13199 - Imaging Polarimetry of the 2013 Comet ISON with ACS: A Pre-Perihelion Study of the Heterogeneous Coma

Cycle: 20, 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) ISON	ACS/WFC	2	05-Apr-2013 21:04:44.0	yes

2 Total Orbits Used

ABSTRACT

We propose for Director's Discretionary time to obtain ACS/WFC polarimetric images of Comet C/2012 S1 (ISON) on its pre-perihelion approach to the inner solar system before it becomes unobservable by HST. Comet ISON is a sungrazer on a nearly parabolic trajectory, similar to that of the

Great Comet of 1680, and likely carries pristine material dating to the time of the solar-system formation. Recent polarimetric observations of other comets have found that different regions of the coma produce different polarimetric light-scattering responses, indicating that different portions of the coma contain different materials. The presence of a strongly negatively polarizing circumnucleus halo region that has been observed very near the nucleus of several comets suggest a depletion of absorbing, carbonaceous particles in this region. High spatial-resolution ACS polarimetric images of Comet ISON not only can be used to place bounds on the material constituents of different regions of its coma, but can also be used to explore its dynamics and acquire an understanding of the radiation-coma interaction that accounts for coma heterogeneities.

OBSERVING DESCRIPTION

We use the ACS/WFC and the POLV* + F606W polarizer/filter combinations to measure the polarization. Instead of using CR-SPLIT, we execute two separate exposures per polarizer/filter combination. This enables us to fit the observations within two consecutive orbits, and still achieve the advantages of CR-SPLIT.

Visit

Proposal 13199, ISON Polarimetry (01), implementation Sat Apr 06 01:04:52 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: PCS MODE FINE; SCHED 30%; BETWEEN 07-MAY-2013 AND 09-MAY-2013

Comments: These observations need to be made on or before May 7, 2013. However, they need to be scheduled as close to May 7 as possible. We definitely don't want them scheduled before May 6 if at all possible.

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	ISON	TYPE=COMET,Q=0.012502288336152 71 ,E=1.000004178571949,I=61.8612017 4134099,O=295.7371915514632,W=3 45.5093083227027,T=28-NOV-2013:18:42:10,TTimeScale=TDT,EQU INOX=J2000,EPOCH=08-JAN-2013:00:00:00,EpochTimeScale=TDT				EARTH

Comments: Target Ephemeris is from JPL Small-Body Database Browser. The solution date is 2013-Mar-24 20:50:46, and is JPL#20

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	POL0Va (498005)	(1) ISON	ACS/WFC, ACCUM, WFC	F606W POL0V			Pattern 1, Exps 1-1 in ISON Polarimetry (01) (1)	710 Secs *[==>749.0 Secs (Pattern 1)]* *[==>749.0 Secs (Pattern 2)]*	 ***[1]***
2	POL60Va (498005)	(1) ISON	ACS/WFC, ACCUM, WFC	F606W POL60V			Pattern 1, Exps 2-2 in ISON Polarimetry (01) (1)	710 Secs *[==>655.0 Secs (Pattern 1)]* *[==>843.0 Secs (Pattern 2)]*	 ***[1]*** ***[2]***
3	POL120Vb (498005)	(1) ISON	ACS/WFC, ACCUM, WFC	F606W POL120V			Pattern 1, Exps 3-3 in ISON Polarimetry (01) (1)	710 Secs *[==>749.0 Secs (Pattern 1)]* *[==>749.0 Secs (Pattern 2)]*	 ***[2]***

Orbit Structure