Swift Observation of GRB 080702B

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1 Introduction

BAT detected GRB 080702B at 01:10:41 UT (Trigger 20077) (Cummings, *et al.*, *GCN Circ.* 7924) during a slew. This was an intermediate length burst with $T_{90} = 20$ *sec*. Swift slewed to this burst and began to observe it at 17:38 UT, 17.3 hours after the burst. XRT observations showed that one source initially found in the BAT error circle disappeared later, indicating it was the likely X-ray afterglow of GRB080702B.

Our best position of this source is the XRT location RA($J2000$) = $355.5665deg$ ($23h42m15.95s$), Dec($J2000$) = $-5.51410deg$ ($-05d30'50.8''$) with an error of 6.3 arcsec (90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 83$ to $T + 37$ *sec*, further analysis of BAT GRB 080702B has been performed by Swift team (Markwardt, *et al.*, *GCN Circ.* 7937). The BAT ground-calculated position is RA($J2000$) = $355.616deg$ ($23h42m27.8s$), Dec($J2000$) = $-5.424deg$ ($-05d25'26.4''$) $\pm$ 3.5 $arcmin$, (radius, systematic and statistical, 90% containment). The average partial coding was 60%.

The masked-weighted light curves (Fig.1) starts at trigger time with a single mildly rapid rise, and returns to background at about $T + 25$ *sec*. $T_{90}(15 - 350keV)$ is 20 ± 3 (estimated error including systematics).

The time-averaged spectrum from $T - 2$ to $T + 21$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 1.44 ± 0.13. For this model the total fluence in the $15 - 150$ keV band is $(5.0 \pm 0.9) \times 10^{-7} ergs/cm^2$ and the 1-sec peak flux measured from $T + 4$ *sec* in the $15 - 150$ keV band is 0.5 ± 0.1 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level.

3 XRT and UVOT Observations and Analysis

During the first day of observation, 4 $ksec$ of XRT data were collected and an uncatalogued X-ray source was found at RA($J2000$) = $355.5665deg$ ($23h42m15.95s$), Dec($J2000$) = -5.51410 deg ($-05d30'50.8''$)$\pm$ 6.3 $arcsec$ (radius, 90% confidence) (Evans et al., GCN 7971). We note that this source is outside the BAT refined error circle, but it still inside the original BAT error circle of Cummings *et al.*, *GCN Circ.* 7924.

At the first epoch observation, this X-ray source had a count rate of $(5 \pm 1.8) \times 10^{-3}$ counts/sec. In successive observations taken 6 and 8 days after the trigger, this object was not found anymore, down to 3 sigma upper limit of 1.3×10^{-3} counts/sec. We therefore conclude that this was the afterglow of GRB 080702B.

The observed (unabsorbed) flux over $0.3 - 10$ keV for the first epoch observation is $2.10 \pm 0.76 \times 10^{-13}$ $ergs/cm^2/sec$. The adopted count-to-flux conversion is 1 count/sec = $4.2 \times 10^{-11} ergs/cm^2/sec$. The early detection and the successive upper limit are shown in Fig.2.

In 4 ks of UVOT data obtained using the White filter between 17.3 and 19.3 hours after the trigger, no new sources are detected. The 3-sigma upper limit at the position of the second XRT source is

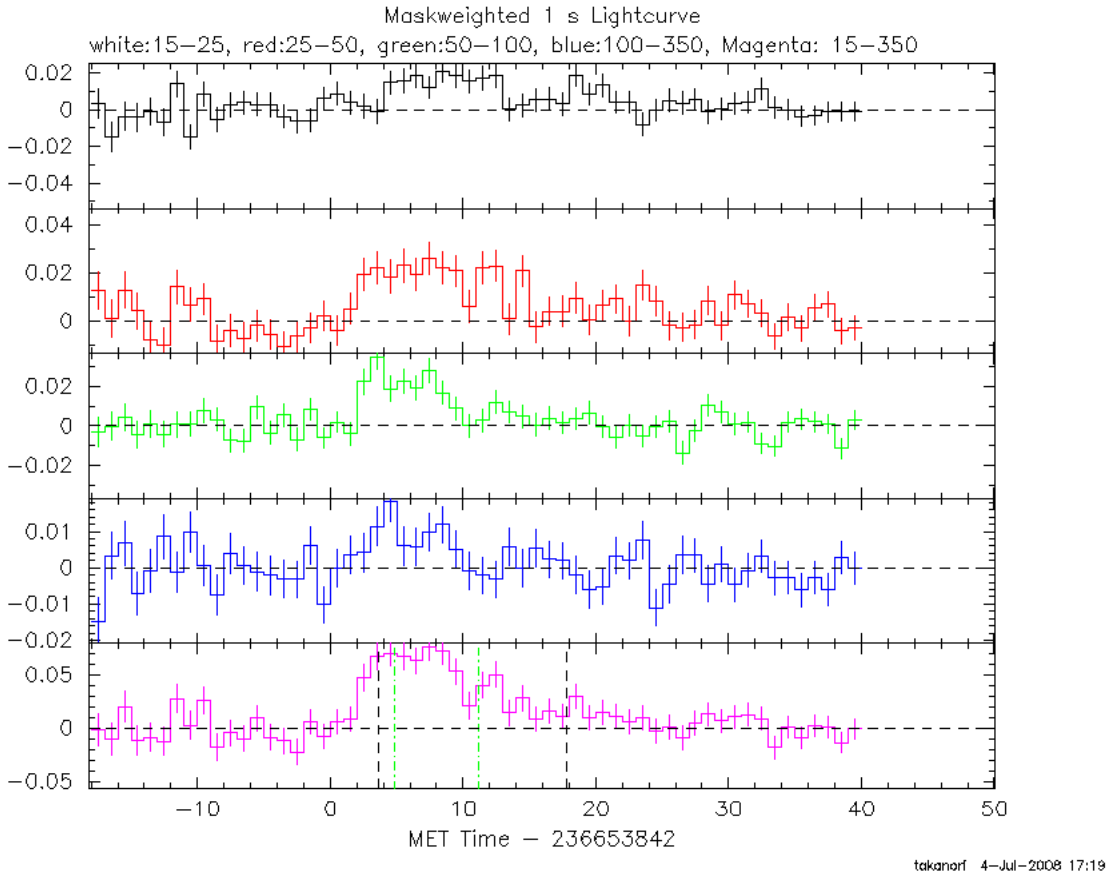

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 01:10:41 UT.

22.4 mag. This value is not corrected for the modest Galactic extinction corresponding to E(B-V) = 0.06 mag. Photometry is based on the UVOT fight system by Poole et al. 2008.

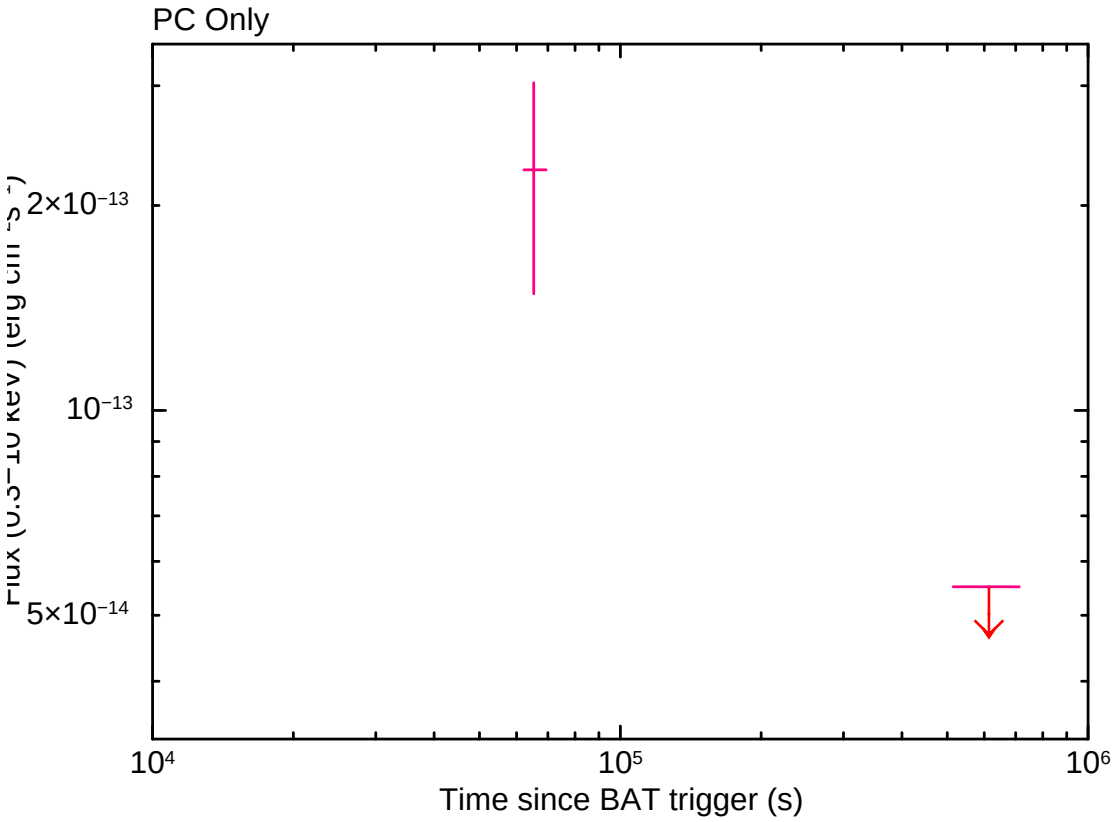

Figure 2: XRT Lightcurve (PC data only). The approximate count rate / fluxconversion is 1 count/sec $= \sim 4.2 \times 10^{-11}\ ergs/cm^2/sec$.