16418 - Bright Near-Sun Comet C/2020 F3 (NEOWISE)

Cycle: 27, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 2020F3	ACS/WFC WFC3/UVIS	1	20-Jul-2020 16:02:48.0	yes
02	(1) 2020F3	ACS/WFC WFC3/UVIS	1	20-Jul-2020 16:02:50.0	yes

2 Total Orbits Used

ABSTRACT

C/2020 F3 (NEOWISE) is the brightest near-Sun comet to survive perihelion in over a decade, and since its post-conjunction recovery from the ground in early 2020 July, has displayed a morphology that is characteristic of many of the brightest and most active such comets in history. Moreover, C/2020 F3 features post-perihelion observing geometry that is unusually favorable for a near-Sun comet, leaving the 55 degree solar exclusion zone of HST only one month past perihelion. These factors combine to make this comet not only a target likely to have high public awareness, but also a particularly favorable candidate for close study to evaluate the behavior and evolution of comets near the Sun more generally.

We propose to use WFC3/UVIS and ACS/WFC to collect multi-color imagery and imaging polarimetry of C/2020 F3 to trace the spatial variation of dust properties throughout the coma---particularly of its jets---and characterize or constrain the presence of fragments or unresolved debris streams produced by the earlier intense activity near perihelion. These observations will provide the first high resolution look at the effects of perihelic heating on a surviving near-Sun comet, and with the imminent loss of HST's three gyro mode and the corresponding collapse in its field of regard, will likely be the last opportunity of this favorability to conduct such analysis for the foreseeable future.

OBSERVING DESCRIPTION

We request two orbits to conduct color imaging and polarimetry of C/2020 F3. As the comet will be receding from the Sun and the targeted activity rapidly declining during the observing window, the observations should be ideally scheduled as early as possible, once the comet leaves the 55 degree solar exclusion zone on 2020 August 3.

Orbit 1 will use WFC3/UVIS to image the comet through five filters: F373N, F487N, F689M, F775W, and F845M. These filters were selected to minimize the contamination of dust colors by typical strong cometary emission lines. Two dithered frames will be collected through each filter to protect against passing field stars, cosmic rays, and detector defects. To avoid a serial buffer dump, the F487N, F689M, and F845M frames will be limited to a 1k subarray, which will provide a 40" wide field of view---still sufficient to cover the inner coma. F373N and F775W will be recorded on the full UVIS frame in order to provide the widest possible field of view (2.7') to search for fragments.

Orbit 2 will use ACS/WFC to image the comet through F775W crossed with each of the POL0V, POL60V, and POL120V polarizers. The limited ACS buffer size and inability to use <2k subarrays with polarizers limits this orbit to three dithered triplets of POL0V+POL60V+POL120V exposures. The first triplet will be comprised of very short exposures to avoid saturation, as described above, while the other two will be longer exposures to improve sensitivity to fainter structures and fragments. An unsaturated F775W+CLR exposure will also be included to protect the polarimetry of the near-nucleus region (likely saturated in the other two polarizer triplets) from stars, cosmic rays, and detector defects. We expect to measure polarizations in the range 10--40%, and with this exposure structure, we anticipate having sufficient S/N for the measured coma polarization to be calibration-limited over most of the frame.

We additionally request coordinated parallel observations with ACS in orbit 1 and WFC3 in orbit 2. These observations will further constrain or characterize the presence of fragments away from the coma, as well any other spatially small features in the dust (including from the disintegration of unresolved fragments) that cannot be resolved from the ground as well as improve the precision of colors/polarimetry measured in the lower surface

brightness outer regions of the coma by the primary observations, where sky background contamination could be important.

