3 229.91752585 to 249.91752585)
Visits Same PA

Observation

Proposal 2677, Observation 4: Repeat of Observation 3

Wed Feb 15 00:00:54 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

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

(Visit 4:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
NONE	No	Q4 Field Point 2			jwst-nirspec-mr	1.5

Spectral Elements

#	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 (G395M/F290LP)	Q4 Field Point 2 Long Slit			5.4846400712426 16E-4		450.0	1	1	1473.478
2	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.0			1	1	160.478

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 8.493301 to 28.493301 Degrees (V3 229.91752585 to 249.91752585)
Visits Same PA

Observation

Proposal 2677, Observation 11: Repat of Visit 1:1

Wed Feb 15 00:00:54 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec MultiObject Spectroscopy

Diagnostics

(Visit 11:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 11:2) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 11:3) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 11:4) Warning (Form): Overheads are provisional until the Visit Planner has been run.
(Visit 11:5) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	M-82	RA: 09 55 52.4300 (148.9684583d) Dec: +69 40 46.93 (69.67970d) Equinox: J2000	Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=Galaxy
Description=[Starburst galaxies]

Template

TA Method	Obtain Confirmation Images	Science Aperture	Primary Candidate List	Filler Candidate List	Spectral Overlap Map	Spectral Overlap Threshold
NONE	No	Q4 Field Point 2			jwst-nirspec-mr	1.5

Spectral Elements

#	Exposure Specification	MSA Configuration	Nod Pattern	Pointing	Aperture PA	Dispersion Offset (Shutters)	Cross-Dispersion Offset (Shutters)	Total Dithers	Total Integrations	Total Exposure Time
1	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.9899060372659		-800.0	1	2	2946.956
2	1 (G395M/F290LP)	Q4 Field Point 2 Long Slit			359.999679605711		-400.0	1	1	1473.478
3	3 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.0			1	1	160.478
4	1 (G395M/F290LP)	Q4 Field Point 2 Long Slit			3.1129409686405 99E-4		400.0	1	1	1473.478
5	2 (G395M/F290LP)	Q4 Field Point 2 Long Slit			0.0100361829581 92297		800.0	1	2	2946.956

Special Requirements

Group Visits within 53.0 Days
Aperture PA Range 338.493301 to 358.493301 Degrees (V3 199.91752585 to 219.91752585)
Visits Same PA