

# 1349 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Rayet Binary

Cycle: 1, Proposal Category: ERS

# **INVESTIGATORS**

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# **OBSERVATIONS**

Folder	Observation	Label	Observing Template	Science Target
WR 140	) - MRS			
	1	WR 140 Offset 1	MIRI Medium Resolution Spectroscopy	(2) WR140-OFFSET-1
	10	WR 140 Offset 2	MIRI Medium Resolution Spectroscopy	(3) WR140-OFFSET-2
	2	WR 140 MRS CAL	MIRI Medium Resolution Spectroscopy	(4) WR140MRSCAL
WR 140	) - MIRI Imager			
	8	WR 140 - MIRI Imager	MIRI Imaging	(1) WR140
	58	WR 140 - MIRI Imager	MIRI Imaging	(1) WR140
WR 137	7 - AMI			

JWST Proposal 1349 (Created: Monday, July 25, 2022 at 12:00:13 PM Eastern Standard Time) - Overview

Folder	Observation	Label	Observing Template	Science Target
	3	WR 137 AMI Dither	NIRISS Aperture Masking Interferometry	(5) WR137
	4	WR 137 AMI PSF REF Dither	NIRISS Aperture Masking Interferometry	(6) WR137AMIREFPSF
	5	WR 137 AMI PSF REF Stare	NIRISS Aperture Masking Interferometry	(6) WR137AMIREFPSF
	6	WR 137 AMI Stare	NIRISS Aperture Masking Interferometry	(5) WR137
	53	WR 137 AMI Dither	NIRISS Aperture Masking Interferometry	(5) WR137
	54	WR 137 AMI PSF REF Dither	NIRISS Aperture Masking Interferometry	(6) WR137AMIREFPSF

## **ABSTRACT**

Dust is a key ingredient in the formation of stars and planets. However, the dominant channels of dust production throughout cosmic time are still unclear. With its unprecedented sensitivity and spatial resolution in the mid-IR, the James Webb Space Telescope (JWST) is the ideal platform to address this issue by investigating the dust abundance, composition, and production rates of various dusty sources. In particular, colliding-wind Wolf-Rayet (WR) binaries are efficient dust producers in the local Universe, and likely existed in the earliest galaxies. We purpose JWST observations of the colliding-wind binaries WR 140 and WR 137 to investigate dust composition, abundance, and formation mechanisms in this dust-forming colliding-wind process. We will utilize three key JWST observing modes with the medium-resolution spectrometer (MRS) and imager on the Mid-Infrared Instrument (MIRI) and the Aperture Masking Interferometry (AMI) mode with the Near Infrared Imager and Slitless Spectrograph (NIRISS).

Our proposed observations will yield high impact scientific results on the dust forming properties WR binaries, and establish a benchmark for key observing modes for imaging bright sources with faint extended emission. This will be valuable in various astrophysical contexts including mass-loss from evolved stars, dusty tori around active galactic nuclei, and protoplanetary disks. We are committed to designing and delivering science-enabling products for the JWST community that address technical issues such as bright source artifacts that will limit the maximum achievable image contrast.

(NoI Ref. #180)

## **OBSERVING DESCRIPTION**

We will perform a total of 17.4 hours of MIRI MRS and Imager observations of the dust-forming Wolf-Rayet (WR) binary WR 140 and NIRISS/AMI observations of the dust-forming WR binary WR 137. These observations include two calibrators for each instrument mode: HD

JWST Proposal 1349 (Created: Monday, July 25, 2022 at 12:00:13 PM Eastern Standard Time) - Overview 193090 and HD 228337.

In the MIRI MRS mode, we will obtain the full 5 - 28 micron spectral coverage (Ch1 - Ch4) of WR 140 out to 3 fossil dust arcs. We will perform MRS observations at two pointings: one offset from WR 140 by 0.4 arcseconds, and one offset by 2.7 arcseconds to cover the bright regions in the 1st, 2nd, and 3rd fossil dust arcs. Both MRS pointings will utlize the 4-point dither pattern optimzed for extended sources.

