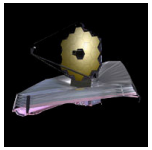

1864 - The Formation of a Primeval Hyperstarburst Galaxy at z~6

Cycle: 1, Proposal Category: GO

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
SPT0346-52				
	1	NIRCam Imaging	NIRCam Imaging	(1) SPT0346-52-IMAGING

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	2	MIRI Imaging	MIRI Imaging	(1) SPT0346-52-IMAGING
	3	H-alpha and other nebular lines	NIRSpec IFU Spectroscopy	(2) SPT0346-52-IFU
	4	NIRSpec Offset	NIRSpec IFU Spectroscopy	(3) SPT0346-52-IFU-OFFSET
	5	Paschen-alpha IFU	MIRI Medium Resolution Spectroscopy	(5) SPT0346-52-IFU-MRS
	6	Paschen-alpha IFU offset	MIRI Medium Resolution Spectroscopy	(6) SPT0346-52-IFU-MRS-OFFSET
	7	PAH 3.3 micron IFU	MIRI Medium Resolution Spectroscopy	(5) SPT0346-52-IFU-MRS
	8	PAH 3.3 micron offfset	MIRI Medium Resolution Spectroscopy	(6) SPT0346-52-IFU-MRS-OFFSET
MIRI Imaging repeat WOPR 88586				
	9	MIRI Imaging	MIRI Imaging	(1) SPT0346-52-IMAGING
NIRSpec observations repeat WOPR 88642				
	10	H-alpha and other nebular lines	NIRSpec IFU Spectroscopy	(2) SPT0346-52-IFU
	11	NIRSpec Offset	NIRSpec IFU Spectroscopy	(3) SPT0346-52-IFU-OFFSET

ABSTRACT

The most massive galaxies in the universe formed in intense dust-enshrouded bursts very early in the history of the universe. These early gas- and dust-rich starbursts have awaited the sensitivity, resolution, and wavelength coverage of JWST for decades. We propose a comprehensive imaging and IFU spectroscopic study of the SPT0346-52 compact hyperstarburst galaxy at z=5.7. With an astounding 3000Msun/yr of star formation packed into a r~0.6kpc region and no sign of an AGN, this system is uniquely compact and intense among all known high-z galaxies. Our observations will finally detect the stellar emission from this extreme galaxy, dissect the physical conditions of the HII regions, and probe for an AGN from a novel angle for high-z dust-enshrouded systems. These data will place this system in the larger context of massive galaxy formation and enable unprecedented detail in our understanding of a primeval massive starburst.

OBSERVING DESCRIPTION

NIRCam Imaging:

Using only module B

2 exposure sets (2 pt INTRAMODULEX dither with 4 sub-pixel positions)

Filters: F200W+F356W, Readout: SHALLOW4, NGroups:3, NInt:1, Dithers:8, Total exp. time: 1202.5s

Filters: F200W+F356W, Readout: BRIGHT1, NGroups:5, NInt:1, Dithers:8, Total exp. time: 773s

MIRI Imaging:
Readout: FAST
Filters: F770W (610s), F1280W (777s), F1500W (777s), F1800W (1110s), F2100W (1332s) [4 point Cycling dither]

NIRSpec IFU:

Grating/Filter: G395H/290LP, Readout: NRSIRS2, Groups 10, 9 MEDIUM cycling dither points. Tot. exp. time (6696s) [Aimed detection of H-alpha]
MSA leak cal + Offset pointing each same time

MIRI MRS:
Includes simultaneous imaging for astrometry registration

Pas- alpha: Channel 3, short wavelength range, FAST readout, tot exp. time 3330s + background offset of same time

PAH: Channel 4, Medium wavelength range, FAST readout, tot exp. time 3885s + background offset of same time

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SPT0346-52-IMAGING	RA: 03 46 41.0750 (56.6711458d) Dec: -52 05 2.19 (-52.08394d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(2)	SPT0346-52-IFU	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(3)	SPT0346-52-IFU-OFFSET	RA: 03 46 35.4530 (56.6477208d) Dec: -52 04 55.26 (-52.08202d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(4)	SPT0346-52-IFU-TA-STAR	RA: 03 46 42.1912 (56.6757967d) Dec: -52 04 32.52 (-52.07570d) Equinox: J2000		
Comments: *Category=Calibration* *Description=[Target acquisition test]* *Extended=NO*				
(5)	SPT0346-52-IFU-MRS	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				
(6)	SPT0346-52-IFU-MRS-OFFSET	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		
Comments: *Category=Galaxy* *Description=[High-redshift galaxies]* *Extended=YES*				