Proposal 16418 - Visit 01 - Bright Near-Sun Comet C/2020 F3 (NEOWISE)

Visit

Proposal 16418, Visit 01, implementation Mon Jul 20 20:02:50 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(Visit 01) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(Primary Exposure 1 (Prime + Parallel Group 1-4 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 2 (Prime + Parallel Group 1-4 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 3 (Prime + Parallel Group 1-4 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 5 (Prime + Parallel Group 5-8 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 6 (Prime + Parallel Group 5-8 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 7 (Prime + Parallel Group 5-8 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 9 (Prime + Parallel Group 9-12 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 10 (Prime + Parallel Group 9-12 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 13 (Prime + Parallel Group 13-16 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Primary Exposure 14 (Prime + Parallel Group 13-16 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

Solar System Targets

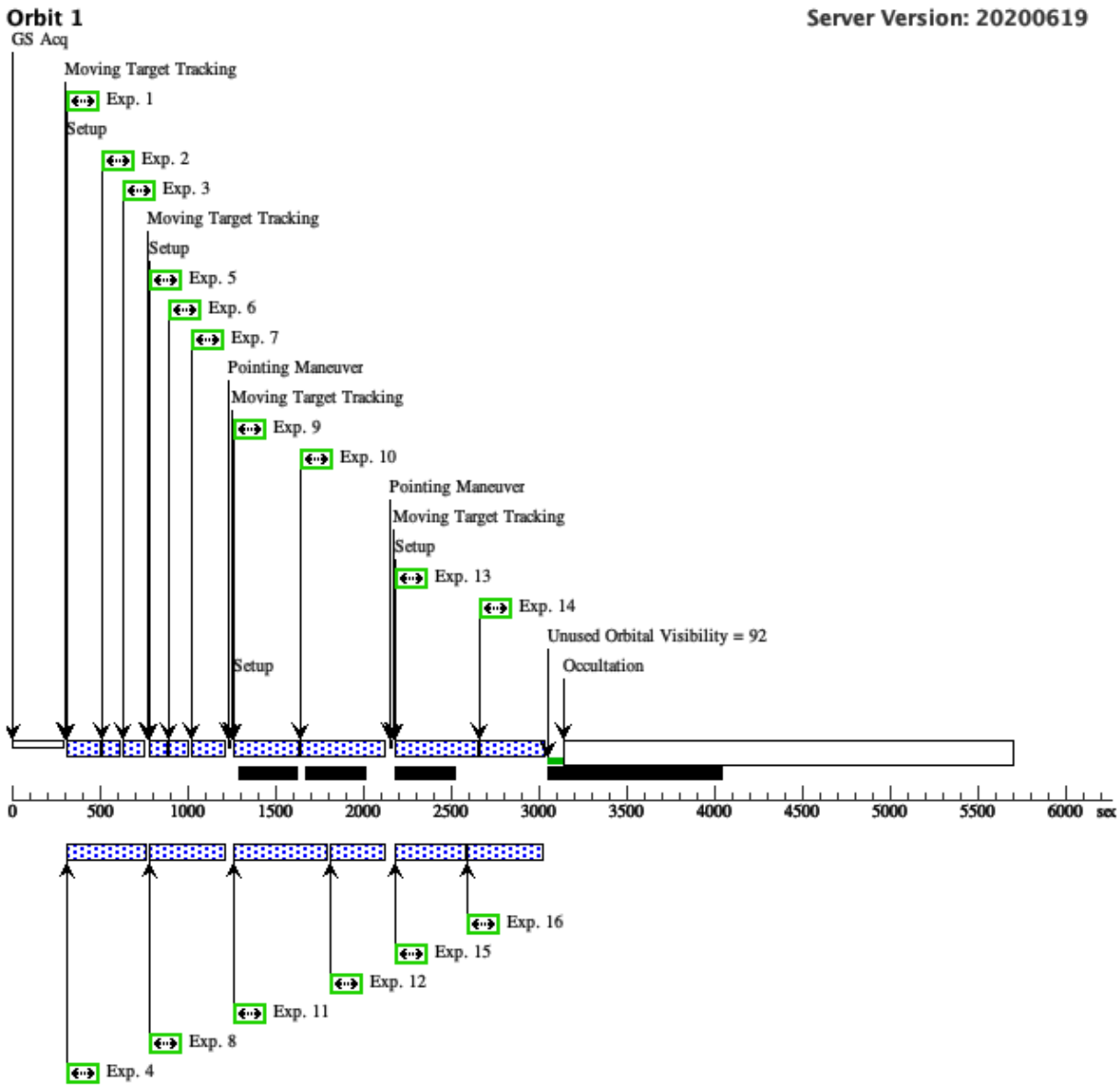
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	2020F3	TYPE=COMET,Q=0.2946512619109637,E=0.99916958479388,I=128.937400236612,O=61.00942236569867,W=37.2784724513936,T=03-JUL-2020:16:17:50,TTimeScale=TDB,EQUINOX=J2000,EPOCH=03-AUG-2020:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Description=C/2020 F3 (NEOWISE)
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F487N		POS TARG 5.12,5; GS ACQ SCENARIO ONEB1BE	Prime + Parallel Group 1-4 in Visit 01	81 Secs (81 Secs) *[==>]*	***[1]***
2		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F689M		SAME POS AS 1	Prime + Parallel Group 1-4 in Visit 01	12 Secs (12 Secs) *[==>]*	***[1]***
3		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F845M		SAME POS AS 1	Prime + Parallel Group 1-4 in Visit 01	20 Secs (20 Secs) *[==>]*	***[1]***
4		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL120V			Prime + Parallel Group 1-4 in Visit 01	240 Secs (240 Secs) *[==>]*	***[1]***