We will observe a mid-IR PSF reference star selected from the JMMC stellar diameter catalog (Bourges et al. 2017) with a nearly identical 12 micron flux as WR 140. Comparing the spectra from the reference star and WR 140 will allow us to differentiate the artifacts and the bright source from faint extended emission around WR 140. Importantly, HD 193090 is located within 2 degrees of WR 140, which requires only a ~5 min JWST slew overhead. We will perform the same dither pattern as our central WR 140 pointing but with a shorter exposure time per dither position.

In the MIRI Imager mode, we will perform short, several minute-long exposures with the F770W, F1500W, and F2100W filters centered on WR 140 using the 4-point dither strategy optimized for extended sources. Although the bright central source of WR 140 and possibly the 1st and 2nd dust arcs will saturate the Imager, we will be able to probe out to 7 or more fossil dust arcs with the Imager sensitivity and field of view in the "FULL" subarray mode.

In the NIRISS/AMI mode, we propose F380M and F480M observations of WR 137 in a 4-point dither and undithered mode. At the anticipated timing of Cycle 1 ERS, WR 137 will be exhibiting enhanced dust-formation due to the orbital confirguration of the central binary system and thus provides an ideal target for NIRISS/AMI to achieve our science and technical goals. The goal of performing the two different observations will be to investigate and attempt to mitigate the NIRISS/AMI persistence effects from bright sources. We will perform dithered and undithered ("stare" mode) with the same on-source exposure time. Both modes have advantages and disadvantages for imaging the faint emission around WR 137. With no dithers, WR 137 will remain in the same position on the detector and persistence will therefore not significantly affect the resulting data. However, bad pixels on the detector cannot be corrected. The 4-point primary dither mode will allow us to remove the bad pixels but persistent images from the bright central source of WR 137 will affect the image reconstruction. One of our goals in this proposal is to determine which method is best suited for performing observations of faint extended emission around bright sources. Additionally, we will investigate how to calibrate for the persistence in the dithered observations. After the last "stare" observation, we will take two short exposure direct images with the F380M and F480M filters.

We will observe a PSF calibrator of similar 3.8 and 4.8 micron flux as the bright central core of WR 137 with NIRISS/AMI in order to characterize the interferometric transfer function and ultimately for the reconstruction of WR 137. Our PSF calibrator, HD 228337, will be observed in the same

JWST Proposal 1349 (Created: Monday, July 25, 2022 at 12:00:13 PM Eastern Standard Time) - Overview dither and no-dither observations that we plan for WR 137 with the same exposure depth to compare the persistence effects.

Proposal 1349 - Targets - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Rayet Bi...

- 0	#	Name	Target Coordinates	Targ. Coord. Corrections	Signals in the Glare of a Wolf-Rayet Bi  Miscellaneous
	(1)	WR140	RA: 20 20 27.9761 (305.1165671d) Dec: +43 51 16.28 (43.85452d) Equinox: J2000		
	Comments: T Category=St Description= Extended=Y	tar =[WC stars]	the target selector and retrieved from the SIMBAD database.		
	(2)	WR140-OFFSET-1	RA: 20 20 27.9851 (305.1166046d) Dec: +43 51 15.90 (43.85442d) Equinox: J2000		
	Comments: 1 Category=St Description= Extended=Yt	=[WC stars]			
	(3)	WR140-OFFSET-2	RA: 20 20 27.7812 (305.1157550d) Dec: +43 51 13.05 (43.85363d) Equinox: J2000		
argets	Category=St Description= Extended=Y	=[WC stars]			
Fixed Targets	(4)	WR140MRSCAL	RA: 20 16 35.9811 (304.1499212d) Dec: +45 20 20.87 (45.33913d) Equinox: J2000		
	K5III Star (V Category=C	MIRI MRS PSF calibrator for V3 = 3.454 mag) alibration =[Point spread function] O	•		
	(5)	WR137	RA: 20 14 31.7632 (303.6323467d) Dec: +36 39 39.51 (36.66098d) Equinox: J2000	Proper Motion RA: -2.2621618417001282E time/yr Proper Motion Dec: -0.00566300000173214 Epoch of Position: 2015.5	
	Comments: T Category=St Description= Extended=Yt	ar	the targetselector and retrieved from the SIMBAD database.		
	(6)	WR137AMIREFPSF	RA: 20 12 57.8919 (303.2412162d) Dec: +35 45 46.45 (35.76290d) Equinox: J2000	Proper Motion RA: -5.562111937378841E-time/yr Proper Motion Dec: -0.00410100001317914 Epoch of Position: 2015.5	
	0.952 Degree Category=C	WI = 5.290, W2 = 5.223 es from WR137 alibration =[Point spread function]		,	

