



16795 - Dust emission process in newly discovered active asteroids P/2021 L4

Cycle: 28, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Jessica Agarwal (PI) (ESA Member) (Contact)	Technische Universitaet Braunschweig	agarwal@mps.mpg.de
Dr. Yoonyoung Kim (CoI) (ESA Member) (Contact)	Technische Universitaet Braunschweig	yoonyoung.kim@tu-braunschweig.de
Dr. David Jewitt (CoI) (AdminUSPI)	University of California - Los Angeles	jewitt@ucla.edu
Maria Mastropietro (CoI) (ESA Member)	Technische Universitaet Braunschweig	m.mastropietro@tu-braunschweig.de
Max Mutchler (CoI) (Contact)	Space Telescope Science Institute	mutchler@stsci.edu
Dr. Harold A. Weaver (CoI)	The Johns Hopkins University Applied Physics Laboratory	hal.weaver@jhuapl.edu

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) P2021L4	WFC3/UVIS	1	03-Sep-2021 10:00:15.0	yes
02	(2) P2021L4-2	WFC3/UVIS	1	03-Sep-2021 10:00:16.0	yes
03	(3) P2021L4-3	WFC3/UVIS	1	03-Sep-2021 10:00:16.0	yes
04	(3) P2021L4-3	WFC3/UVIS	1	03-Sep-2021 10:00:17.0	yes
05	(3) P2021L4-3	WFC3/UVIS	1	03-Sep-2021 10:00:17.0	yes

5 Total Orbits Used

ABSTRACT

We request 3 orbits of DD time to identify the cause of dust emission in newly discovered active asteroid P/2021 L4. The orbit of L4 is in the outer main belt, and similar to those of two other asteroids with confirmed activity likely driven by the sublimation of ice. However, the activity in L4 can be dated to an epoch more than 1.5 years after perihelion, which make sublimation-driven activity questionable, with possible alternatives being an impact or rotational mass shedding. We here seek to find out about the cause of activity from studying the distribution and dynamical evolution of dust and debris near the nucleus and in the dust tail, and to characterise the nucleus itself. This will help us to constrain the depth of buried ice in this outer-main-belt object, and lay the basis for follow-up observations during the next perihelion passage in 2025. We request DD time because L4 was discovered after the last regular GO proposal deadline, and because we expect the debris to disperse on timescales of weeks to a few months.

OBSERVING DESCRIPTION

The goal of this program is to characterise the nucleus and dust environment of newly detected active asteroid L4. The first orbit (out of a total 3) should be scheduled as soon as possible to catch the dust field in its current state. The second visit should be scheduled 2-4 weeks after the first to study the motion of potential fragments or a binary system. The third visit should be scheduled as close as possible to October 03 (when L4 will enter HST's solar exclusion zone).

The predicted total magnitude of L4 is $V=21$ in July, decreasing to 22 by late September. We expect that the nucleus or largest fragment will be 1-2 mag fainter, $V = 23 - 24$.

Since this is a newly discovered asteroid with a short arc of observations, the JPL ephemeris will be updated as new astrometry is being reported to the Minor Planet Center and JPL. We will monitor this and request to update the ephemeris in APT when a new orbit solution has been published.

To mitigate the ephemeris uncertainty, we would like to use the 2K2C sub-detector of WFC3/UVIS (instead of the 1K-subarray as in the phase 1 proposal). This will give us maximum protection against the position uncertainty, at the moderate cost of increased readout time. To compensate for increased readout time, we plan to reduce the number of exposures from 8 to 6, such that now in each orbit, we plan to take 6 exposures of 205s and perform a 2-point dither pattern to mitigate hot pixels and cosmic ray hits, obtaining 3 exposures at each dither point. We plan to use the wide bandpass filter F606W.