5		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F845M		POS TARG 5.12,5	Prime + Parallel Group 5-8 in Visit 01	20 Secs (20 Secs) *[==>]*	***[1]***
6		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F689M		SAME POS AS 5	Prime + Parallel Group 5-8 in Visit 01	11 Secs (11 Secs) *[==>]*	***[1]***
7		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS2-M1K1C-SUB	F487N		SAME POS AS 5	Prime + Parallel Group 5-8 in Visit 01	81 Secs (81 Secs) *[==>]*	***[1]***
8		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL60V			Prime + Parallel Group 5-8 in Visit 01	289 Secs (289 Secs) *[==>]*	***[1]***
9		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS-CENTER	F775W		POS TARG 5,-15	Prime + Parallel Group 9-12 in Visit 01	232 Secs (232 Secs) *[==>]*	***[1]***
10		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS-FIX	F373N	FLASH=5	SAME POS AS 9	Prime + Parallel Group 9-12 in Visit 01	348 Secs (348 Secs) *[==>]*	***[1]***
11		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL0V			Prime + Parallel Group 9-12 in Visit 01	387 Secs (387 Secs) *[==>]*	***[1]***
12		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL0V			Prime + Parallel Group 9-12 in Visit 01	181 Secs (181 Secs) *[==>]*	***[1]***
13		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS-CENTER	F373N	FLASH=5	POS TARG 5.12,-17	Prime + Parallel Group 13-16 in Visit 01	348 Secs (348 Secs) *[==>]*	***[1]***
14		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS-FIX	F775W		SAME POS AS 13	Prime + Parallel Group 13-16 in Visit 01	232 Secs (232 Secs) *[==>]*	***[1]***
15		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL60V			Prime + Parallel Group 13-16 in Visit 01	258 Secs (258 Secs) *[==>]*	***[1]***
16		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W POL120V			Prime + Parallel Group 13-16 in Visit 01	288 Secs (288 Secs) *[==>]*	***[1]***

Orbit Structure



Proposal 16418 - Visit 02 - Bright Near-Sun Comet C/2020 F3 (NEOWISE)

Visit

Proposal 16418, Visit 02, implementation Mon Jul 20 20:02:51 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS, ACS/WFC