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Acquisition	# 1 Primary Channel		-		FAST Simulta		4		is/Exp	1 Imager Subarray			
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<u>Prc</u>	posal 1349 - Observation 1 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra
Requiremen	Sequence Observations 1, 10, Non-interruptible Same Aperture PA 1, 2
Special	

<u>Pro</u>	oposal 134	9 - Obser	<u>vation 10 -</u>	- Establis	hing Extre	me Dynami	<u>ic Range w</u>	ith JWST:	Decodin	g Smoke Si	gnals in th	e Glare o	f a Wolf-R
Ľ	Proposal 1349	Observation 10	0: WR 140 Offse	et 2								Mon Jul 25 17	7:00:13 GMT 2022
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l š	2	MEDIUM(B)	MRSSHORT		FASTR1	60	5	1	Dither 1	4	20	3374.449	
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Ī	3	LONG(C)	MRSLONG		FASTR1	60	5	1	Dither 1	4	20	3374.449	
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ou	_	, Observation 2:	WR 140 MRS	S CAL								Mon Jul 25 1	7:00:13 GMT 2022
ati	Diagnostic Sta	tus: Warning											
Observation	Observing Ten	nplate: MIRI Med	lium Resolution	n Spectroscopy									
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Diagnostics	(Visit 2:1) War	rning (Form): Ov	erheads are pro	visional until the	Visit Planner ha	as been run.							
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te	Primary Chan	ınel			Simult	taneous Imaging	g			Imager Subarray			
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nts	1		IMAGER	F560W	FASTR1	60	1	1	Dither 1	4	4	666.01	
me	1	SHORT(A)	MRSLONG		FASTR1	60	1	1	Dither 1	4	4	666.01	
<u> e</u>	1	SHORT(A)	MRSSHORT		FASTR1	60	1	1	Dither 1	4	4	666.01	
=	2		IMAGER	F1000W	FASTR1	60	1	1	Dither 1	4	4	666.01	
tra	2	MEDIUM(B)	MRSLONG		FASTR1	60	1	1	Dither 1	4	4	666.01	
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ě			77.4.677	F2100W	EACED 1	<i>c</i> 0	1	1	D:41 1	4	4	666.01	
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<u>Pro</u>	oposal 1349 - Observation 2 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra
Requirements	Same Aperture PA 1, 2
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Pro	posal 1349 - Observati	on 8 - Establ	ishing Extre	eme Dynamic	Range with	ı JWST	: Decoding Si	moke Signals	in the Glare of	of a Wolf-Ra
Ľ	Proposal 1349, Observation 8: WR	140 - MIRI Imager							Mon Jul 25	17:00:13 GMT 2022
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Įĕ	Observing Template: MIRI Imaging									
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Observation										
Diagnostics	(Visit 8:1) Warning (Form): Overhead	ds are provisional un	til the Visit Planne	r has been run.						
	# Name	Target Co	ordinates		Targ. Co	ord. Correc	tions	Miscella	neous	
Targets	(1) WR140		27.9761 (305.116	5671d)	<b> </b>					
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be	Comments: This object was generated	*		om the SIMBAD data	base.					
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rs	# Dither Type	Starting Poin	t Number o	f Points Points	Starting	g Set	Number of Sets	Optimized For	Direction	Pattern Size
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قا								SOURCE		
Spectral Elements	# Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithe	rs Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
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I≗	2 F1500W	FASTR1	43	1	1	Dither 1	12	12	1431.921	
٦	3 F2100W	FASTR1	43	1	1	Dither 1	12	12	1431.921	
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<u>Pr</u>	oposal 1349 - Observatio	n 58 - Estab	lishing Extr	eme Dynam	ic Range wi	th JWS	T: Decoding S	Smoke Signal	s in the Glare	of a Wolf-R
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Įặ	Diagnostic Status: Warning									
ĮΞ	Observing Template: MIRI Imaging									
l se										
Observation										
Diagnostics	(Visit 58:1) Warning (Form): Overhead	ls are provisional un	til the Visit Planne	er has been run.						
Т	# Name	Target Coo	ordinates		Targ. Coo	rd. Correc	tions	Miscella	neous	
Targets	(1) WR140		27.9761 (305.1165	6671d)						
Įě			1 16.28 (43.85452)							
<u> </u>		Equinox: J2	2000							
Fixed	Comments: This object was generated le Category=Star Description=[WC stars] Extended=YES	by the target selector	r and retrieved fro	m the SIMBAD datai	base.					
Template	Subarray FULL									
S	# Dither Type	Starting Point	Number of	Points Points	Starting	Set	Number of Sets	Optimized For	Direction	Pattern Size
Dithers	1 4-Point-Sets				5		3	EXTENDED SOURCE	POSITIVE	DEFAULT
ents	# Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithe	rs Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
إ	1 F770W	FASTR1	43	1	1	Dither 1	12	12	1431.921	
	2 F1500W	FASTR1	43	1	1	Dither 1	12	12	1431.921	
a l	3 F2100W	FASTR1	43	1	1	Dither 1	12	12	1431.921	
Spectral Elements										