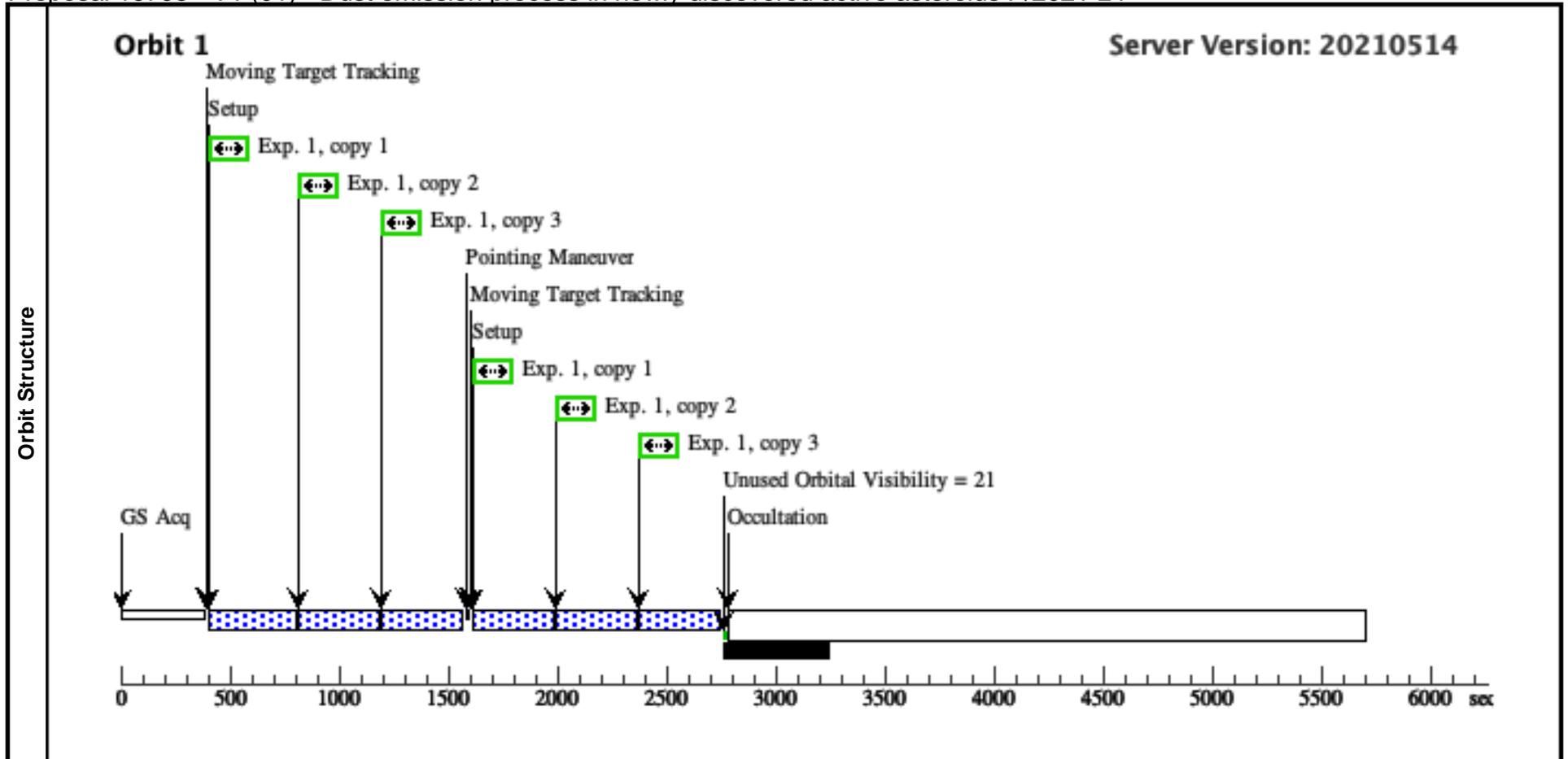
The exposure time is flagged with a CTE warning. However, when running the ETC with the zodiacal light background for the actual target position

Proposal 16795 (STScI Edit Number: 3, Created: Friday, September 3, 2021 at 9:00:18 AM Eastern Standard Time) - Overview
in July 2021 (WFC3UVIS.im.1522864), the background flux increases to 16 electrons/pixel. Due to the presence of extended dust, we expect the actual flux to be even higher, and therefore expect the CTE to be acceptable.

