15979 - Unpicking the exceptional properties of the first TeV emitting gamma-ray burst

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

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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	(3) GRB190114C	WFC3/IR	1	25-Jul-2019 08:01:33.0	yes
02	(3) GRB190114C	ACS/WFC	2	25-Jul-2019 08:01:34.0	yes

3 Total Orbits Used

ABSTRACT

Several thousand gamma-ray bursts (GRBs) have now been detected, lasting from a fraction of a second to several hours, and with spectral energies peaking in the hundreds of keV range. A handful of bursts have been detected at GeV energies, but very recently GRB 190114C became the first GRB to be identified in the TeV regime via the detection of a flash of Chernkov light by the MAGIC telescope. This detection offers a new window on the GRB phenomena, probing the generation of these extreme photons, as well as a route to testing the scattering of such photons off the Extragalactic Background Light (EBL). The environment of the burst is also exceptional, being extremely dense and perhaps indicating a link between the very high energy emisison and environment, as suggested by some models. Our proposed HST observaitons will track the late time behaviour of the counterpart, disentangle the supernova, afterglow and host emission and determine if the physics of this unique burst differs from that seen in other examples. The observations will also characterise the environment in emission, dissecting it at higher resolution than possible from the ground and tying the emission to absorption properties. Finally, the observations will measure the optical photon density close to the GRB itself (i.e. in the host), and hence the contribution of these photons to the scattering of very high energy light (i.e. the total of local to the burst + EBL). This in turn will enable the determination of the true energetics of the burst at TeV energies and test scattering models in the EBL, both key questions in high energy astrophysics and cosmology.

OBSERVING DESCRIPTION

We will obain a series of observations of GRB 190114C in the F606W, F775W, F850LP, F110W and F160W filters. Each of these exposures will use a standard 3-point dither. We will place the WFC observations close to the edge of the chip using the CTE aperture in order to mitigate CTE effects, and will use the standard IR aperture for infrared observations.

The purpose of these observations is to measure the long term decay of the counterpart of GRB 190114C, in tandem with earlier observations. This final epoch will be used for the purposes of host galaxy subtraction.

Visit

Proposal 15979, Visit 01, implementation Thu Jul 25 12:01:35 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 100%; BETWEEN 01-JAN-2020:00:00:00 AND 28-FEB-2020:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.605 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(1-2)

Fixed Targets

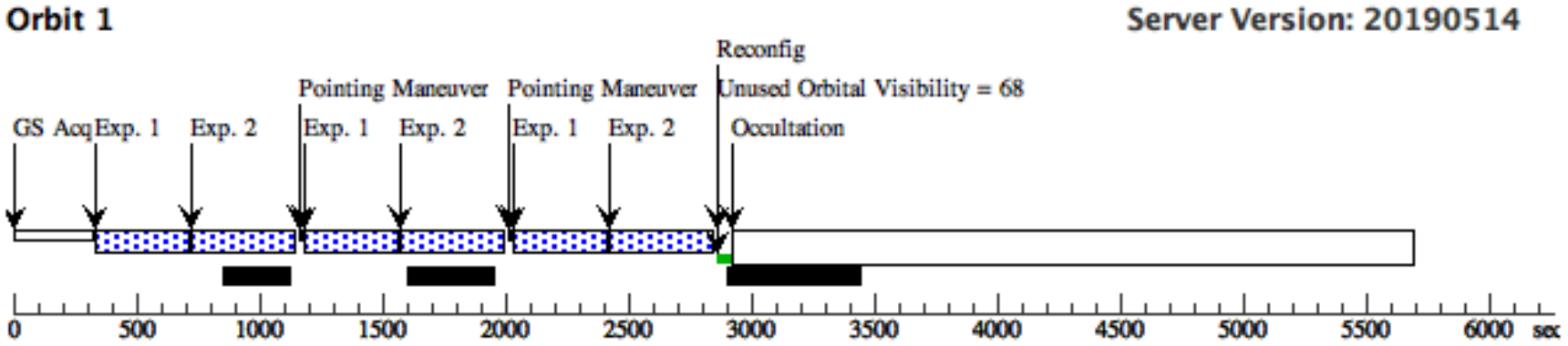
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	GRB190114C	RA: 03 38 1.1600 (54.5048333d) Dec: -26 56 46.90 (-26.94636d) Equinox: J2000		V=22+/-2	Reference Frame: ICRS

Comments:
Category=EXT-STAR
Description=[GAMMA RAY BURSTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) GRB190114C	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=8; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-2 in Visit 01 (1)	352.935448 Secs (1058.806 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***
2		(3) GRB190114C	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=9; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-2 in Visit 01 (1)	402.935899 Secs (1208.808 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***

Orbit Structure



Visit

Proposal 15979, Visit 02, implementation Thu Jul 25 12:01:35 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: SCHED 100%; GROUP 02,01 WITHIN 10D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-3)
	Purpose=DITHER	Pattern Orientation=41.788		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.604	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	GRB190114C	RA: 03 38 1.1600 (54.5048333d)		V=22+/-2	Reference Frame: ICRS
		Dec: -26 56 46.90 (-26.94636d)			
		Equinox: J2000			

Comments:
Category=EXT-STAR
Description=[GAMMA RAY BURSTER]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) GRB190114C	ACS/WFC, ACCUM, WFC1-CTE	F606W			Pattern 3, Exps 1-3 in Visit 02 (3)	400 Secs (1386 Secs)	
								[==>493.0 Secs (Pattern 1)]	***[1]***
								[==>493.0 Secs (Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
2		(3) GRB190114C	ACS/WFC, ACCUM, WFC1-CTE	F775W			Pattern 3, Exps 1-3 in Visit 02 (3)	337 Secs (1104 Secs)	
								[==>430.0 Secs (Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	
3		(3) GRB190114C	ACS/WFC, ACCUM, WFC1-CTE	F850LP			Pattern 3, Exps 1-3 in Visit 02 (3)	337 Secs (1104 Secs)	
								[==>430.0 Secs (Pattern 1)]	***[1]***
								[==>(Pattern 2)]	***[2]***
								[==>(Pattern 3)]	

Orbit Structure