Observation

Proposal 1864, Observation 1: NIRCam Imaging

Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

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)	SPT0346-52-IMAGING	RA: 03 46 41.0750 (56.6711458d) Dec: -52 05 2.19 (-52.08394d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

Module	Subarray
B	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	INTRAMODULEX	2	STANDARD		4

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F200W	F356W	BRIGHT2	7	1	8	8	1202.518	
2	F200W	F444W	RAPID	9	1	8	8	773.047	

Special Requirements

Offset -29.17 arcsec, 38.43 arcsec

Observation

Proposal 1864, Observation 2: MIRI Imaging

Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Imaging

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
(1)	SPT0346-52-IMAGING	RA: 03 46 41.0750 (56.6711458d) Dec: -52 05 2.19 (-52.08394d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

Subarray
FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	1	4						DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F770W	FASTR1	55	1	1	Dither 1	4	4	610.509	
2	F1280W	FASTR1	70	1	1	Dither 1	4	4	777.011	
3	F1500W	FASTR1	70	1	1	Dither 1	4	4	777.011	
4	F1800W	FASTR1	100	1	1	Dither 1	4	4	1110.016	
5	F2100W	FASTR1	120	1	1	Dither 1	4	4	1332.019	

Observation

Proposal 1864, Observation 3: H-alpha and other nebular lines Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observations:[NIRSpec Offset (Obs 4)]

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
(2)	SPT0346-52-IFU	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
VERIFY_ONLY

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	9	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	3	1	1	1	58.356

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	10	1	false	true	NONE	9	9	6696.301	
2	G395H/F290LP	NRSIRS2	10	1	true	true	NONE	9	9	6696.301	

Special Requirements	Sequence Observations 3, 4, Non-interruptible

Observation

Proposal 1864, Observation 4: NIRSpec Offset Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observation For: [H-alpha and other nebular lines (Obs 3)]

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
(3)	SPT0346-52-IFU-OFFSET	RA: 03 46 35.4530 (56.6477208d) Dec: -52 04 55.26 (-52.08202d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	10	1	false	true	NONE	9	9	6696.301	

Special Requirements

Sequence Observations 3, 4, Non-interruptible

Observation

Proposal 1864, Observation 5: Paschen-alpha IFU Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[Paschen-alpha IFU offset (Obs 6)]

Diagnostics

(Paschen-alpha IFU (Obs 5)) Warning (Form): The slew between the acquisition exposure and the farthest science exposure is 45.042 Arcsec (larger than the recommended limit of 45.000 Arcsec) and may result in reduced or no schedulability. See more information in the diagnostic browser.

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	SPT0346-52-IFU-MRS	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	4 SPT0346-52-IFU-TA-STAR	F1000W	FASTGRPAVG	4	1	1	44.401	57334.3

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
CHANNEL3	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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	F1000W	FASTR1	292	1	1	Dither 1	4	4	3241.247	
1	SHORT(A)	MRSLONG		SLOWR1	34	1	1	Dither 1	4	4	3249.029	57334.2
1	SHORT(A)	MRSSHORT		SLOWR1	34	1	1	Dither 1	4	4	3249.029	57334.2

Special Requirements	
	Aperture PA Range 177.927 to 43.021 Degrees (V3 177.927 to 43.021) Background Limited. Background no more than 10th percentile above minimum Sequence Observations 5, 6, Non-interruptible

Observation

Proposal 1864, Observation 6: Paschen-alpha IFU offset Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [Paschen-alpha IFU (Obs 5)]

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
(6)	SPT0346-52-IFU-MRS-OFFSET	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F560W	CHANNEL3	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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	F1000W	FASTR1	292	1	1	Dither 1	4	4	3241.247	
1	SHORT(A)	MRSLONG		SLOWR1	34	1	1	Dither 1	4	4	3249.029	
1	SHORT(A)	MRSSHORT		SLOWR1	34	1	1	Dither 1	4	4	3249.029	

