13497 - A smoking gun for a neutron star merger in a short GRB?

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?*
W1	(1) GRB130603B	WFC3/IR	1	20-Jun-2013 21:27:53.0	yes
A1	(1) GRB130603B	ACS/WFC	1	20-Jun-2013 21:28:01.0	yes
W2	(1) GRB130603B	WFC3/IR	1	20-Jun-2013 21:28:07.0	yes
A2	(1) GRB130603B	ACS/WFC	1	20-Jun-2013 21:28:12.0	yes

4 Total Orbits Used

ABSTRACT

The nature of short duration gamma-ray bursts (SGRBs) represents one of the great unsolved mysteries of astrophysics today. While a favoured model for their origin is in the merger of two compact objects (e.g. neutron stars) this lacks a smoking gun to date. However, these mergers are expected to create r-process elements and radioactive nickel, visible as a faint, fast transient in the days following the burst, a so-called kilonova. Recent calculations suggest much energy comes out in the near-infrared in the days following the initial burst. Here we propose for such a search in

the burst GRB 130603B, the first short-GRB to have a firm redshift established directly from the afterglow. At z~0.3 the faint transient is expected to peak a few days after the burst at a H-band magnitude of ~25. Only HST has the sensitivity to detect this source, and the resolution to cleanly resolve it within its host galaxy. Our modest observations will locate, or place strong constraints on the nature of any radioactive transient associated with an prime SGRB, and may finally solve the mystery of the origin of SGRBs. If found, it will also establish that there is an alternative, un-beamed electromagnetic counterpart to binary neutron star mergers, which will have great value in the future in localising gravitational wave sources.

OBSERVING DESCRIPTION

We propose to obtain two visits of observations, targetted at GRB 130603B in two filters, one in the optical (F606W) and one in the infrared (F160W). These observations will map the evolution of the SED of the GRB with time to levels much fainter than possible from the ground, and effectively remove host galaxy contamination. In each filter we will obtain a single orbit of observation split across a 4 point dither pattern. We will place the target in ACS at the CTE1 aperture to minimize any CTE effects, in the IR it will be placed at the standard aperture close to the chip centre.

REAL TIME JUSTIFICATION

We ask for visits 1 and 2 to be scheduled as soon as possible. Visits 3 and 4 should then follow several weeks later.

Visit

Proposal 13497, Visit W1, completed Fri Jun 21 01:28:19 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: BEFORE 15-JUN-2013:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1)

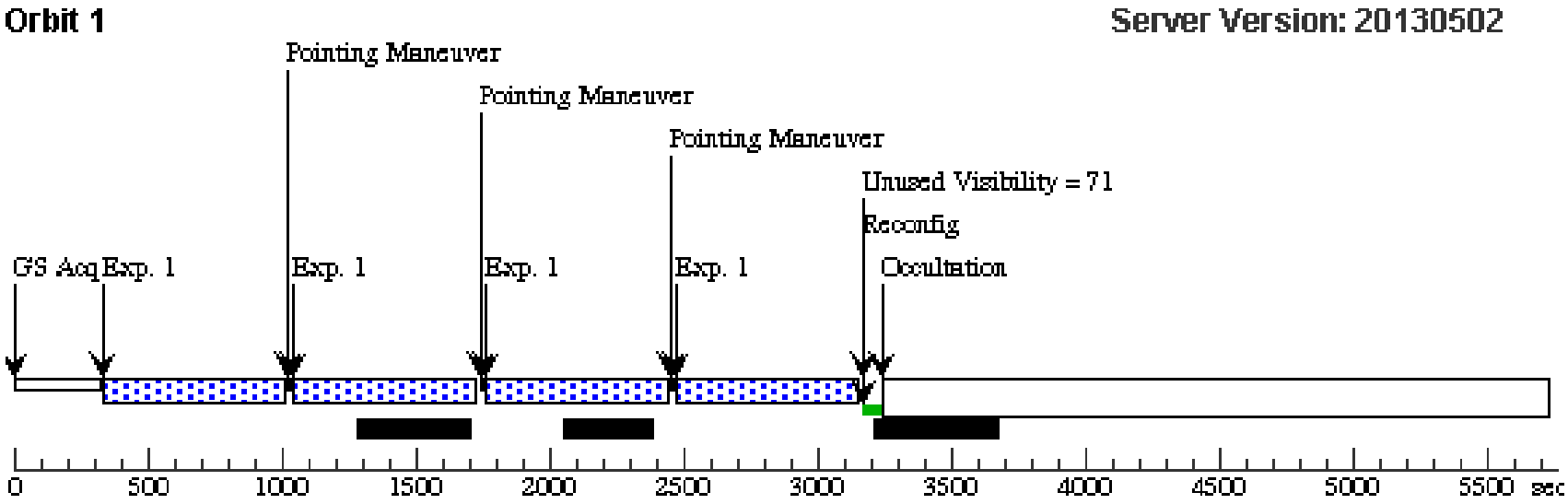
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130603B	RA: 11 28 48.1600 (172.2006667d) Dec: +17 04 18.00 (17.07167d) Equinox: J2000		V=20+/-1	Reference Frame: Swift

