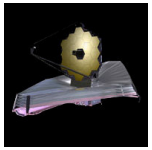

6377 - When worlds collide: formation and evolution of a synestia

Cycle: 3, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
MIRI MRS 1				
	1	MRS all bands 1	MIRI Medium Resolution Spectroscopy	(1) ASASSN--21qj
MIRI MRS 2				
	2	MRS all bands 2	MIRI Medium Resolution Spectroscopy	(1) ASASSN--21qj

ABSTRACT

We propose to confirm and characterise a candidate 'synestia', the self luminous remnant produced by a collision that occurred in 2019 between two ice giant exoplanets orbiting a Sun-like star, ASASSN-21qj. The unique sensitivity of JWST at thermal infrared wavelengths will enable the direct detection and spectral identification of chemical species in this post-impact body.

Our science goals are:

- Confirm the identification of the phenomena observed in ASASSN-21qj as a post-impact remnant.
- Constrain the mass and composition of the synestia by measuring the time evolution of its spectral energy distribution.
- Quantify the presence of water vapour, silicates and/or other refractory materials in the synestia's photosphere with medium resolution spectroscopy.

OBSERVING DESCRIPTION

We will observe the star ASASSN-21qj and its orbiting synestia that is formed out of a recent collision between planetary mass objects. Our goal is to observe the decay in flux as the synestia dissipates and cools down, thus we request the same set of observations at two epochs separated by about 3 months. Each set of observations will cover the 4.8-28.8 micron range with the four channels of the MIRI Medium Resolution Spectrometer.
We set a "Before Date" and "After date" constraint for the fist and second sets of observations respectively to ensure they are separated by at least 3 months.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	ASASSN--21qj	RA: 08 15 23.2863 (123.8470263d) Dec: -38 59 23.19 (-38.98978d) Equinox: J2000	Proper Motion RA: -9.692 mas/yr Proper Motion Dec: 7.349 mas/yr Parallax: 0.00176313505" Epoch of Position: 2016	
Comments: Target coordinates pulled from Gaia ESA archive (Gaia DR3) 08h15m23.28633256s -38d59m23.18687749s Category=Star Description=[G dwarfs] Extended=NO				
(2)	TA-target	RA: 08 15 21.4280 (123.8392833d) Dec: -38 59 41.01 (-38.99473d) Equinox: J2000	Proper Motion RA: -2.360 mas/yr Proper Motion Dec: -5.159 mas/yr Parallax: 0.00106700943" Epoch of Position: 2016	
Comments: Gaia DR3 5539970601632030208 Target coordinates pulled from Gaia ESA archive (Gaia DR3) 08h15m21.42800705s -38d59m41.00970402s VOSA fit Teff=3500K Category=Star Description=[M stars] Extended=NO				

Observation

Proposal 6377, Observation 1: MRS all bands 1 Fri Oct 18 18:00:10 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: Data excess for MRS is over the middle threshold. As justified in our (approved) change request to add all previously requested NIRSpec time into the MIRI observations, we require the higher signal to noise to detect the fainter synestia, and therefor to reach our science goals. Adjusting the setup to be below the middle threshold would counteract this.

Diagnostics

(Visit 1:1) Warning (Form): Data Excess over middle threshold

(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)	ASASSN--21qj	RA: 08 15 23.2863 (123.8470263d)	Proper Motion RA: -9.692 mas/yr	
		Dec: -38 59 23.19 (-38.98978d)	Proper Motion Dec: 7.349 mas/yr	
		Equinox: J2000	Parallax: 0.00176313505"	
			Epoch of Position: 2016	

Comments: Target coordinates pulled from Gaia ESA archive (Gaia DR3)
08h15m23.28633256s -38d59m23.18687749s
Category=Star
Description=[G dwarfs]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	2 TA-target	F560W	FAST	8	1	1	22.2	220970

Template

Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F770W	FASTR1	75	2	1	Dither 1	4	8	1676.124	
1	SHORT(A)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
1	SHORT(A)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
2		IMAGER	F1000W	FASTR1	75	2	1	Dither 1	4	8	1676.124	
2	MEDIUM(B)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
2	MEDIUM(B)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
3		IMAGER	F1130W	FASTR1	75	2	1	Dither 1	4	8	1676.124	
3	LONG(C)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
3	LONG(C)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970

Special Requirements	Before Date 16-DEC-2024:00:00:00

Observation

Proposal 6377, Observation 2: MRS all bands 2 Fri Oct 18 18:00:10 GMT 2024

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Comments: Data excess for MRS is over the middle threshold. As justified in our (approved) change request to add all previously requested NIRSpec time into the MIRI observations, we require the higher signal to noise to detect the fainter synestia, and therefor to reach our science goals. Adjusting the setup to be below the middle threshold would counteract this.

Simultaneous imaging switched off to decrease excess and overhead

Diagnostics

(Visit 2:1) Warning (Form): Data Excess over middle threshold

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	ASASSN--21qj	RA: 08 15 23.2863 (123.8470263d)	Proper Motion RA: -9.692 mas/yr	
		Dec: -38 59 23.19 (-38.98978d)	Proper Motion Dec: 7.349 mas/yr	
		Equinox: J2000	Parallax: 0.00176313505"	
			Epoch of Position: 2016	

Comments: Target coordinates pulled from Gaia ESA archive (Gaia DR3)
08h15m23.28633256s -38d59m23.18687749s
Category=Star
Description=[G dwarfs]
Extended=NO

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	2 TA-target	F560W	FAST	8	1	1	22.2	220970

Template

Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
All MRS	YES	FULL	Allow Auto Reorder

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	POINT SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1		IMAGER	F770W	FASTR1	50	1	1	Dither 1	4	4	555.008	
1	SHORT(A)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
1	SHORT(A)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
2		IMAGER	F770W	FASTR1	50	1	1	Dither 1	4	4	555.008	
2	MEDIUM(B)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
2	MEDIUM(B)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
3		IMAGER	F770W	FASTR1	50	1	1	Dither 1	4	4	555.008	
3	LONG(C)	MRSLONG		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970
3	LONG(C)	MRSSHORT		FASTR1	127	5	1	Dither 1	4	20	7093.002	220970

Special Requirements	After Date 03-APR-2025:00:00:00