<u>Pro</u>	posal 13	349 - Observatior	n 3 - Establishir	ng Extreme D	ynamic Ran	ge with	JWST:	Decoding S	Smoke Sign	als in the Glare	of a Wolf-Ra	
		349, Observation 3: WR 13									25 17:00:13 GMT 2022	
Ιij	Diagnostic S	Status: Warning										
Observation	Observing T	Cemplate: NIRISS Aperture	Masking Interferometry									
Se												
lö												
Diagnostics		Varning (Form): Overheads	•		ı run.							
۱.,	#	Name	Target Coordina			Targ. Coord				scellaneous		
Targets	(5) WR137		RA: 20 14 31.7632 (303.6323467d) Dec: +36 39 39.51 (36.66098d)			Proper Motion time/yr	on RA: -2.	2621618417001282	2E-4 sec of			
Ta'	Equinox: J2000		- (	I			.005663000001732	144 arcsec/yr				
<u>ي</u> ا						Epoch of Position: 2015.5						
Fixed	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Category=Star											
I۳	Description=  w \cdot stars											
-	Extended=Y	Target	Acquisition Mode	Elton	Readout Pattern	Groups/Ir		Integrations/Exp	Total Integrat	ions Total Exposure	ETC Wkbk.Calc	
Acquisition	#	Target	Acquisition wode	rittei	Readout Fattern	Groups/ii		integrations/Exp	Total Integrat	Time	ID ID	
İsi	1	SAME	AMIBRIGHT	F480M	NISRAPID	5		1	1	0.293	50283.1	
l 항												
_												
l ag	Subarray					Direct Image						
I쁄	SUB80					false						
Template												
Dithers	#			Primary Dit	hers			Sul	ppixel Positions			
le ipe	1			4				NO	NE			
ă												
	#	Filter	Readout Patter	n Groups/Int	Integrat	ions/Exp	Total Di	ithers Tot	al Integrations	<b>Total Exposure Time</b>	ETC Wkbk.Calc ID	
l e	1	F480M	NISRAPID	4	400		4	160	0	636.288	50283	
e I	2	F380M	NISRAPID	2	680		4	272	0	671.296	50283	
፱												
ra												
Spectral Elements												
Sp												
0,												

<u>Pr</u>	oposal 1349 - Observation 3 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra
ď	WR 137 AMI PSF REF Dither (Obs 4) (PSF Reference; Filters [F380M, F480M])
rences	Additional Justification: false
1	
Refe	
L C	
Δ	
Į ų	5 After 3
1 2	6 After 3 Sequence Observations 3, 4, Non-interruptible
1 8	
ŀ	
Requirements	
<u>.</u>	
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Special	