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130603B	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPARS50	GS ACQ SCENARIO BASE1B3	Pattern 2, Exps 1-1 in Visit W1 (2)	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13497, Visit A1, completed Fri Jun 21 01:28:21 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 106D TO 110 D; BEFORE 15-JUN-2013:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

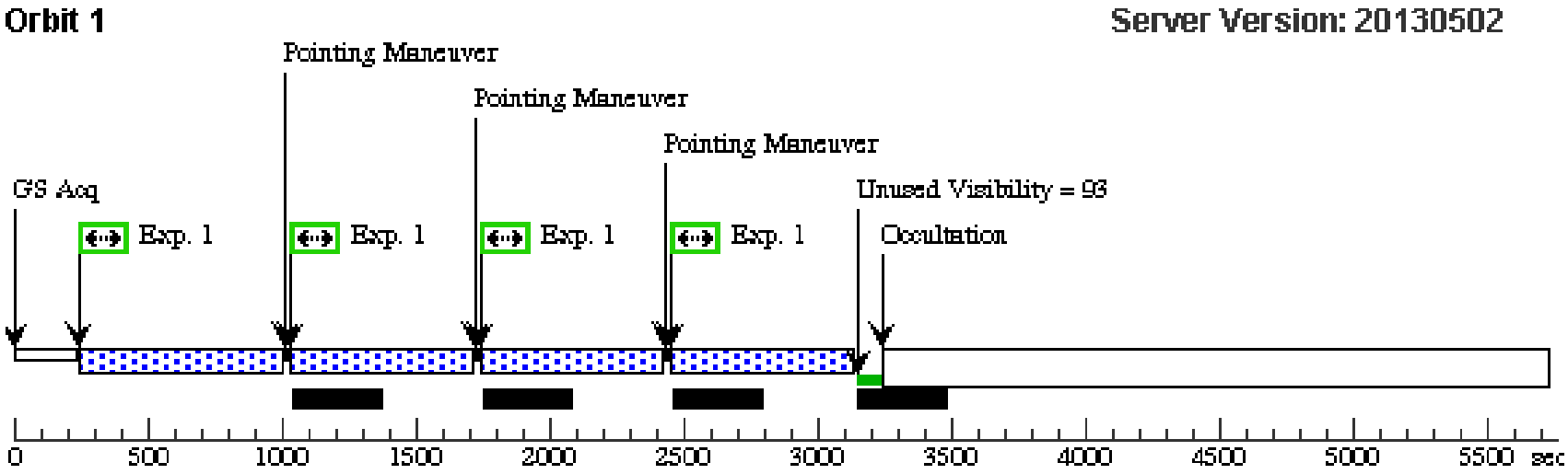
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130603B	RA: 11 28 48.1600 (172.2006667d) Dec: +17 04 18.00 (17.07167d) Equinox: J2000		V=20+/-1	Reference Frame: Swift

