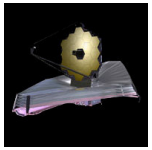

2127 - Frozen Oort Cloud Comet Hale-Bopp

Cycle: 1, Proposal Category: GO

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Photometry and astrometry				
	1	Photometry	NIRCam Imaging	(1) HALE-BOPP
Spectral characteriation				
	2	Spectrum	NIRSpec IFU Spectroscopy	(2) HALE-BOPP-UPDATED-ORBIT

ABSTRACT

We propose to observe the Great Comet C/1995 O1 (Hale-Bopp) at 46 au from the Sun, distances where many surface ices are thermally stable. With a modest 11.2 hr program, a near-infrared spectrum can be obtained, providing key physical information on the composition of cold cometary surfaces. This wavelength range contains diagnostic spectral features from water, CO2, and methanol ice. Such data would enable studies of cometary volatiles in a unique context: on the surface of an Oort cloud comet at distances equivalent to the Kuiper Belt. No other observatory can spectroscopically observe Hale-Bopp in the near-infrared, and no other comet will be observable at this distance in JWST's lifetime. This, and future studies of cometary surfaces with JWST, will lay the groundwork that, together with spacecraft missions to comets, will enable us to assess cometary

nuclei under a wide range of physical circumstances.

OBSERVING DESCRIPTION

Observations are designed to observe the surface of comet C/1995 O1 (Hale-Bopp) at 46 au from the Sun. The comet is expected to be a point source, and very faint. The main goal is to test for the presence of water ice absorption features at 1.5, 2.0, and 3 micron, and, if present, characterize the physical properties of the ice. NIRSpec will provide a suitable spectrum up to at least 3 micron with the IFU in prism mode. NIRCam photometry provides spectral flux measurements at 1.8 and 3.6 micron, and astrometry to refine the orbit.

NIRSpec IFU mode is chosen to avoid target acquisition failures on this r=25.7 mag moving target. Without a target acquision, we chose medium scale cycling to avoid dithering the target outside the field-of-view. We anticipate a 1-sigma ephemeris uncertainty near 0.07".

Special Requirements:

- Timing to place NIRCam observations before the NIRSpec observations for pre-spectroscopic astrometry.
- Timing for spectroscopy near the end of the first observing window in cycle 1 (the comet is getting fainter by about 0.2 mag/year).
- Offsets to place the target near the center of NIRCAM module B3.

Proposal 2127 - Targets - Frozen Oort Cloud Comet Hale-Bopp

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	HALE-BOPP	TYPE=COMET,Q=0.9174143409263262,E=0.9949607008417696,I=89.21708989130315,O=282.9487539423989,W=130.662020526416,T=30-MAR-1997:22:30:30,TTimeScale=TDB,EQUINOX=J2000,EPOCH=15-SEP-2008:00:00:00,EpochTimeScale=TDB		
Comments: Extended=NO				
(2)	HALE-BOPP-UPDATED-ORBIT	TYPE=COMET,Q=0.890537663547794,E=0.9949810027633206,I=89.28759424740302,O=282.7334213961641,W=130.4146670659176,T=29-MAR-1997:15:14:15,TTimeScale=TDB,EQUINOX=J2000,EPOCH=15-SEP-2022:00:00:00,EpochTimeScale=TDB		
Comments: Updated orbital elements for the spectroscopic observations. Extended=NO				

Observation

Proposal 2127, Observation 1: Photometry

Wed Aug 03 20:01:14 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.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	HALE-BOPP	TYPE=COMET,Q=0.9174143409263262,E=0.9949607008417696,I=89.21708989130315,O=282.9487539423989,W=130.662020526416,T=30-MAR-1997:22:30:30,TTimeScale=TDB,EQUINOX=J2000,EPOCH=15-SEP-2008:00:00:00,EpochTimeScale=TDB		

Comments: Extended=NO

Template

Module	Subarray
B	FULL

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	NONE		STANDARD		2

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F182M	F360M	MEDIUM8	10	1	2	2	2104.407	59382.52

Special Requirements

Before Date 15-JUL-2022:00:00:00
Offset 30.0 arcsec, 40.0 arcsec

DEFAULT WINDOW: ANGULAR RATE HALE-BOPP FROM JWST LESS THAN 0.03

Observation

Proposal 2127, Observation 2: Spectrum

Wed Aug 03 20:01:14 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

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

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(2)	HALE-BOPP-UPDATED-ORBIT	TYPE=COMET,Q=0.890537663547794,E=0.9949810027633206,I=89.28759424740302,O=282.7334213961641,W=130.4146670659176,T=29-MAR-1997:15:14:15,TTimeScale=TDB,EQUINOX=J2000,EPOCH=15-SEP-2022:00:00:00,EpochTimeScale=TDB		

Comments: Updated orbital elements for the spectroscopic observations.
Extended=NO

Template

TA Method
VERIFY_ONLY

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	16	

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	CLEAR	NRSIRS2RAPID	10	1	1	1	160.478

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	PRISM/CLEAR	NRSIRS2	20	1	false	true	NONE	16	16	23575.646	59382.63

Special Requirements	
	After Date 01-AUG-2022:00:00:00 DEFAULT WINDOW: ANGULAR RATE HALE-BOPP-UPDATED-ORBIT FROM JWST LESS THAN 0.03