13005 - Hubble Imaging of a Newly Discovered Main Belt Comet

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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Mr. Max Mutchler (CoI) (Contact)	Space Telescope Science Institute	mutchler@stsci.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 133P-ELST-PIZARRO	WFC3/UVIS	1	11-Jul-2013 11:26:09.0	yes
02	(1) 133P-ELST-PIZARRO	WFC3/UVIS	1	11-Jul-2013 11:26:17.0	yes

2 Total Orbits Used

ABSTRACT

Main-belt comets (MBCs, or 'active asteroids') have the orbital characteristics of asteroids but also show transient, comet-like activity. Examples of mass-loss likely caused by ice sublimation and by impact have been established, while numerous additional processes are capable of launching material from asteroids. We propose two orbits of non-disruptive, target-of-opportunity observations of the next MBC discovered in order to help determine the process driving mass-loss.

OBSERVING DESCRIPTION

The Main Belt Comet 133P/Elst-Pizarro has recently (mid-June 2013) erupted in activity, displaying a long, thin dust tail. Hubble observations in July or early August 2013 should help determine why this object has become active again.

We plan to take WFC3/UVIS observations with the F350LP filter in two consecutive orbits to make sensitive measurements of the near-nucleus coma. Each orbit will have identical activities: images at one CCD location for the first half of the orbit and images at a dithered CCD location for the second half of the orbit.

ADDITIONAL COMMENTS

The trigger for these observations is the discovery of an object in the main-belt having a Tisserand parameter TJ > 3.1 and showing a coma or tail. Comets have TJ < 3, asteroids have TJ > 3. The parameter is useful only in the context of the circular, restricted three-body approximation. As a result, objects with TJ very close to 3 can be either cometary or asteroidal in nature. In practice, we take TJ > 3.1 as the dividing line, since objects with larger TJ cannot be dynamically linked to the classical comets. The Tisserand constraint is quite stringent, and avoids any possibility of confusion with classical comets. 133P/Elst-Pizarro is the prototypical MBC and its recent activation is the trigger for this cycle 20 program.

Proposal 13005 - Visit 01 - Hubble Imaging of a Newly Discovered Main Belt Comet

Visit

Proposal 13005, Visit 01, implementation

Thu Jul 11 15:26:25 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Solar System Targets