Proposal 16795 - V1 (01) - Dust emission process in newly discovered active asteroids P/2021 L4

Fri Sep 03 14:00:18 GMT 2021

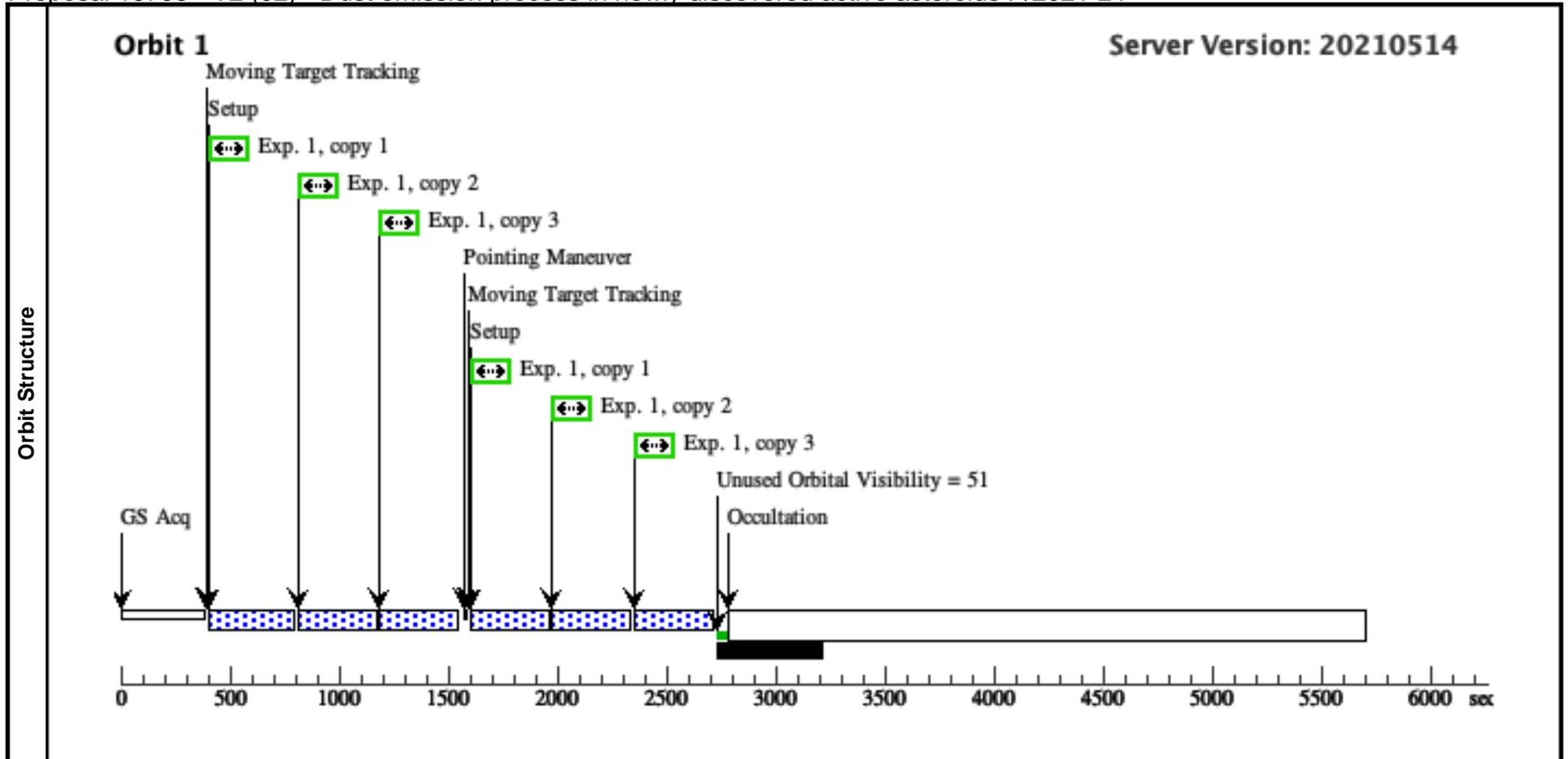
Visit	Proposal 16795, V1 (01), failed Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 26-JUL-2021:00:00 AND 26-JUL-2021:00:40; BETWEEN 26-JUL-2021:03:10 AND 26-JUL-2021:05:30; BETWEEN 26-JUL-2021:06:50 AND 26-JUL-2021:11:50; BETWEEN 26-JUL-2021:13:10 AND 26-JUL-2021:16:40; BETWEEN 26-JUL-2021:18:00 AND 27-JUL-2021:09:00; BETWEEN 27-JUL-2021:11:10 AND 27-JUL-2021:19:30; BETWEEN 27-JUL-2021:21:20 AND 28-JUL-2021:00:20; BETWEEN 28-JUL-2021:01:30 AND 28-JUL-2021:18:10; BETWEEN 28-JUL-2021:18:10; BETWEEN 28-JUL-2021:20:40 AND 29-JUL-2021:04:50; BETWEEN 29-JUL-2021:06:10 AND 29-JUL-2021:16:00; BETWEEN 29-JUL-2021:20:30 AND 30-JUL-2021:03:20; BETWEEN 30-JUL-2021:04:30 AND 30-JUL-2021:07:50; BETWEEN 30-JUL-2021:09:00 AND 30-JUL-2021:11:00; BETWEEN 30-JUL-2021:12:20 AND 30-JUL-2021:12:50; BETWEEN 30-JUL-2021:15:10 AND 30-JUL-2021:19:30; BETWEEN 30-JUL-2021:21:50 AND 31-JUL-2021:03:20; BETWEEN 31-JUL-2021:05:30 AND 31-JUL-2021:06:10; BETWEEN 31-JUL-2021:08:00 AND 31-JUL-2021:20:40; BETWEEN 31-JUL-2021:23:20 AND 01-AUG-2021:00:10; BETWEEN 01-AUG-2021:02:10 AND 01-AUG-2021:15:20; BETWEEN 01-AUG-2021:16:50 AND 02-AUG-2021:00:00									
	Diagnosics (Exposure 1 (Pattern 1, Exps 1-1 in V1 (01))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Patterns	#	Primary Pattern			Secondary Pattern		Exposures			
	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1)			
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(1)	P2021L4	TYPE=ASTEROID,A=3.16531428962 2532,E=0.1193576578627996,I=16.97 017863084731 .O=243.2235429431992,W=234.75124 00659903,M=113.7169141429207,EQ UINOX=J2000,EPOCH=16-JUN- 2021:00:00:00,EpochTimeScale=TDB				EARTH			
Comments: The ephemeris will need to be updated regularly, in particular for visits 2 and 3. We do not expect the necessity of late ephemeris updates. Description=Active Asteroid Extended=YES										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(WFC3UVI S.im.152286 4)	(1) P2021L4	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W			Pattern 1, Exps 1-1 i n V1 (01) (1)	205 Secs X 3 (1230 Secs) [=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 1, Copy 3)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 2, Copy 3)]	[1]



