Swift Observations of GRB 121201A

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1. Introduction

Yershov *et al*. (GCN Circ. 14025) reported the initial Swift results. At 12:25:42 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 121201A (trigger=540178). Swift slewed immediately to the burst. **Table 1** contains the best-reported positions from Swift. The latest XRT position can be viewed at http://www.swift.ac.uk/xrt_positions.

Yershov *et al*. (GCN Circ. 14025) reported the discovery with UVOT of an optical afterglow. Kruehler *et al*. (GCN Circ. 14031) reported a photometric redshift of 3.6 (+0.2,-0.3) from GROND and Sanchez-Ramirez *et al*. (GCN Circ. 14035) confirmed with a spectroscopic redshift of 3.385 from X-shooter. **Table 2** is a summary of GCN Circulars about this GRB from observatories other than Swift. Standard analysis products for this burst are available at http://gcn.gsfc.nasa.gov/swift_gnd_ana.html.

2. BAT Observations and Analysis

Analysis of the BAT data was reported by Sakamoto *et al*. (GCN Circ. 14028). The BAT ground-calculated position is RA, Dec = 13.473, -42.929 deg, which is
RA(J2000) = 00h 53m 53.6s
Dec(J2000) = -42d 55' 45.9"
with an uncertainty of 2.3 arcmin, (radius, sys+stat, 90% containment). The partial coding was 100%.

The mask-weighted light curve (**Figure 1**) shows 3 main peaks starting at ~T-23, peaking at ~T-18, -8, & +4 s, and ending at ~T+55 s. T_{90}(15-350 keV) is 85 ± 21 s (estimated error including systematics).

The time-averaged spectrum from T-24.00 to T+71.00 s is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.90 ± 0.21. The fluence in the 15-150 keV band is 7.8 ± 1.0 x 10^{-7} erg cm^{-2}. The 1-s peak photon flux measured from T-9.00 s in the 15-150 keV band is 0.8 ± 0.1 ph cm^{-2} s^{-1}. All the quoted errors are at the 90% confidence level.

The results of the batgrbproduct analysis are available at http://gcn.gsfc.nasa.gov/notices_s/540178/BA/.

3. XRT Observations and Analysis

Analysis of the XRT data was reported by Kennea *et al*. (GCN Circ. 14029). We analysed 8.7 ks of XRT data for GRB 121201A, from 101 s to 33.6 ks after the BAT trigger. The data comprise 24 s in Windowed Timing (WT) mode (the first 7 s were taken while Swift was slewing) with the remainder in Photon Counting (PC) mode.

The light curve (**Figure 2**) can be modelled with a power-law decay with a decay index of α=1.24 (+0.06, -0.05).

A spectrum formed from the PC mode data can be fitted with an absorbed power-law with a photon spectral index of 1.62 (+0.15, -0.09). The best-fitting absorption column is 2.15 (+3.39, -0.16) x 10^{20} cm^{-2}, consistent with the Galactic value of 2.0 x 10^{20} cm^{-2} (Kalberla et al. 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is 4.3 x 10^{-11} (4.4 x 10^{-11}) erg cm^{-2} $count^{-1}$.

The results of the XRT team automatic analysis are available at
http://www.swift.ac.uk/xrt_products/00540178.

4. UVOT Observations and Analysis

Analysis of the UVOT data was reported by Kuin (GCN Circ. 14030). The Swift/UVOT began settled observations of the field of GRB 121201A 120 s after the BAT trigger. A source consistent with the XRT position is detected in the initial UVOT exposures. **Table 3** gives preliminary magnitudes using the UVOT photometric system (Breeveld *et al*. 2011, AIP Conf. Proc., 1358, 373). No correction has been made for the expected extinction in the Milky Way corresponding to a reddening of E_{B-V} of 0.01 mag. in the direction of the GRB (Schlegel *et al*. 1998). The light curve ((**Figure 3**) show an initial rise followed by a peak round 1000s and decay with a index of 1.0 (±0.1) . The reported redshift of 3.385 is consistent with the absence of detections in the u, and uv bands of UVOT.

RA	Dec	Error	Note	Reference
$00^h53^m52.16^s$	-42º56' 34.5"	0.62"	UVOT-refined	Kuin GCN Circ. 14030
$00^h53^m52.22^s$	-42º56' 35.0"	1.6"	XRT-enhanced	Beardmore *et al*. GCN Circ. 14027
$00^h53^m53.6^s$	-42º55' 45.9"	2.3'	BAT-refined	Sakamoto *et al*. GCN Circ. 14028

Table 1. Positions from the Swift instruments.

