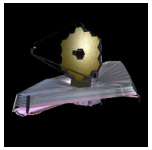

12499 - Confirming a Possible Escapee from the Outer Main Belt

Cycle: 4, Proposal Category: DD

INVESTIGATORS

Name	*Institution*
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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
210P				
	1	NIRSpec Bkg	NIRSpec IFU Spectroscopy	(2) 210P-Bkg
	2	NIRSpec Target	NIRSpec IFU Spectroscopy	(1) 210P
	3	MIRI Target	MIRI Low Resolution Spectroscopy	(1) 210P
	4	MIRI Bkg	MIRI Low Resolution Spectroscopy	(2) 210P-Bkg

ABSTRACT

Over the last few decades, a growing number of comets have been identified orbiting within the outer main belt, hinting at an abundance of icy volatiles there. Models predict that dynamical instabilities can deliver these icy objects into near-Earth space where they could potentially hide among ordinary Jupiter-family comets (JFCs) from the Kuiper belt, though none have yet been confirmed. Earlier JWST observations revealed main-belt comets (MBCs) to be exceptionally depleted in CO2 relative to H2O, providing a potential means to distinguish between comets from the main belt and those from the outer solar system. Meanwhile, recent ground-based observations of 210P/Christensen—a JFC with close dynamical ties to outer main belt—found it to be compositionally distinct from other measured JFCs, amplifying suspicions it may be an escaped MBC. To evaluate this possibility, we request JWST observations with NIRSpec IFU and MIRI LRS to measure 210P's primary volatile composition (particularly its CO2/H2O ratio), as well as the reflectance, emissivity, and albedo of its nucleus and dust for comparison with MBCs, related main-belt asteroids, and other comets.

OBSERVING DESCRIPTION

We request observations of 210P/Christensen shortly after it enters JWST's field of regard on 2026 February 11, using NIRSpec IFU (PRISM/CLEAR) and MIRI LRS. These are comprised of four observations, one with each instrument targeting the comet, and a matching pair of background observations, ideally all scheduled as one non-interruptible sequence to improve background matching and cross analysis of the NIRSpec and MIRI datasets: (1) NIRSpec background, (2) NIRSpec on-target, (3) MIRI on-target, (4) MIRI background. Only the on-target MIRI observation will use target acquisition, but both on-target observations include verification exposures for astrometric calibration of the resulting datasets. The telescope pointing would benefit from an update of the comet's orbital elements prior to the final scheduling of observations.

Proposal 12499 - Targets - Confirming a Possible Escapee from the Outer Main Belt

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	210P	TYPE=COMET,Q=0.52488240865809,E=0.83400677 01701487,I=10.28499508803551 ,O=93.7972393127627,W=345.9259615693633,T=22- NOV- 2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,E POCH=12-MAY- 2024:00:00:00,EpochTimeScale=TDB,R0=2.808 ,DT=0. ,A1=0.,A2=5.914333835244E-10,A3=0. ,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142 ,AMRAT=0.		
Comments: Extended=YES				
(2)	210P-Bkg	TYPE=COMET,Q=0.52488240865809,E=0.83400677 01701487,I=10.28499508803551 ,O=93.7972393127627,W=345.9259615693633,T=22- NOV- 2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,E POCH=12-MAY- 2024:00:00:00,EpochTimeScale=TDB,R0=2.808 ,DT=0. ,A1=0.,A2=5.914333835244E-10,A3=0. ,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142 ,AMRAT=0.	TYPE=POS_ANGLE,RAD=300,ANG=45,REF=SUN	
Comments: Extended=YES				

Observation

Proposal 12499, Observation 1: NIRSpec Bkg Tue Jan 27 16:00:26 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observation For: [NIRSpec Target (Obs 2), MIRI Target (Obs 3)]

Diagnostics

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

(NIRSpec Bkg (Obs 1)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(2)	210P-Bkg	TYPE=COMET,Q=0.52488240865809,E=0.8340067701701487,I=10.28499508803551,O=93.7972393127627,W=345.9259615693633,T=22-NOV-2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,EPOCH=12-MAY-2024:00:00:00,EpochTimeScale=TDB,R0=2.808,DT=0.,A1=0.,A2=5.914333835244E-10,A3=0.,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142,AMRAT=0.	TYPE=POS_ANGLE,RAD=300,ANG=45,REF=SUN	

Comments: Extended=YES

Template

TA Method	HFF Readout Mode
NONE	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	5	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRS	10	1	false	true	NONE	5	5	2201.038	

Special Requirements

Sequence Observations 1, 2, 3, 4, Non-interruptible

DEFAULT WINDOW: ANGULAR RATE 210P-Bkg FROM JWST LESS THAN 0.075

Observation

Proposal 12499, Observation 2: NIRSpec Target Tue Jan 27 16:00:26 GMT 2026

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Background Observations:[NIRSpec Bkg (Obs 1), MIRI Target (Obs 3), MIRI Bkg (Obs 4)]

Diagnostics

(NIRSpec Target (Obs 2)) Warning (Form): Verification imaging while tracking on a moving target with the MSA ALLOPEN is not recommended. It will typically cause trailing of fixed background sources in the MSA.