Proposal 16795 - V2 (02) - Dust emission process in newly discovered active asteroids P/2021 L4

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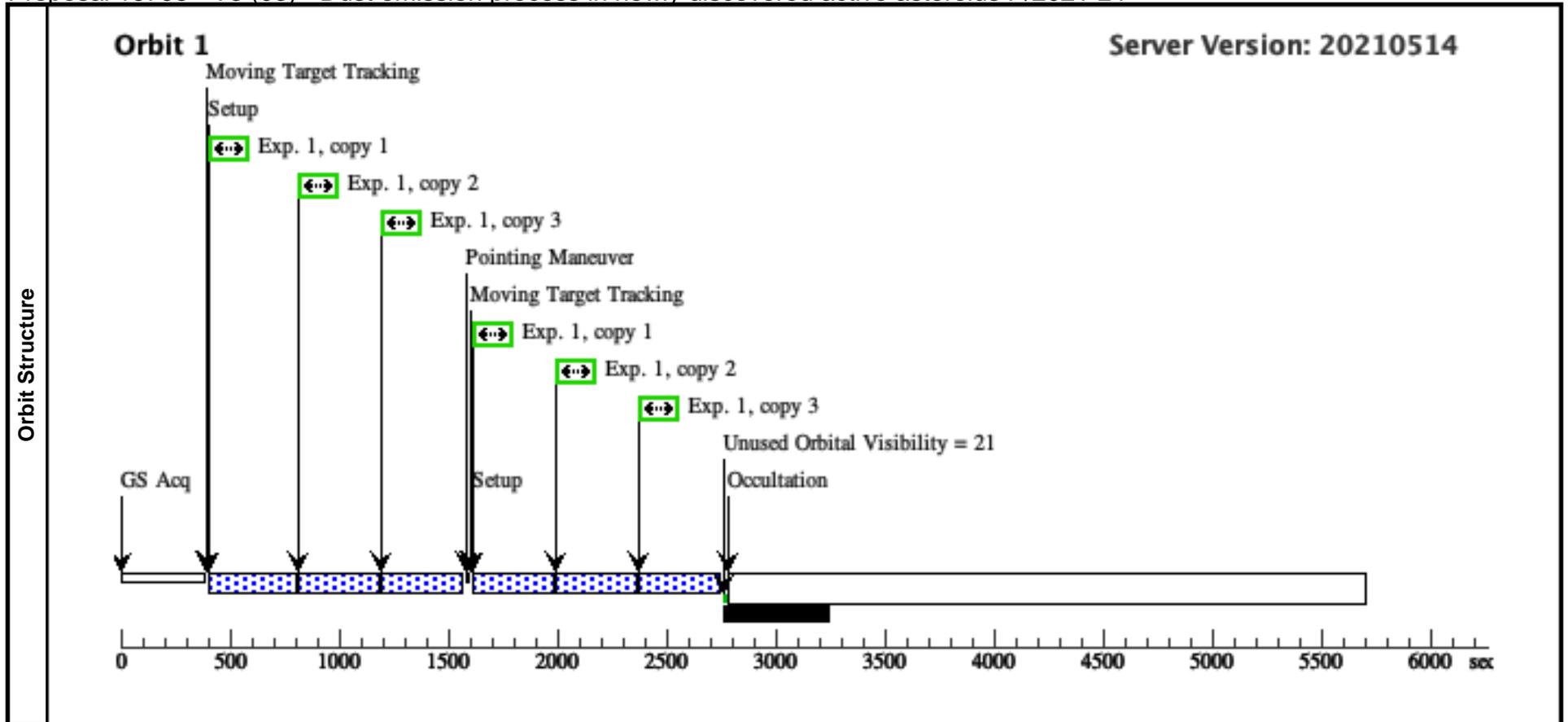
Visit	Proposal 16795, V2 (02), failed Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 16-AUG-2021:00:00:00 AND 16-AUG-2021:08:10:00; BETWEEN 16-AUG-2021:09:50:00 AND 17-AUG-2021:08:00:00; BETWEEN 17-AUG-2021:09:50:00 AND 17-AUG-2021:18:00:00; BETWEEN 17-AUG-2021:20:20:00 AND 18-AUG-2021:09:20:00; BETWEEN 18-AUG-2021:11:10:00 AND 18-AUG-2021:11:20:00; BETWEEN 18-AUG-2021:13:10:00 AND 18-AUG-2021:22:20:00; BETWEEN 19-AUG-2021:00:20:00 AND 19-AUG-2021:15:40:00; BETWEEN 19-AUG-2021:18:40:00 AND 23-AUG-2021:07:00:00; BETWEEN 23-AUG-2021:08:50:00 AND 23-AUG-2021:20:30:00; BETWEEN 23-AUG-2021:22:50:00 AND 24-AUG-2021:02:10:00; BETWEEN 24-AUG-2021:04:30:00 AND 24-AUG-2021:17:00:00; BETWEEN 24-AUG-2021:19:10:00 AND 25-AUG-2021:07:40:00; BETWEEN 25-AUG-2021:09:30:00 AND 27-AUG-2021:09:50:00; BETWEEN 27-AUG-2021:11:40:00 AND 27-AUG-2021:19:10:00; BETWEEN 27-AUG-2021:20:50:00 AND 28-AUG-2021:04:20:00; BETWEEN 28-AUG-2021:06:30:00 AND 28-AUG-2021:21:10:00; BETWEEN 28-AUG-2021:23:00:00 AND 29-AUG-2021:10:00:00; BETWEEN 29-AUG-2021:11:30:00 AND 30-AUG-2021:00:00:00									
	(Exposure 1 (Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V2 (02))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Diagnosics										
Patterns	#	Primary Pattern			Secondary Pattern		Exposures			
	(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1)			
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(2)	P2021L4-2	TYPE=ASTEROID,A=3.16509500172 2153,E=0.1187392431431302,I=16.96 260314419682 .O=243.2248890332734,W=234.66989 22988284,M=119.8238708365419,EQ UINOX=J2000,EPOCH=20-JUL-2021:00:00:00,EpochTimeScale=TDB				EARTH			
Comments: The ephemeris will need to be updated regularly, in particular for visits 2 and 3. We do not expect the necessity of late ephemeris updates. Description=Active Asteroid Extended=YES										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(WFC3UVI S.im.152286 4)	(2) P2021L4-2	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W			Sequence 1-1 Non-Int in V2 (02) Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V2 (02) (1)	200 Secs X 3 (1200 Secs) [=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 1, Copy 3)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 2, Copy 3)]	[1]