Band	Authors	GCN Circ.	Observatory	Notes
Optical	Kruehler *et al*.	14031	GROND	redshift
Optical, NIR	Sanchez-Ramirez *et al*.	14035	X-shooter	redshift

Table 2. Summary of GCN Circulars from other observatories sorted by band and then circular number.

Filter	T±start(s)	T±stop(s)	Exp(s)	Mag
white	120	270	147	20.3 ± 0.2
white	558	578	20	19.9 ± 0.4
white	5689	5888	200	21.3 ± 0.4
v	608	1080	59	>19.6
b	534	1178	58	19.4 ± 0.2
u	278	528	125	>24.8
u	6714	6914	200	20.6 ± 0.5
w1	830	6710	432	>21.3
m2	632	6504	413	>21.1
w2	1036	6094	413	>20.8

Table 3. UVOT Observations. The start and stop times of the exposures are given in seconds since the BAT trigger. The preliminary detections and 3-σ upper limits are given. No correction has been made for extinction in the Milky Way.

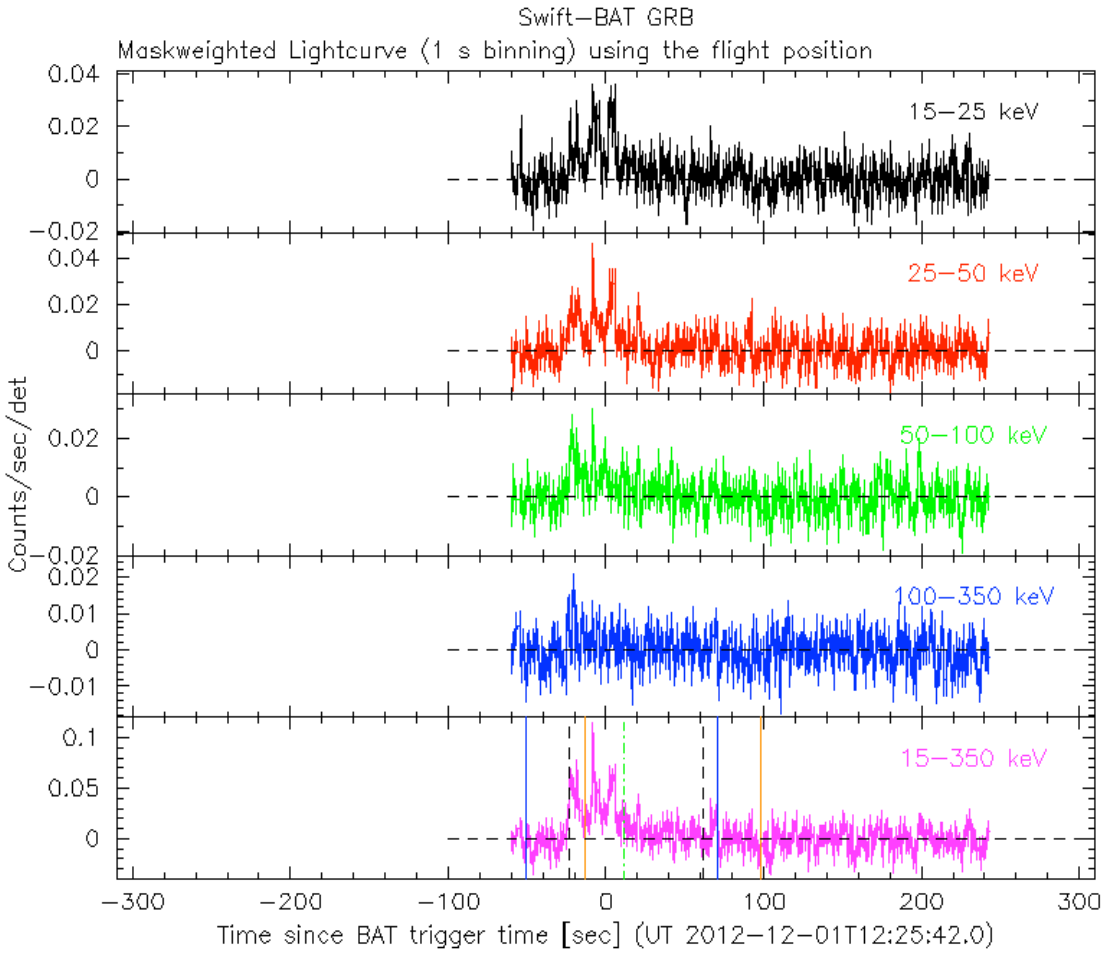

Figure 1. GRB121201A: The BAT mask-weighted light curve in the four individual and total energy bands. The units are counts s^{-1} illuminated-detector^{-1}.