Pro	posal 13	349 - Observation	4 - Establishir	ng Extreme D	ynamic Ran	ge with	JWST	: Decoding S	Smoke Signa	als in the Glare	of a Wolf-Ra		
		49, Observation 4: WR 137									25 17:00:13 GMT 2022		
Ιĕ	Diagnostic S	Status: Warning											
ٳ	Observing T	emplate: NIRISS Aperture M	asking Interferometry										
Observation													
ŏ													
Diagnostics		Varning (Form): Overheads ar	•		ı run.								
ي ا	#	Name	Target Coordin			Targ. Coor				ellaneous			
Targets	(6)	WR137AMIREFPSF	RA: 20 12 57.89 Dec: +35 45 46.4		Proper Moti time/yr	on RA: -5	.5621119373788411	E-5 sec of					
ā	Equinox: J2000				Proper Motion Dec: -0.004101000013179146 arcsec/yr								
٦	·					Epoch of Position: 2015.5							
Fixed	Comments: W1 = 5.290, W2 = 5.223 0.952 Degrees from WR137												
l۳	Category=Calibration  Description=[Point spread function]												
-	#	Target	Acquisition Mode	Filtor	Readout Pattern	Groups/I	nt	Integrations/Exp	Total Integration	ons Total Exposure	ETC Wkbk.Calc		
Acquisition	TT .	Target	Acquisition would	Thei	Keadout I attern	G10ups/1		megrations/Exp	Total Integratio	Time	ID ID		
l isi	1	SAME	AMIBRIGHT	F480M	NISRAPID	5		1	1	0.293	50283.6		
l 향													
Ĭ													
ite	Subarray					Direct Image							
[출	SUB80					false							
Template													
	#			Primary Dit	hers			Sul	pixel Positions				
Dithers	1			4				NO	NE				
)ts	#	Filter	Readout Patter	n Groups/Int	Integrat	ions/Exp	Total D	ithers Tot	al Integrations	Total Exposure Time	ETC Wkbk.Calc ID		
e l	1	F480M	NISRAPID	7	255		4	102		636.48	50283		
le l	2	F380M	NISRAPID	2	680		4	272	0	671.296	50283		
1 =													
tra													
Spectral Elements													
လွ													

<u>Pro</u>	oposal 1349 - Observation 4 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra
PSF References	PSF Reference: true
Special Requirements	

Pro	posal 13	349 - Observation	5 - Establishir	ng Extreme D	ynamic Ran	ge with	JWST	: Decoding S	Smoke Signa	lls in the Glare	of a Wolf-Ra	
		49, Observation 5: WR 137									25 17:00:13 GMT 2022	
Į₩	Diagnostic S	Status: Warning										
۱	Observing T	emplate: NIRISS Aperture M	lasking Interferometry									
Observation												
١ŏ												
Diagnostics		Varning (Form): Overheads an	·		run.							
۱.,	#	Name	Target Coordina			Targ. Coord				ellaneous		
Targets	(6)	WR137AMIREFPSF	RA: 20 12 57.8919 (303.2412162d) Dec: +35 45 46.45 (35.76290d)			Proper Motion RA: -5.562111937378841E-5 sec of time/yr						
arć	Equinox: J2000				Proper Motion Dec: -0.004101000013179146 arcsec/yr							
12		Equiliox. 32000				Epoch of Position: 2015.5						
Fixed	Comments: W1 = 5.290, W2 = 5.223 0.952 Degrees from WR137											
I۴	Calegory=Calibration											
┢	Description=	=[Point spread function] Target	Acquisition Mode	F214	Readout Pattern	Groups/II	-4	Integrations/Exp	Total Integratio	ns Total Exposure	ETC Wkbk.Calc	
Acquisition	#	Target	Acquisition Wode	ritter	Readout Pattern	Groups/11	lit .	integrations/Exp	Total Integratio	Time Total Exposure	ID ID	
isi	1	SAME	AMIBRIGHT	F480M	NISRAPID	5		1	1	0.293	50283.6	
l 향												
_												
ige	Subarray					Direct Image						
[출	SUB80					false						
Template												
Dithers	#			Primary Dit	hers			Sub	pixel Positions			
lag.	1			NONE				NO	NE			
₫												
ts	#	Filter	Readout Patter	n Groups/Int	Integrat	ions/Exp	Total D	ithers Tot	al Integrations	Total Exposure Time	ETC Wkbk.Calc ID	
l e	1	F480M	NISRAPID	7	1020		1	102	0	636.48	50283	
len.	2	F380M	NISRAPID	2	2720		1	272	0	671.296	50283	
lΞ												
tra												
Spectral Elements												
Sp												