Special Requirements: GROUP 02,01 WITHIN 5.2 Orbits

Diagnostics

(Visit 02) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(Visit 02) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

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(Visit 02) Warning (Orbit Planner): SAME POS MAY NOT BE APPROPRIATE

(Parallel Exposure 5 (Prime + Parallel Group 1-6 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 6 (Prime + Parallel Group 1-6 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 10 (Prime + Parallel Group 7-12 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 11 (Prime + Parallel Group 7-12 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 12 (Prime + Parallel Group 7-12 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 16 (Prime + Parallel Group 13-17 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

(Parallel Exposure 17 (Prime + Parallel Group 13-17 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	2020F3	TYPE=COMET,Q=0.2946512619109637,E=0.99916958479388,I=128.937400236612,O=61.00942236569867,W=37.2784724513936,T=03-JUL-2020:16:17:50,TTimeScale=TDB,EQUINOX=J2000,EPOCH=03-AUG-2020:00:00:00,EpochTimeScale=TDB				EARTH

Comments: Description=C/2020 F3 (NEOWISE)
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 2020F3	ACS/WFC, ACCUM, WFC1B-2K	F775W		POS TARG 2,-2; GS ACQ SCENARIO ONEB1BE	Prime + Parallel Group 1-6 in Visit 02	3 Secs (3 Secs)	
								[==>]	***[1]***
2		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 1	Prime + Parallel Group 1-6 in Visit 02	10 Secs (10 Secs)	
				POL0V				*[==>]*	***[1]***
3		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 1	Prime + Parallel Group 1-6 in Visit 02	10 Secs (10 Secs)	
				POL60V				*[==>]*	***[1]***
4		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 1	Prime + Parallel Group 1-6 in Visit 02	10 Secs (10 Secs)	
				POL120V				*[==>]*	***[1]***
5		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F373N	FLASH=10		Prime + Parallel Group 1-6 in Visit 02	197 Secs (197 Secs)	
								[==>]	***[1]***
6		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F373N	FLASH=10		Prime + Parallel Group 1-6 in Visit 02	196 Secs (196 Secs)	
								[==>]	***[1]***
7		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		POS TARG 0,-2	Prime + Parallel Group 7-12 in Visit 02	150 Secs (150 Secs)	
				POL120V				*[==>]*	***[1]***
8		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 7	Prime + Parallel Group 7-12 in Visit 02	150 Secs (150 Secs)	
				POL60V				*[==>]*	***[1]***
9		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 7	Prime + Parallel Group 7-12 in Visit 02	150 Secs (150 Secs)	
				POL0V				*[==>]*	***[1]***
10		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F775W			Prime + Parallel Group 7-12 in Visit 02	110 Secs (110 Secs)	
								[==>]	***[1]***
11		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F775W			Prime + Parallel Group 7-12 in Visit 02	110 Secs (110 Secs)	
								[==>]	***[1]***
12		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F775W			Prime + Parallel Group 7-12 in Visit 02	110 Secs (110 Secs)	
								[==>]	***[1]***
13		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W			Prime + Parallel Group 13-17 in Visit 02	56 Secs (56 Secs)	
				POL0V				*[==>]*	***[1]***
14		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 13	Prime + Parallel Group 13-17 in Visit 02	56 Secs (56 Secs)	
				POL60V				*[==>]*	***[1]***
15		(1) 2020F3	ACS/WFC, ACCUM, WFC	F775W		SAME POS AS 13	Prime + Parallel Group 13-17 in Visit 02	56 Secs (56 Secs)	
				POL120V				*[==>]*	***[1]***
16		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS	F775W			Prime + Parallel Group 13-17 in Visit 02	270 Secs (270 Secs)	
								[==>]	***[1]***
17		(1) 2020F3	WFC3/UVIS, ACCUM, UVIS	F775W			Prime + Parallel Group 13-17 in Visit 02	103 Secs (103 Secs)	
								[==>]	***[1]***

Orbit Structure