Special Requirements	
	Aperture PA Range 325.11 to 43.021 Degrees (V3 325.11 to 43.021) Offset -42.017515437022865 arcsec, -20.390453765802985 arcsec Sequence Observations 5, 6, Non-interruptible

Observation

Proposal 1864, Observation 7: PAH 3.3 micron IFU Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[PAH 3.3 micron offfset (Obs 8)]

Diagnostics

(Visit 7:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(5)	SPT0346-52-IFU-MRS	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	4 SPT0346-52-IFU-TA-STAR	F1000W	FASTGRPAVG	8	1	1	88.801	57334.3

Template

Primary Channel	Simultaneous Imaging	Imager Subarray
ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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	F560W	FASTR1	350	1	1	Dither 1	4	4	3885.056	
1	MEDIUM(B)	MRSLONG		SLOWR1	41	1	1	Dither 1	4	4	3917.947	
1	MEDIUM(B)	MRSSHORT		SLOWR1	41	1	1	Dither 1	4	4	3917.947	

Special Requirements	
	Aperture PA Range 177.927 to 43.021 Degrees (V3 177.927 to 43.021) Sequence Observations 7, 8, Non-interruptible

Observation

Proposal 1864, Observation 8: PAH 3.3 micron offfset Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [PAH 3.3 micron IFU (Obs 7)]

Diagnostics

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(6)	SPT0346-52-IFU-MRS-OFFSET	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray
F1000W	ALL	YES	FULL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED 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	F560W	FASTR1	350	1	1	Dither 1	4	4	3885.056	
1	MEDIUM(B)	MRSLONG		SLOWR1	41	1	1	Dither 1	4	4	3917.947	
1	MEDIUM(B)	MRSSHORT		SLOWR1	41	1	1	Dither 1	4	4	3917.947	

Special Requirements	
	Aperture PA Range 325.11 to 43.021 Degrees (V3 325.11 to 43.021) Offset -44.26367068276398 arcsec, -13.387448610206812 arcsec Sequence Observations 7, 8, Non-interruptible

Observation

Proposal 1864, Observation 9: MIRI Imaging Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: MIRI Imaging

Diagnostics

(Visit 9:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SPT0346-52-IMAGING	RA: 03 46 41.0750 (56.6711458d) Dec: -52 05 2.19 (-52.08394d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

Subarray
FULL

Dithers

#	Dither Type	Starting Point	Number of Points	Points	Starting Set	Number of Sets	Optimized For	Direction	Pattern Size
1	CYCLING	1	4						DEFAULT

Spectral Elements

#	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	F770W	FASTR1	55	1	1	Dither 1	4	4	610.509	
2	F1280W	FASTR1	70	1	1	Dither 1	4	4	777.011	
3	F1500W	FASTR1	70	1	1	Dither 1	4	4	777.011	
4	F1800W	FASTR1	100	1	1	Dither 1	4	4	1110.016	
5	F2100W	FASTR1	120	1	1	Dither 1	4	4	1332.019	

Observation

Proposal 1864, Observation 10: H-alpha and other nebular lines Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observations:[NIRSpec Offset (Obs 11)]

Diagnostics

(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(2)	SPT0346-52-IFU	RA: 03 46 41.1001 (56.6712504d) Dec: -52 05 2.15 (-52.08393d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
VERIFY_ONLY

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	9	

Pointing Verification

#	PV MSA Configuration	Filter	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Dithers	PV Total Integrations	PV Total Exposure Time
1	ALLCLOSED	F140X	NRSIRS2RAPID	3	1	1	1	58.356

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	10	1	false	true	NONE	9	9	6696.301	
2	G395H/F290LP	NRSIRS2	10	1	true	true	NONE	9	9	6696.301	

Special Requirements	Sequence Observations 10, 11, Non-interruptible

Observation

Proposal 1864, Observation 11: NIRSpec Offset Tue Dec 20 15:00:30 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observation For: [H-alpha and other nebular lines (Obs 10)]

Diagnostics

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

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(3)	SPT0346-52-IFU-OFFSET	RA: 03 46 35.4530 (56.6477208d) Dec: -52 04 55.26 (-52.08202d) Equinox: J2000		

Comments:
Category=Galaxy
Description=[High-redshift galaxies]
Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	9	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395H/F290LP	NRSIRS2	10	1	false	true	NONE	9	9	6696.301	

Special Requirements

Sequence Observations 10, 11, Non-interruptible