<u>Pro</u>	<u>oposal 1349 - Observation 5 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra.</u>
PSF References	
Special Requirements	

		349 - Observation		g Extreme L	<u>ynamic Ran</u>	ge with J	WST: Dec	oding Si	moke Signals		
ion	_	349, Observation 6: WR 13	7 AMI Stare							Mon Jul	25 17:00:13 GMT 202
ati	_	Status: Warning									
Observation	Observing T	emplate: NIRISS Aperture l	Masking Interferometry								
Diagnostics	(Visit 6:1) V	Varning (Form): Overheads a	are provisional until the V	isit Planner has beer	n run.						
	#	Name	Target Coordina	tes		Targ. Coord	. Corrections		Miscella	aneous	
Targets	(5)	WR137	RA: 20 14 31.763 Dec: +36 39 39.51			Proper Motio time/yr	n RA: -2.2621618	417001282E	-4 sec of		
ar			Equinox: J2000	(30.000)04)		Proper Motio	n Dec: -0.0056630	00000173214	14 arcsec/yr		
_ _			Equilion. 32000			Epoch of Pos	ition: 2015.5				
Fixed	Category=S	=[WC stars]	y the targetselector and re	etrieved from the SIM	ABAD database.						
tion	#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/In	t Integra	tions/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
Acquisition	1	SAME	AMIBRIGHT	F480M	NISRAPID	5	1		1	0.293	50283.1
ie	Subarray Direct Image										
lemplate	SUB80					true					
ırs	#			Primary Dit	hers			Subp	ixel Positions		
Ditners	1			NONE	NONE						
5	2			4				NON	E		
ge	#	Filter	Readout Pattern	n Groups/Int	Integrati	ons/Exp	<b>Total Dithers</b>	Total	Integrations To	otal Exposure Time	ETC Wkbk.Calc ID
na	1	F480M	NISRAPID	5	21		4	84	39	0.742	
Direct Image	2	F380M	NISRAPID	2	40		4	160	39	9.488	
	#	Filter	Readout Pattern	n Groups/Int	Integrati	ons/Exp	Total Dithers	Total	Integrations To	otal Exposure Time	ETC Wkbk.Calc ID
eu	1	F480M	NISRAPID	4	1600	-	1	1600		36.288	50283
al Elem	2	F380M	NISRAPID	2	2720		1	2720	67	71.296	50283
Spectral Elements											

<u>Pro</u>	oposal 1349 - Observation 6 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Ra
<b>PSF References</b>	WR 137 AMI PSF REF Stare (Obs 5) (PSF Reference; Filters [F380M, F480M]) Additional Justification: false
Special Requirements	6 After 3 6 After 4 Sequence Observations 5, 6, Non-interruptible

