Swift Observations of GRB 080207

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1 Introduction

BAT triggered on GRB 080207 at 21:30:21 UT (Trigger 302728) (Racusin, *et al.*, *GCN Circ.* 7264). This was an image trigger on a long burst with $T_{90} = 340$ *sec*. Swift slewed to this burst immediately and XRT began follow-up observations at $T + 124$ *sec*, and UVOT at $T + 140$ *sec*. Our best position is the Enhanced XRT location RA($J2000$) = $207.51253deg$ ($13h50m3.01s$), Dec($J2000$) = $+7.50245deg$ ($+7d30'08.8''$) with an uncertainty of 2.9 arcsec (radius, 90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 239$ to $T + 963$ *sec*, further analysis of BAT GRB 080207 has been performed by Swift team (Stamatikos, *et al.*, *GCN Circ.* 7272). The BAT ground-calculated position is RA($J2000$) = $207.514deg$ ($13h50m03.3s$), Dec($J2000$) = $+7.492deg$ ($+07d29'32''$) with an uncertainty of 1.2 *arcmin*, (radius, systematic and statistical, 90% containment). The partial coding was 100%.

The mask-weighted light curves (Fig. 1) shows a long smooth rise starting at $\sim T - 20$ *sec*, peaking around $T + 100$ *sec*, then dropping to a minimum around $T + 200$ *sec*, then rising again out to $\sim T + 340$ *sec* at which point the location went out of the BAT FOV when the spacecraft slewed to a new target. Based on the raw counting rates, which are somewhat sensitive to photons through the side of the instrument, there was no significant emission above about 50 keV after this time. $T_{90}(15 - 350keV)$ is 340 ± 20 *sec* (estimated error including systematics).

The time-averaged spectrum from $T+4.7$ to $T+332.9$ *sec* is best fit by a power law with an exponential cutoff. This fit gives a photon index 1.17 ± 0.27, and E_{peak} of 107.8 ± 72.5 keV ($\chi^2 = 51.31$ for 56 d.o.f.). For this model the total fluence in the $15 - 150$ keV band is $6.1 \pm 0.2 \times 10^{-06}$ $ergs/cm^2$ and the 1-sec peak flux measured from $T + 330.34$ *sec* in the $15 - 150$ keV band is 1.0 ± 0.3 $ph/cm^2/sec$. A fit to a simple power law gives a photon index of 1.58 ± 0.06 ($\chi^2 = 57.73$ for 57 d.o.f.). All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using 199 s of overlapping XRT Photon Counting mode and UVOT V-band data for GRB 080207, we find an astrometrically corrected X-ray position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue): RA($J2000$) = $207.51253deg$ ($13h50m3.01s$), Dec($J2000$) = $+7.50245deg$ ($+07d30'08.8''$) with an uncertainty of 2.9 *arcsec* (radius, 90% confidence). This position (Beardmore *et al.*, *GCN Circ.* 7265) is within 3.9 *arcsec* of the initial XRT position (Racusin *et al.*, *GCN Circ.* 7264).

The $0.3-10$ keV light curve (Fig.2) shows a flaring shallow portion, beginning at $T+130$ *sec*, following by a poorly constrained break to a power-law decay with slope of 1.85 ± 0.10.

The WT data ($133 - 197$ seconds) can be modeled as an absorbed power-law with photon index of 1.1 ± 0.1 and a total absorbing column of $N_H = (85 \pm 10) \times 10^{20} cm^{-2}$. The PC data ($4.7 - 17.1$ ks) can be modeled as an absorbed power-law with photon index of 2.4 ± 0.2 and a total absorbing column of $N_H = (75 \pm 17) \times 10^{20} cm^{-2}$. Both fits are in excess of the Galactic value of $1.95 \times 10^{20} cm^{-2}$. The $0.3 - 10$ keV observed (unabsorbed) flux during this time is $5.80 \times 10^{-9} (5.81 \times 10^{-9})$ $ergs/cm^2/sec$ and $1.15 \times 10^{-11} (1.16 \times 10^{-11})$ $ergs/cm^2/sec$ for WT and PC, respectively.