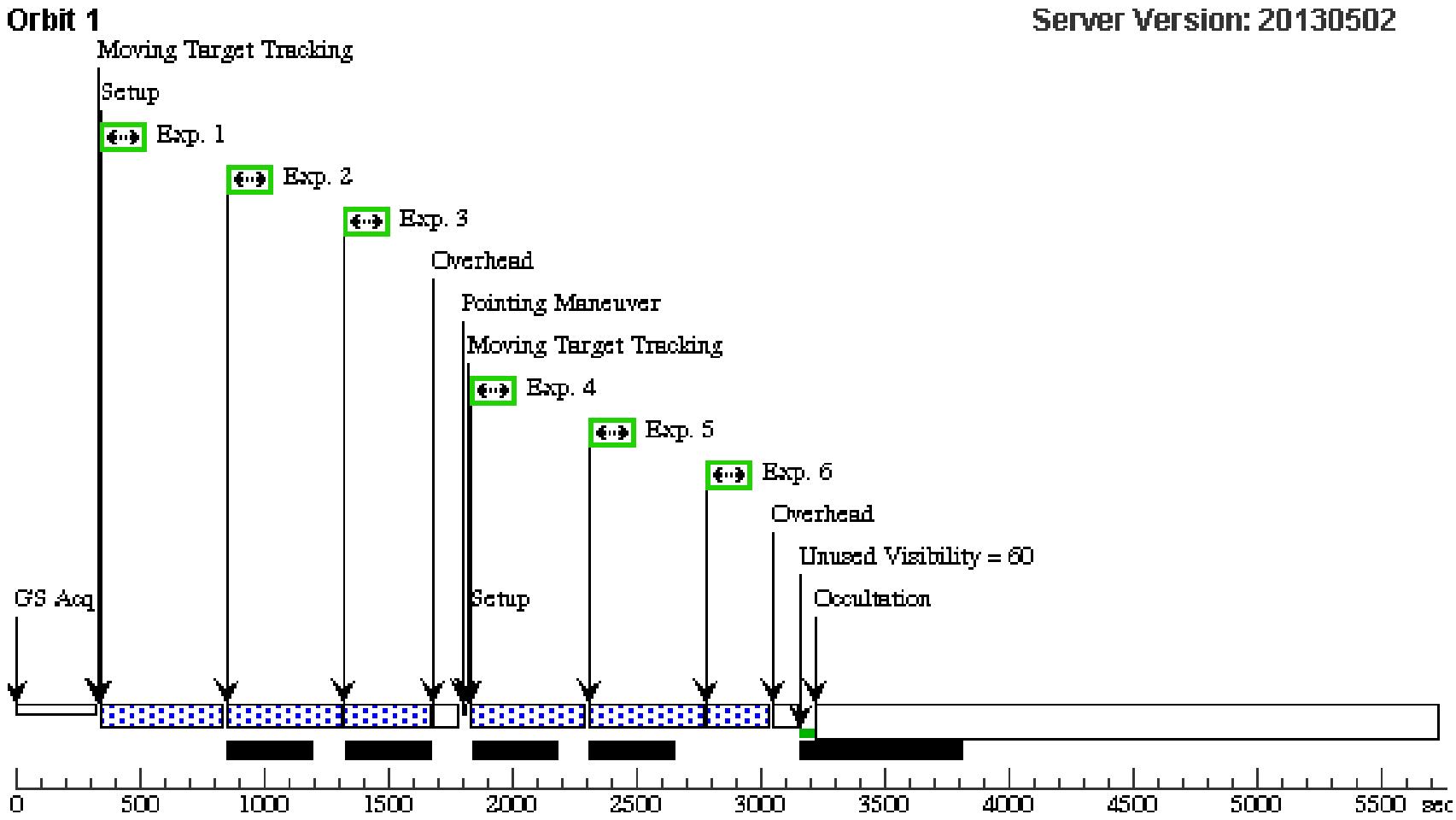
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	133P-ELST-PIZARRO	TYPE=COMET,Q=2.6499159310812 85,E=0.1614201402748764,I=1.38692 3482939521,O=160.1479051307290, W=132.1299288431555,T=08-FEB-2013:20:06:43,TTimeScale=TDT,EQU INOX=J2000,EPOCH=01-AUG-2013,EpochTimeScale=TDT				EARTH

Comments: The nucleus will be brightest in late-August 2013 (closest approach to Earth) and early September (opposition), at which time the long exposures used here may saturate in the peak pixel.
However, we prefer observing ASAP, in July or early August, in which case all the exposure times should be fine.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO			348 Secs (348 Secs)	
								[==>]	***[1]***
2		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO			348 Secs (348 Secs)	
								[==>]	***[1]***
3		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO			348 Secs (348 Secs)	
								[==>]	***[1]***
4		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		348 Secs (348 Secs)	
								[==>]	***[1]***
5		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		348 Secs (348 Secs)	
								[==>]	***[1]***
6		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		252 Secs (252 Secs)	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 13005, Visit 02, implementation Thu Jul 11 15:26:27 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: AFTER_01 BY 0.9_Orbits TO 1.5_Orbits

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	133P-ELST-PIZARRO	TYPE=COMET,Q=2.6499159310812 85,E=0.1614201402748764,I=1.38692 3482939521,O=160.1479051307290, W=132.1299288431555,T=08-FEB-2013:20:06:43,TTimeScale=TDT,EQU INOX=J2000,EPOCH=01-AUG-2013,EpochTimeScale=TDT				EARTH

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								[==>]	***[1]***
2		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO			348 Secs (348 Secs)	
								[==>]	***[1]***
3		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO			348 Secs (348 Secs)	
								[==>]	***[1]***
4		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		348 Secs (348 Secs)	
								[==>]	***[1]***
5		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		348 Secs (348 Secs)	
								[==>]	***[1]***
6		(1) 133P-ELST-PIZARRO	WFC3/UVIS, ACCUM, UVIS2	F350LP	CR-SPLIT=NO	POS TARG 0.2,2.41		252 Secs (252 Secs)	
								[==>]	***[1]***

Orbit Structure