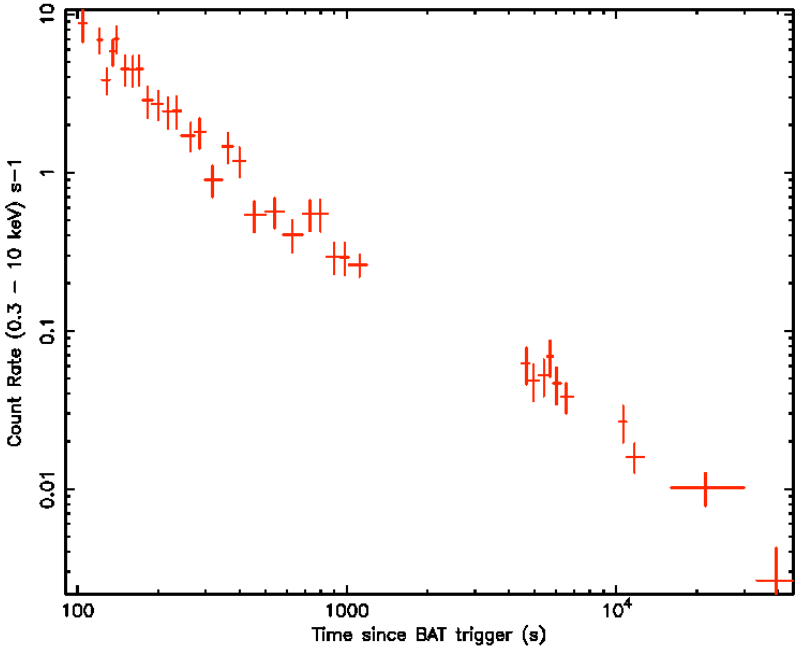

Figure 2. GRB121201A: The XRT light curve.

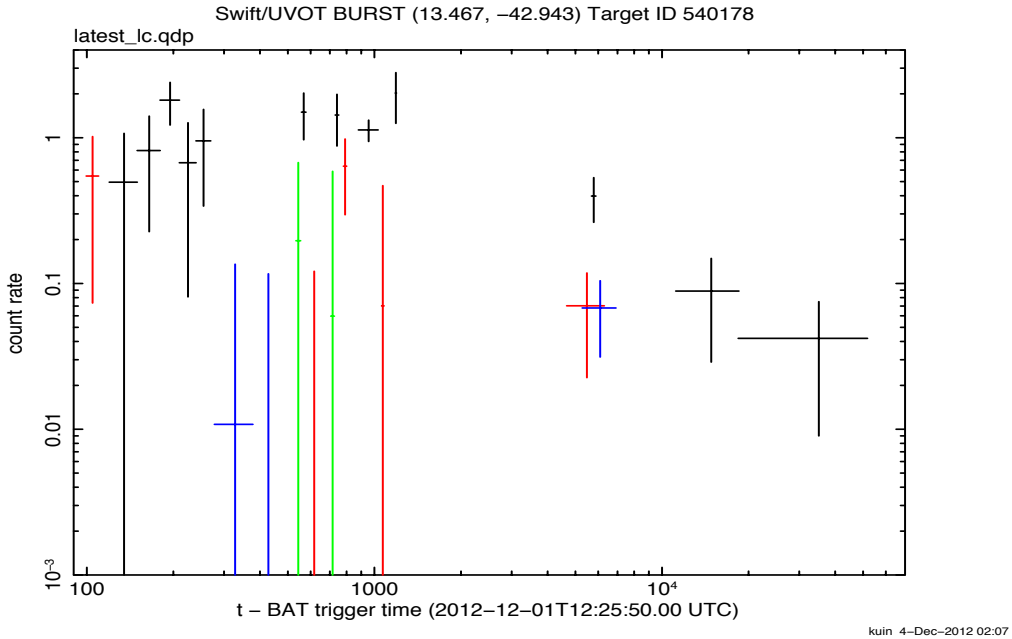

Figure 3. GRB121201A: The UVOT light curve. White filter count rates are in black, v-filter in red, b-filter in green, and the u-filter in blue.