Proposal 16795 - V3 (03) - Dust emission process in newly discovered active asteroids P/2021 L4

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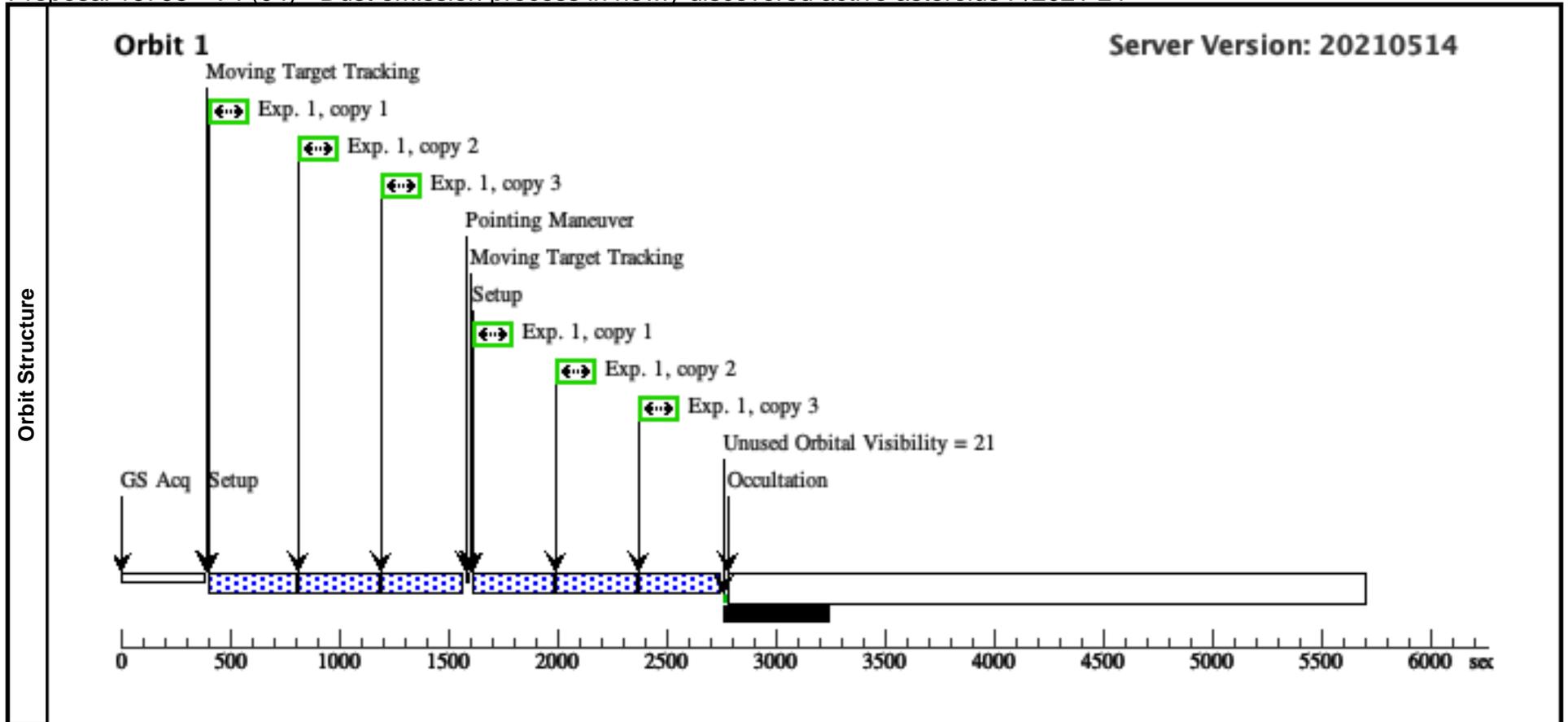
Visit	Proposal 16795, V3 (03), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 26-SEP-2021:01:00:00 AND 26-SEP-2021:16:20:00; BETWEEN 26-SEP-2021:23:30:00 AND 27-SEP-2021:18:20:00; BETWEEN 28-SEP-2021:01:00:00 AND 03-OCT-2021:15:40:00; BETWEEN 04-OCT-2021:00:00:00 AND 04-OCT-2021:12:00:00									
	Diagnosics (Exposure 1 (Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V3 (03))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false					(1)	
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center			
	(3)	P2021L4-3	TYPE=ASTEROID,A=3.165057892850544,E=0.1186608143484228,I=16.96177845929909,O=243.2250068856324,W=234.6547896738686,M=120.0241691048568,EQUINOX=J2000,EPOCH=21-JUL-2021:00:00:00,EpochTimeScale=TDB					EARTH		
Comments: Description=Active Asteroid Extended=YES										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(WFC3UVI S.im.1522864)	(3) P2021L4-3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W			Sequence 1-1 Non-Int in V3 (03) Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V3 (03) (1)	205 Secs X 3 (1230 Secs) [=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 1, Copy 3)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 2, Copy 3)]	[1]



