Swift Observation of GRB 080702A

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1 Introduction

BAT triggered on GRB 080702A at 11:50:43 UT (Trigger 315710) (De Pasquale *et al.*, *GCN Circ.* 7920), a short burst with $T_{90} = 0.5 \pm 0.2$ *sec*. Swift slewed to this burst immediately and XRT and UVOT began follow-up observations at $T + 66$ *sec*. Our best position is the XRT location RA($J2000$) = $313.05081deg$ ($20h52m12.20s$), Dec($J2000$) = $+72.31271deg$ ($+72d18'45.8''$) with an error of 1.9 arcsec (90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 120$ to $T + 182$ *sec*, further analysis of BAT GRB 080702 has been performed by Swift team (Krimm, *et al.*, *GCN Circ.* 7926). The BAT ground-calculated position is RA($J2000$) = $313.049deg$ ($20h52m11.8s$), Dec($J2000$) = $72.278deg$ ($+72d16'39.7''$) $\pm$ 3.0 $arcmin$, (radius, systematic and statistical, 90% containment). The partial coding was 81%.

The masked-weighted light curves (Fig.1) starts at trigger time $T = 0$ *sec* with a single rise, and returns to background at about $T + 0.6$ *sec*. $T_{90}(15 - 350keV)$ is 0.5 ± 0.2 *sec* (estimated error including systematics).

The time-averaged spectrum from $T + 0.0$ to $T + 0.5$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 1.34 ± 0.42. For this model the total fluence in the $15 - 150$ keV band is $(3.6 \pm 1.0) \times 10^{-8} ergs/cm^2$ and the 1-sec peak flux measured from $T - 0.22$ *sec* in the $15 - 150$ keV band is 0.7 ± 0.2 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using 95 s of overlapping XRT Photon Counting mode and UVOT data for GRB 080702A, we find an astrometrically corrected X-ray position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue): RA, Dec = 313.05081, +72.31271 which is equivalent to RA ($J2000$) : $20h52m12.20s$, Dec ($J2000$) : $+72d18'45.8$".

The $0.3 - 10$ keV light curve (Fig.2) shows an initial shallow decline with a slope of $0.5^{+0.3}_{-0.4}$, following by a steeper slope of $1.3^{+0.3}_{-0.2}$, beginning at $T \sim 475s$. We note that the break time is not well constrained.

The first orbit of the X-ray data can be modeled with an absorbed power-law with spectral indices of $2.05^{+0.71}_{-0.64}$. The NH column density is $6.2^{+5.4}_{-3.6} \times 10^{21} cm^{-2}$, in excess of the Galactic column density NH 1.53×10^{21}in the direction of the burst. The average observed (unabsorbed) flux over $0.3 - 10$ keV for this spectrum (spanning a time of 75-800 seconds after the trigger) is 5.7×10^{-12} (1×10^{-11}) $ergs/cm^2/sec$.

4 UVOT Observation and Analysis

The UVOT began settled exposures of the field of GRB 080702A at 11:51:56 UT, 73 sec after the initial BAT trigger (De Pasquale *et al.*, *GCN Circ.* 7920). No new source was detected within the XRT error circle in the white (99 *sec*) and V (399 *sec*) finding exposures, or in the co-added images in any filter down to 3-sigma magnitude. Upper limits are summarized in Table 1. These upper limits

Filter	Start	Stop	Exposure	3-Sigma UL
wh (finding)	73	172	98	20.8
v (finding)	179	578	393	20.0
v	713	6099	305	19.8
b	659	6840	334	20.8
u	634	6714	432	20.6
uvw11	610	6509	432	20.2
uvm2	585	6303	432	20.3
uvw22	689	5894	235	20.3
wh	674	5688	314	21.4

Table 1: Magnitude limits from UVOT observations

are not corrected for strong Galactic extinction E(B-V) = 0.67. Photometry is based on the UVOT flight system by Poole et al. 2008.

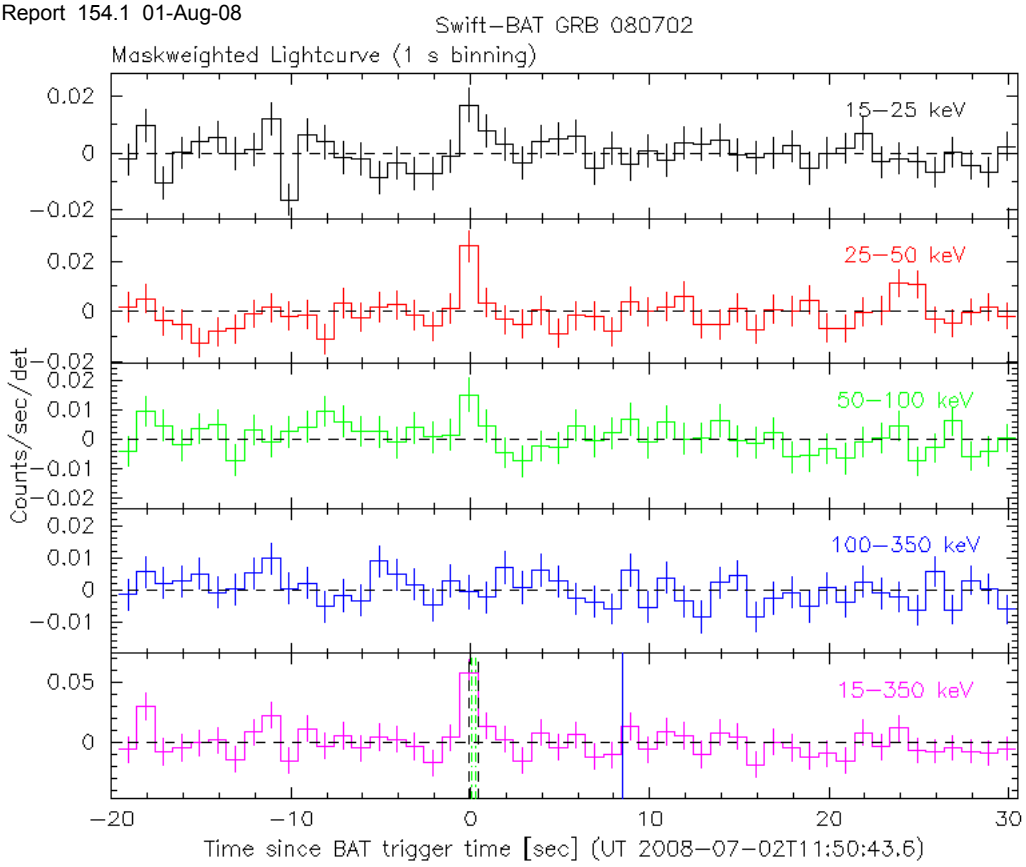

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 11:50:43 UT.

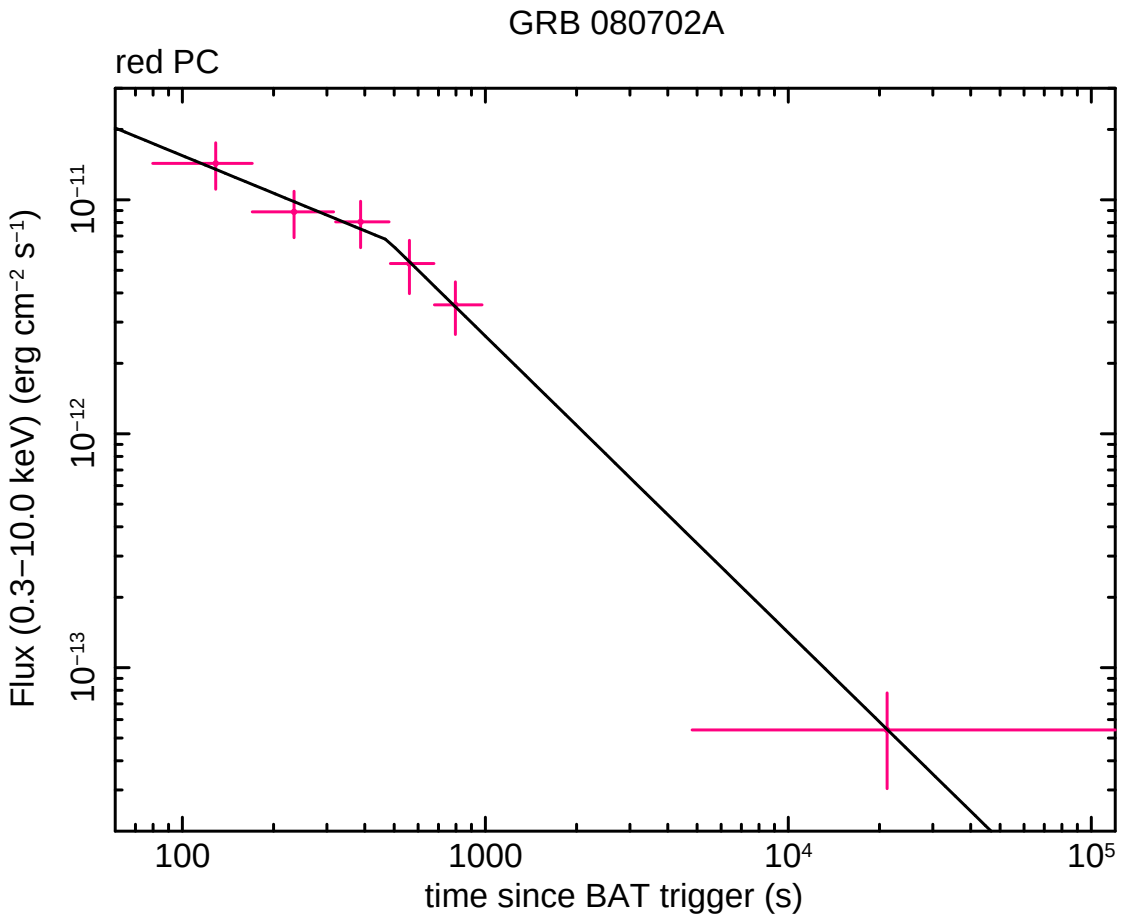

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Window Timing mode (black), Photon Counting mode (red). The approximate conversion is 1 count/sec = $\sim 1 \times 10^{-11}$ $ergs/cm^2/sec$.