13196 - The dynamical aftermath of a major gamma-ray flare from the Crab nebula

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) CRAB	ACS/WFC	1	25-Mar-2013 21:00:57.0	yes

1 Total Orbits Used

ABSTRACT

One of the most intriguing results of the gamma-ray instruments currently in orbit has been the detection of powerful flares from the Crab Nebula. With the aim of locating the site(s) of the flares, we have organized a multiwavelength program, including a regular monitoring of the source both in X-ray and optical through a joint Chandra-HST project, coupled to pre-planned ToOs with both telescopes in order to react promptly in case of a new

brightening in gamma rays. We could take advantage of our program, activating the HST ToO at the onset of a new flare on March 4, 2013. Comparing this ToO observation with a recent monitoring observation allowed us to spot a peculiar, active region, possibly associated to the flaring gamma-ray activity. We ask here for a new HST/ACS observation to be performed on March 25-30, i.e. about 20 days after the flare and 20 days before the next planned observation of our monitoring program (scheduled on April 18, just before the end of the visibility window of the target). Such a sequence of observations will allow us to search for the expected dynamical aftermath of the flare, yielding a crucial piece of information about the location of the flaring site.

OBSERVING DESCRIPTION

We ask to observe the Crab pulsar and nebula system to search for surface brightness changes in the inner nebula possibly associated to the dynamical aftermath of a large gamma-ray flare. We will use the same setup we adopted in our ongoing HST monitoring campaign of the Crab, as well as in our recent HST pre-planned ToO. We will use the ACS/WFC with the WFC1 aperture, with the large-band F550M filter, well suited to sample the continuum emission from the system, with almost no contamination from line emission from the SNR filaments. A box dithering pattern will be implemented to fill the inter-chip gap as well as to reject cosmic ray hits. Setting an exposure of 500 s for each position of the dithering pattern results in 2000 s exposure time per visit, which is well suited to achieve our goals and allows for an optimal use of the orbital visibility window. The new image will be compared to the one collected in our ToO (performed on March 6, when the flare was ongoing) as well as to the most recent pre-flare image (collected on February 24), as well as to the next observation of our monitoring program, planned for April 18. Such a multi-epoch dataset, thanks to the superb angular resolution of HST, will allow to perform a definitive search for the expected variability related to the aftermath of a gamma-ray flare.

Visit

Proposal 13196, Visit 01 Tue Mar 26 01:01:04 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=3.5 Line Spacing=0.5	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides=85.28 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CRAB	RA: 05 34 31.9500 (83.6331250d) Dec: +22 00 52.10 (22.01447d) Equinox: J2000		V=16.5	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) CRAB	ACS/WFC, ACCUM, WFC1	F550M			Pattern 1, Exps 1-1 in Visit 01 (1)	500 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure