Swift Observation of GRB 070802

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1 Introduction

BAT triggered on GRB 070802 at 07:07:25 UT (Trigger 286809) (Barthelmy, *et al.*, *GCN Circ.* 6692). This was a 64 sec image-trigger on a long duration burst with $T_{90} = 16.4 \pm 1.0$ *sec*. Swift slewed to this burst immediately and XRT began follow-up observations at $T + 138$ *sec*, and UVOT at $T + 100$ *sec*. Our best position is the XRT location RA($J2000$) = 36.89899 *deg* ($02h27m35.76s$), Dec($J2000$) = -55.52733 *deg* ($-55d31'38.4''$) with an error of 2.1 arcsec (90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 239$ to $T + 776$ *sec*, further analysis of BAT GRB 070802 has been performed by Swift team (Cummings, *et al.*, *GCN Circ.* 6699). The BAT ground-calculated position is RA($J2000$) = 36.903 *deg* ($02h27m36.7s$), Dec($J2000$) = $-55.517deg$ ($-55d31'01''$) $\pm$ 2.0 $arcmin$, (radius, systematic and statistical, 90% containment). The partial coding was 73%.

The masked-weighted light curves (Fig.1) shows a single peak starting at $T+5$ and ending at $T+50$ sec. We note that there is a 3σ blip at $T - 150$ lasting about 20 sec. $T90$ (15–350 keV) is 16.4 ± 1.0 sec (estimated error including systematics).

The time-averaged spectrum from $T + 4.9$ to $T + 23.2$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 1.79 ± 0.27. For this model the total fluence in the $15 - 150$ keV band is $(2.8 \pm 0.5) \times 10^{-7} ergs/cm^2$ and the 1-sec peak flux measured from $T + 6.15$ *sec* in the $15 - 150$ keV band is 0.4 ± 0.1 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using the data from the first three orbits of XRT data of GRB 070802 (3.4 $ksec$ in Photon Counting mode), the refined XRT position is RA($J2000$) = 36.89899 *deg* ($02h27m35.76s$), Dec($J2000$) = -55.52733 *deg* ($-55d31'38.4''$) ± 2.1 $arcsec$ (90% confidence, including boresight uncertainties). This position is within 4.9 $arcsec$ of the initial XRT position, and 0.7 $arcsec$ from the optical afterglow candidate, reported by Malesani *et al.*, *GCN Circ.* 6696.

The $0.3 - 10$ keV light curve (Fig.2) decays with slope -2.0 ± 0.2 up to about $T + 500$ s, then flattens to slope -0.25 ± 0.08.

The spectrum can be fit with an absorbed power law with a photon index of 1.9 ± 0.3 and a column density consistent with the Galactic value ($2.9 \times 10^{20} cm^{-2}$). The average observed (unabsorbed) flux over $0.3 - 10$ keV for this spectrum is $3.9 \pm 0.8 \times 10^{-12}$ ($4.6 \pm 0.8 \times 10^{-12}$) $ergs/cm^2/sec$.

4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 070802 at 07:09:30 UT, 125 sec after the initial BAT trigger (Kuin & Immler, *GCN Circ.* 6701). No new source was detected within the refined XRT error circle. The 3σ upper limits (in the UVOT photometric system, Breeveld et al., *GCN Circ.* 6614) for detecting a source inside the XRT error circle in the co-added frames (including the settling exposure

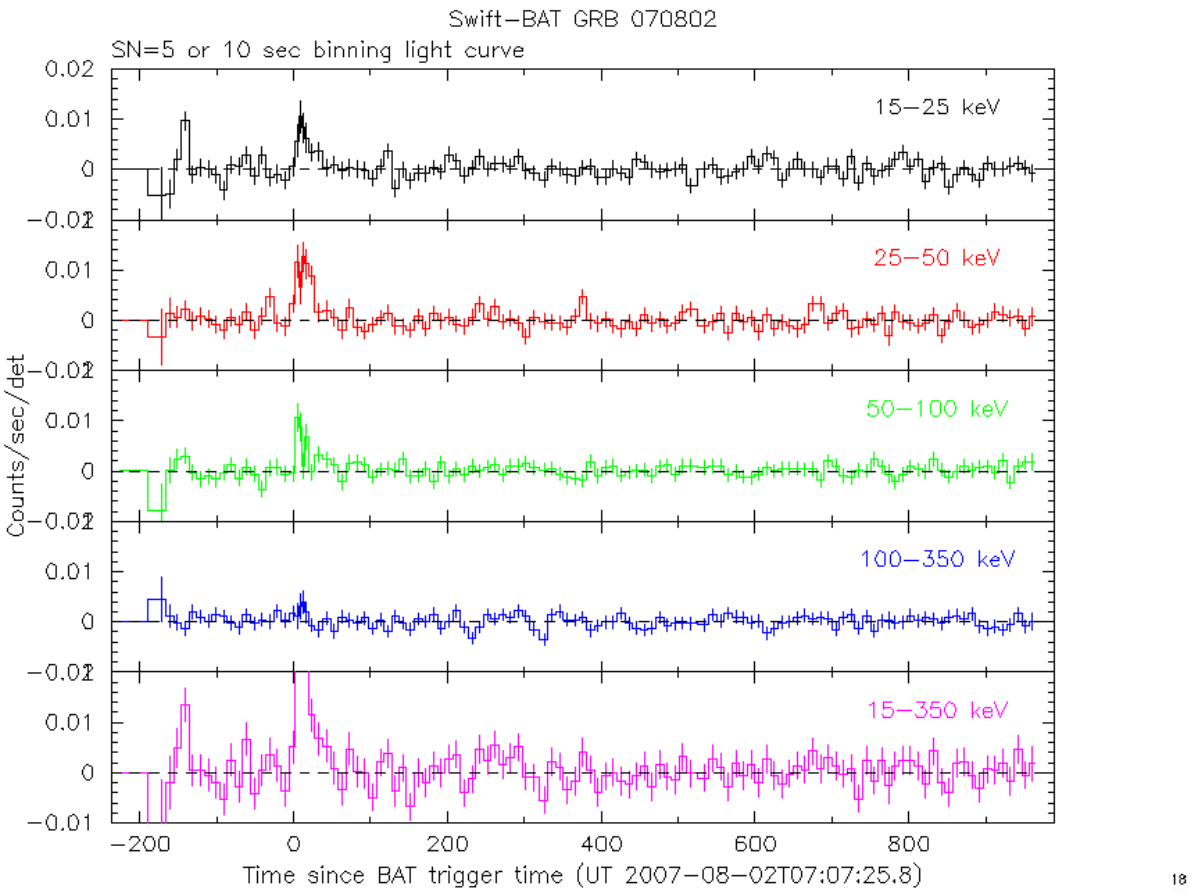

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector.

and finding charts) are listed below. These upper limits are not corrected for Galactic extinction E(B-V) = 0.026.

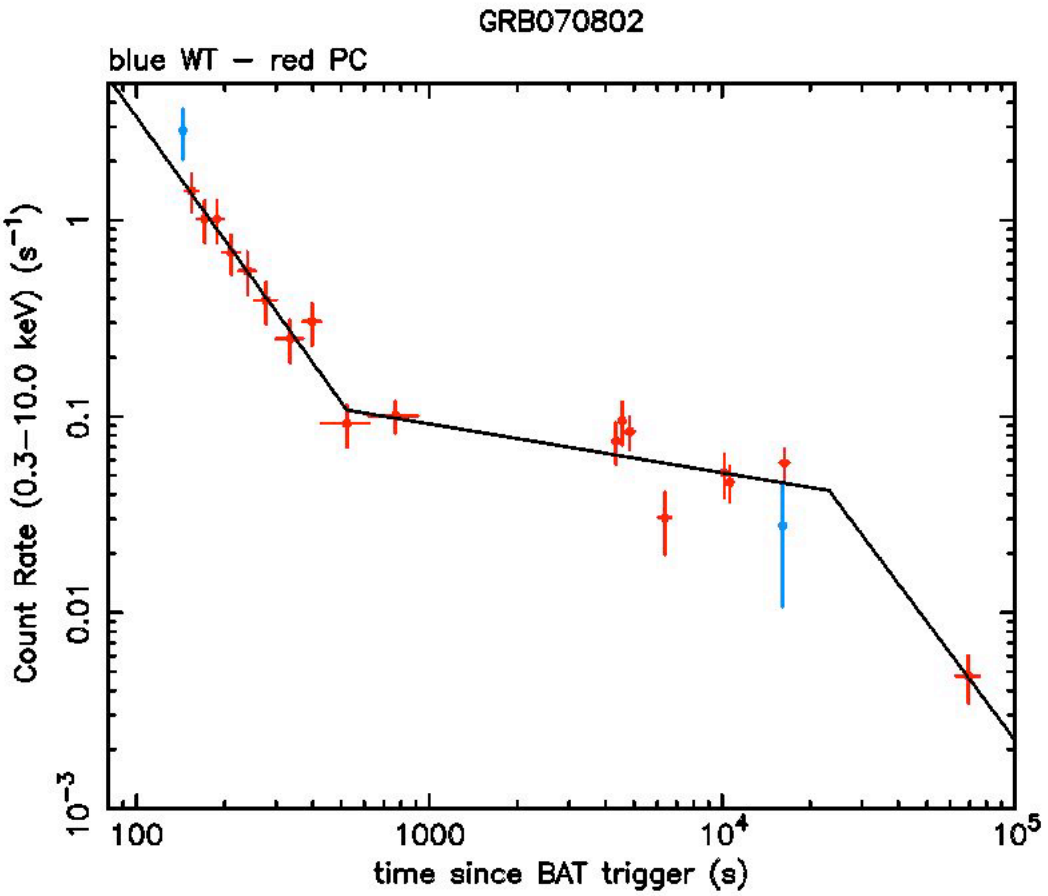

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Window Timing mode (black), Photon Counting mode (red).

Filter	Start	Stop	Exposure	3-Sigma UL
white (finding)	142	16875	589.9	>21.25
v (finding)	125	12514	773.2	>19.96
uvm2	654	4821	239.4	>19.84
uvw1	679	4969	182.3	>19.77
u	703	6307	219.6	>19.52
b	728	16681	1109.0	>21.27
uvw2	758	10893	1127.5	>21.16

Table 1: Magnitude limits from UVOT observations