Proposal 16795 - V4 (04) - Dust emission process in newly discovered active asteroids P/2021 L4

Fri Sep 03 14:00:18 GMT 2021

Visit	Proposal 16795, V4 (04), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: AFTER 03 BY 0.8 Orbits TO 1.3 Orbits										
	(Exposure 1 (Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V4 (04))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false				(1)	
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(3)	P2021L4-3	TYPE=ASTEROID,A=3.16505789285 0544,E=0.1186608143484228,I=16.96 177845929909 ,O=243.2250068856324,W=234.65478 96738686,M=120.0241691048568,EQ UINOX=J2000,EPOCH=21-JUL- 2021:00:00:00,EpochTimeScale=TDB					EARTH			
Comments: Description=Active Asteroid Extended=YES											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(WFC3UVI S.im.152286 4)	(3) P2021L4-3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W			Sequence 1-1 Non-Int in V4 (04) Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V4 (04) (1)	205 Secs X 3 (1230 Secs) [=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 1, Copy 3)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 2, Copy 3)]	[1]	



Proposal 16795 - V5 (05) - Dust emission process in newly discovered active asteroids P/2021 L4

Fri Sep 03 14:00:18 GMT 2021

Visit	Proposal 16795, V5 (05), scheduling Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: AFTER 03 BY 1.8 Orbits TO 3.3 Orbits										
	(Exposure 1 (Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V5 (05))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser										
Diagnosics											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false				(1)	
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center				
	(3)	P2021L4-3	TYPE=ASTEROID,A=3.16505789285 0544,E=0.1186608143484228,I=16.96 177845929909 .O=243.2250068856324,W=234.65478 96738686,M=120.0241691048568,EQ UINOX=J2000,EPOCH=21-JUL- 2021:00:00:00,EpochTimeScale=TDB					EARTH			
Comments: Description=Active Asteroid Extended=YES											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(WFC3UVI S.im.152286 4)	(3) P2021L4-3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W			Sequence 1-1 Non-Int in V5 (05) Pattern 1, Exps 1-1 in Sequence 1-1 Non-Int in V5 (05) (1)	205 Secs X 3 (1230 Secs) [=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 1, Copy 3)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 2, Copy 3)]	[1]	

