

Swift Observations of GRB 081127

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1 Introduction

At 07:05:08 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 081127 (trigger 335715). Swift slewed immediately to the burst. The XRT began observing the field at 07:07:10.8 UT, 121.9 seconds after the BAT trigger. Using promptly downlinked data we found a bright, fading, uncatalogued X-ray source. UVOT took a finding chart exposure of 150 seconds with the White filter starting 130 seconds after the BAT trigger. No credible afterglow candidate had been found in the initial data products. The UVOT-enhanced Swift-XRT position was $RA(J2000) = 22h\ 08m\ 15.40s$, $Dec(J2000) = +06d\ 51'\ 01.7''$ with a 90% error circle of 1.7 arcsec (Beardmore *et al.*, *GCN Circ.* 8565).

2 BAT Observation and Analysis

Using the data set from T-119 to T+183 sec from recent telemetry downlinks, we report further analysis of BAT GRB 081127 (trigger 335715) (Mao, *et al.*, *GCN Circ.* 8560). The BAT ground-calculated position is $RA, Dec = 332.075, 6.858$ deg, which is

$$RA(J2000) = 22h\ 08m\ 18.0s$$

$$Dec(J2000) = +06d\ 51'\ 30.2''$$

with an uncertainty of 2.4 arcmin, (radius, sys+stat, 90% containment). The partial coding was 51%.

The mask-weighted light curve (Fig. 1) shows a single peak starting at T-30 sec, peaking around T+0 sec, and ending at T+55 sec. T₉₀ (15-350 keV) is 37 ± 10 sec (estimated error including systematics).

The time-averaged spectrum from T-31.2 to T+8.8 sec is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 2.10 ± 0.35 . The fluence in the 15-150 keV band is $(4.9 \pm 1.0) \times 10^{-7}$ *erg cm*⁻². The 1-sec peak photon flux measured from T-1.19 sec in the 15-150 keV band is 0.6 ± 0.2 *ph cm*⁻² *sec*⁻¹. All the quoted errors are at the 90% confidence level.

The results of the analysis will be available at http://gcn.gsfc.nasa.gov/notices_s/335715/BA/.

3 XRT Observations and Analysis

We have analysed the first 4 orbits of Swift-XRT data obtained for GRB 081127 (Mao *et al.*, *GCN Circ.* 8560), covering from 128 to 219 s in Windowed Timing (WT) and from 220 s to 19.5 ks in Photon Counting (PC) mode data, respectively. The net exposures are 90 s and 9.4 ks for the WT and PC modes data, respectively. The UVOT-enhanced XRT position was given by Beardmore *et al.*, in *GCN Circ.* 8565.

The light curve shows an initial steep decay of index 5.6 until 420 s, then it shows a shallow decay with index of 0.6. After 13.3 ks the lightcurve shows a decay with an index of about 2.0.

The WT spectrum can be fit with an absorbed power-law model with a photon index of 4.2 ± 0.2 and an absorbing equivalent hydrogen column density is $(2.8 \pm 0.3) \times 10^{21}$ *cm*⁻², which is larger than the Galactic one, 6.7×10^{20} *cm*⁻² (Kalberla *et al.*, 2005). The observed (unabsorbed) 0.3-10 keV flux is $3.7(4.5) \times 10^{-10}$ *erg cm*⁻² *s*⁻¹. The PC spectrum can be fit with an absorbed power-law model with

a photon index of 2.3 ± 0.3 with an absorbing equivalent hydrogen column density compatible with the Galactic value.

Detailed light curves in both count rate and flux units are available in both graphical and ASCII formats at http://www.swift.ac.uk/xrt_curves/.

4 UVOT Observation and Analysis

The Swift/UVOT observed the field of GRB 081127 starting 113 s after the BAT trigger (Mao, *et al.*, 2008, *GCN Circ.* 8560). Settled exposures started at T+131 s. We do not find any new source, relative to the DSS or 2MASS, or any variable source inside the UVOT-enhanced XRT error circle (Beardmore, *et al.*, 2008, *GCN Circ.* 8565). Preliminary 3-sigma upper limits for detecting a source in the white finding chart, and the co-added images, using a 2.5 arcsecond radius circular aperture, are:

Filter	T_{start}	T_{stop}	Exp(s)	mag
white	130	380	147	> 21.3
v	365	18,799	1473	> 21.0
b	466	7263	568	> 21.4
u	440	13,713	1246	> 21.4
uvw1	415	13,011	1276	> 21.6
uvm2	389	19,496	2004	> 21.8
uvw2	341	17,885	1473	> 21.8
white	490	7468	714	> 22.2

Table 1: Magnitudes from UVOT observations.

The quoted upper limits have not been corrected for the expected Galactic extinction along the line of sight corresponding to a reddening of $E_{B-V} = 0.09$ mag (Schlegel, *et al.*, 1998, *ApJS*, 500, 525). All photometry is on the UVOT photometry system described in Poole *et al.*, (2008, *MNRAS*, 383, 627).