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130603B	ACS/WFC, ACCUM, WFC1-FIX	F606W		POS TARG -15,30; GS ACQ SCENARIO ONEB1B3	Pattern 1, Exps 1-1 in Visit A1 (1)	475 Secs (2216 Secs) *[==>554.0 Secs (Pattern 1)]* *[==>554.0 Secs (Pattern 2)]* *[==>554.0 Secs (Pattern 3)]* *[==>554.0 Secs (Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 13497, Visit W2, scheduling Fri Jun 21 01:28:22 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: SAME ORIENT AS W1; AFTER W1 BY 20 D TO 40 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1)

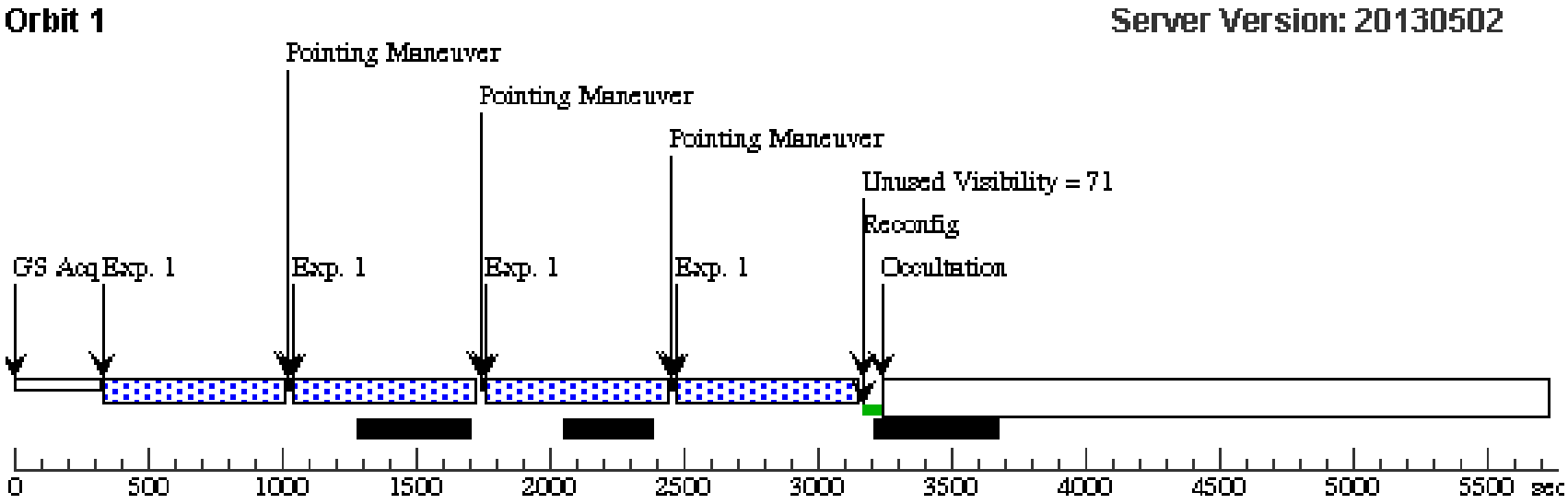
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130603B	RA: 11 28 48.1600 (172.2006667d) Dec: +17 04 18.00 (17.07167d) Equinox: J2000		V=20+/-1	Reference Frame: Swift

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130603B	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPARS50	GS ACQ SCENARIO BASE1B3	Pattern 2, Exps 1-1 in Visit W2 (2)	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 13497, Visit A2, scheduling Fri Jun 21 01:28:23 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: SAME ORIENT AS A1; AFTER W1 BY 20 D TO 40 D; GROUP A2,W2 WITHIN 1D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GRB130603B	RA: 11 28 48.1600 (172.2006667d) Dec: +17 04 18.00 (17.07167d) Equinox: J2000		V=20+/-1	Reference Frame: Swift

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) GRB130603B	ACS/WFC, ACCUM, WFC1-FIX	F606W		POS TARG -15,30; GS ACQ SCENARIO ONEB1B3	Pattern 1, Exps 1-1 in Visit A2 (1)	475 Secs (2216 Secs) *[==>554.0 Secs (Pattern 1)]* *[==>554.0 Secs (Pattern 2)]* *[==>554.0 Secs (Pattern 3)]* *[==>554.0 Secs (Pattern 4)]*	***[1]***

Orbit Structure