(NIRSpec Target (Obs 2)) Warning (Form): WATA may be a better choice for more accurate placement in the IFU for point-like acquisition targets with positional uncertainty of 0.1 arcsec or less.

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

(NIRSpec Target (Obs 2)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	210P	TYPE=COMET,Q=0.52488240865809,E=0.8340067701701487,I=10.28499508803551,O=93.7972393127627,W=345.9259615693633,T=22-NOV-2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,EPOCH=12-MAY-2024:00:00:00,EpochTimeScale=TDB,R0=2.808,DT=0.,A1=0.,A2=5.914333835244E-10,A3=0.,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142,AMRAT=0.		

Comments: Extended=YES

Template

TA Method	HFF Readout Mode
VERIFY_ONLY	false

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	MEDIUM	1	5	

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	ALLOPEN	F140X	NRSRAPID	3	1	1	1	42.947

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	Optional ETC ID
1	PRISM/CLEAR	NRS	10	1	false	true	NONE	5	5	2201.038	

Special Requirements	
	Before Date 20-FEB-2026:00:00:00 Sequence Observations 1, 2, 3, 4, Non-interruptible DEFAULT WINDOW: ANGULAR RATE 210P FROM JWST LESS THAN 0.075

Observation

Proposal 12499, Observation 3: MIRI Target Tue Jan 27 16:00:26 GMT 2026

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Background Observations:[NIRSpec Bkg (Obs 1), NIRSpec Target (Obs 2), MIRI Bkg (Obs 4)]

Diagnostics

(MIRI Target (Obs 3)) Warning (Form): Observers are responsible for checking that target acquisition is feasible.

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

(MIRI Target (Obs 3)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	210P	TYPE=COMET,Q=0.52488240865809,E=0.8340067701701487,I=10.28499508803551,O=93.7972393127627,W=345.9259615693633,T=22-NOV-2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,EPOCH=12-MAY-2024:00:00:00,EpochTimeScale=TDB,R0=2.808,DT=0.,A1=0.,A2=5.914333835244E-10,A3=0.,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142,AMRAT=0.		

Comments: Extended=YES

Acquisition

#	Target	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	Optional ETC ID
1	SAME	F560W	FAST	10	1	1	27.75	

Template

Subarray	Obtain Verification Image?
FULL	true

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	MAPPING	1	0.0	3	0.5

Pointing Verification

#	PV Readout Pattern	PV Groups/Int	PV Integrations/Exp	PV Total Integrations	PV Exposures/Dith	PV Total Dithers	PV Total Exposure Time	Optional ETC ID	Filter
1	FASTR1	10	1	1	1	1	27.75		F560W

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	Optional ETC ID
1	FASTR1	50	2	6	1	3	840.837	

Special Requirements

Sequence Observations 1, 2, 3, 4, Non-interruptible

DEFAULT WINDOW: ANGULAR RATE 210P FROM JWST LESS THAN 0.075

Observation

Proposal 12499, Observation 4: MIRI Bkg Tue Jan 27 16:00:26 GMT 2026

Diagnostic Status: Warning

Observing Template: MIRI Low Resolution Spectroscopy

Background Observation For: [NIRSpec Target (Obs 2), MIRI Target (Obs 3)]

Diagnostics

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

(MIRI Bkg (Obs 4)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(2)	210P-Bkg	TYPE=COMET,Q=0.52488240865809,E=0.8340067701701487,I=10.28499508803551,O=93.7972393127627,W=345.9259615693633,T=22-NOV-2025:16:57:28,TTimeScale=TDB,EQUINOX=J2000,EPOCH=12-MAY-2024:00:00:00,EpochTimeScale=TDB,R0=2.808,DT=0.,A1=0.,A2=5.914333835244E-10,A3=0.,ALN=0.1112620426,NM=2.15,NN=5.093,NK=4.6142,AMRAT=0.	TYPE=POS_ANGLE,RAD=300,ANG=45,REF=SUN	

Comments: Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Subarray	Obtain Verification Image?
F560W	FULL	false

Dithers

#	Dither Type	No. Spectral Steps	Spectral Step Offset	No. Spatial Steps	Spatial Step Offset
1	MAPPING	1	0.0	3	0.5

Spectral Elements

#	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Exposures/Dith	Total Dithers	Total Exposure Time	Optional ETC ID
1	FASTR1	50	2	6	1	3	840.837	

Special Requirements	
	Sequence Observations 1, 2, 3, 4, Non-interruptible DEFAULT WINDOW: ANGULAR RATE 210P-Bkg FROM JWST LESS THAN 0.075