The $B = 13.15$ mag USNO-B1.0 star 0968-0627697 is located approximately 4 arcsec north of the XRT position. UVOT photometry at the location of the X-ray source is contaminated by this star.

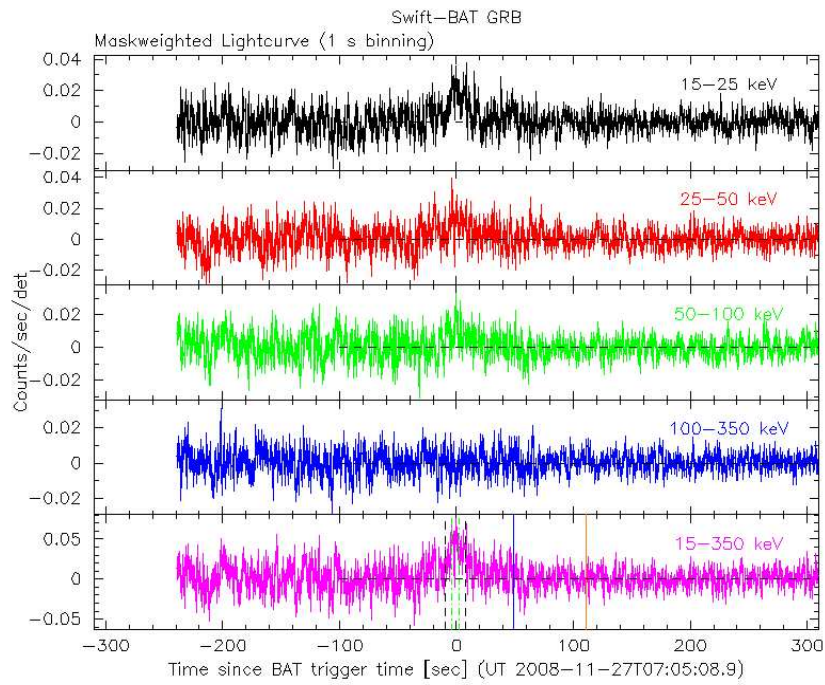


Figure 1: BAT Lightcurve. The mask-weighted light curve in the 4 individual plus total energy bands: 15-25 keV (black), 25-50 keV (red), 50-100 keV (green), 100-350 keV (blue), 15-350 keV (magenta).

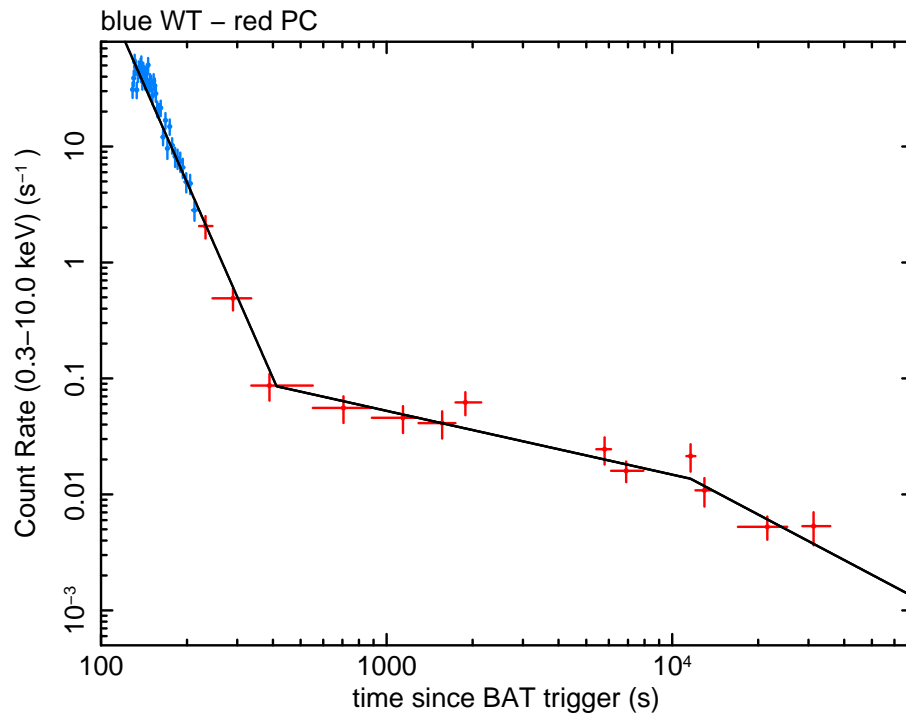


Figure 2: XRT Lightcurve in the 0.3-10 keV band. The approximate conversion is $1 \text{ count s}^{-1} \sim 3.3 \times 10^{-11} \text{ erg cm}^{-2} \text{ s}^{-1}$.