Pro	posal 1	349 - Observatior	n 53 - Establishi	ing Extreme	Dynamic Ra	nge with	JWST: De	ecoding S	Smoke Signa	als in the Glar	e of a Wolf-R		
ا ا	_	349, Observation 53: WR 13	37 AMI Dither							Mon Jul	25 17:00:13 GMT 2022		
Observation	_	Status: Warning											
į	Observing T	Template: NIRISS Aperture M	Masking Interferometry										
Se	Comments:	WOPR repeat of obs 3											
١ö													
ý	(WR 137 A)	MI Dither (Obs 53)) Warning	(Form): PSF Reference	observations should	be SEO NON-INT	or GROUP NO	N-INT						
Diagnostics		Warning (Form): Overheads				, on on							
۱ĕ			•										
ğ													
Iä̈													
	#	Name	Target Coordina	tes		Targ. Coord	. Corrections		Miscel	laneous			
Targets	(5)	WR137	RA: 20 14 31.763	· ·		Proper Motion time/yr	n RA: -2.262161	8417001282E	-4 sec of				
E	Dec: +36 39 39.51 (36			l (36.66098d)	Proper Motion Dec: -0.005663000001732144 arcsec/yr								
⊨			Equinox: J2000	Equinox: J2000			Epoch of Position: 2015.5						
Fixed	Comments	This object was generated by	v the targetselector and r	etrieved from the SIA	ARAD database	Epoch of Fosition, 2015.5							
ΙĚ	Category=S	Star	, inc iai geiseiceioi ana i	enterea from the 511	1Di ID umabase.								
-	Description: Extended=Y	=[WC stars] YFS											
Ľ	#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	t Integr	rations/Exp	Total Integration		ETC Wkbk.Calc		
Acquisition	1	SAME	AMIBRIGHT	F480M	NISRAPID	5	1		1	<b>Time</b> 0.293	ID 50283.1		
Ι <u>Ξ</u>	1	SAME	AMIBRIOTT	1'400WI	NISKAFID	3	1		1	0.293	30263.1		
🎽													
_	Subarray					Direct Ima	Direct Image						
<u>a</u>	SUB80					false							
Template													
<u>1</u>													
ร	#			Primary Dit	hers			Subp	ixel Positions				
Dithers	1			4				NON	E				
ă													
ıts	#	Filter	Readout Pattern	n Groups/Int	Integrat	ions/Exp	<b>Total Dithers</b>	Total	Integrations 7	Total Exposure Time	ETC Wkbk.Calc ID		
Į į	1	F480M	NISRAPID	4	400		4	1600	6	536.288	50283		
e I	2	F380M	NISRAPID	2	680		4	2720	6	571.296	50283		
面													
ra													
Spectral Elements													
۱ğ													
(0)													

<u>Pr</u>	oposal 1349 - Observation 53 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-R
es	WR 137 AMI PSF REF Dither (Obs 4) (PSF Reference; Filters [F380M, F480M])
2	Additional Justification: false
ē	
References	
l S	
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l ta	Sequence Observations 53, 54, Non-interruptible
l ē	
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ΙĒ	
Requirements	
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Special	
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Pro		349 - Observation			Dynamic Ra	nge with	JWST: Deco	ding Smoke Sig					
ا ا	Proposal 13	349, Observation 54: WR 137	7 AMI PSF REF Dith	er					Mon Jul	25 17:00:13 GMT 2022			
Observation	_	Status: Warning											
<u>ک</u>	Observing T	emplate: NIRISS Aperture M	asking Interferometry										
l š	Comments:	WOPR repeat of obs 4											
ŏ													
Diagnostics	(Visit 54:1)	Warning (Form): Overheads a	are provisional until the	e Visit Planner has be	en run.								
	#	Name	Target Coordin	ates		Targ. Coord.			iscellaneous				
Targets	(6)	WR137AMIREFPSF	RA: 20 12 57.89	19 (303.2412162d)			RA: -5.5621119373	78841E-5 sec of					
Ιğ			Dec: +35 45 46.4	45 (35.76290d)		time/yr	D 004101000	012170146					
Ι¤	Equinox: J2000					Proper Motion Dec: -0.004101000013179146 arcsec/yr							
Fixed	Comments	W1 = 5.290, W2 = 5.223				Epoch of Position: 2015.5							
۱×	0.952 Degre	es from WR137											
1	Category=C	Calibration =[Point spread function]											
٦	#	Target	Acquisition Mode	Filter	Readout Pattern	Groups/Int	Integration	ns/Exp Total Integra		ETC Wkbk.Calc			
Acquisition		-						-	Time	ID			
Ϊ́Ξ	1	SAME	AMIBRIGHT	F480M	NISRAPID	5	1	1	0.293	50283.6			
5													
_													
Template	Subarray					Direct Imag	ge						
١ğ	SUB80					false							
e I													
_													
ers	#			Primary Di	thers			Subpixel Positions					
Dithers	1			4				NONE					
-													
lts	#	Filter	Readout Patter		Integrati	•	Total Dithers	Total Integrations	Total Exposure Time				
l ē	1	F480M	NISRAPID	7	255		4	1020	636.48	50283			
<u>e</u>	2	F380M	NISRAPID	2	680	2	4	2720	671.296	50283			
tra													
Spectral Elements													
ြလ္တ													

<u>Pr</u>	oposal 1349 - Observation 54 - Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-R
PSF References	
Special Requirements F	Sequence Observations 53, 54, Non-interruptible