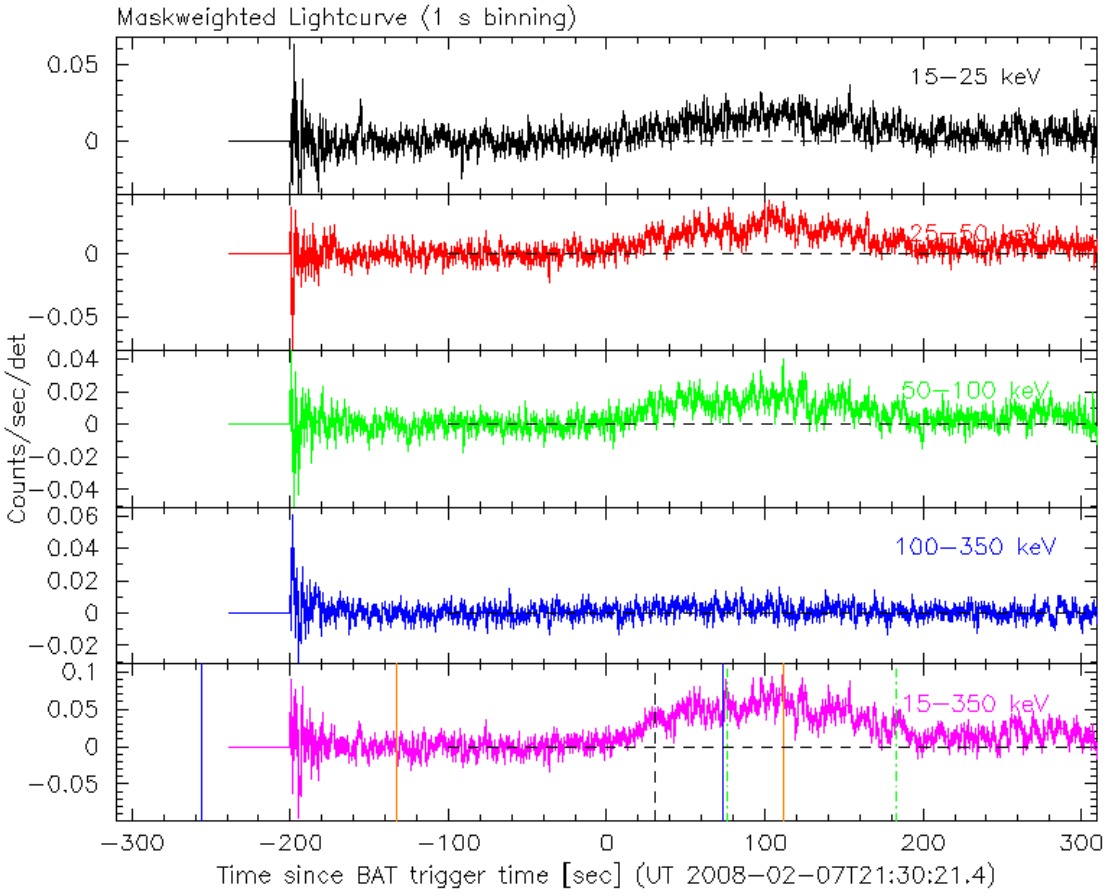

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector (note illum-det = $0.16cm^2$) and T_0 is 21:30:21 UT.

4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 080207 starting 140 sec after the initial BAT trigger (Racusin *et al.*, *GCN Circ.* 7264). No new source was detected within the Enhanced-XRT error circle (Beardmore *et al.*, *GCN Circ.* 7265) in any of the UVOT coadded observations. The 3-sigma upper limits (in the UVOT photometric system, Breeveld *et al.*, *GCN Circ.* 6614) are summarized in Table 1. These upper limits are not corrected for Galactic extinction E(B-V) = 0.02 mag.

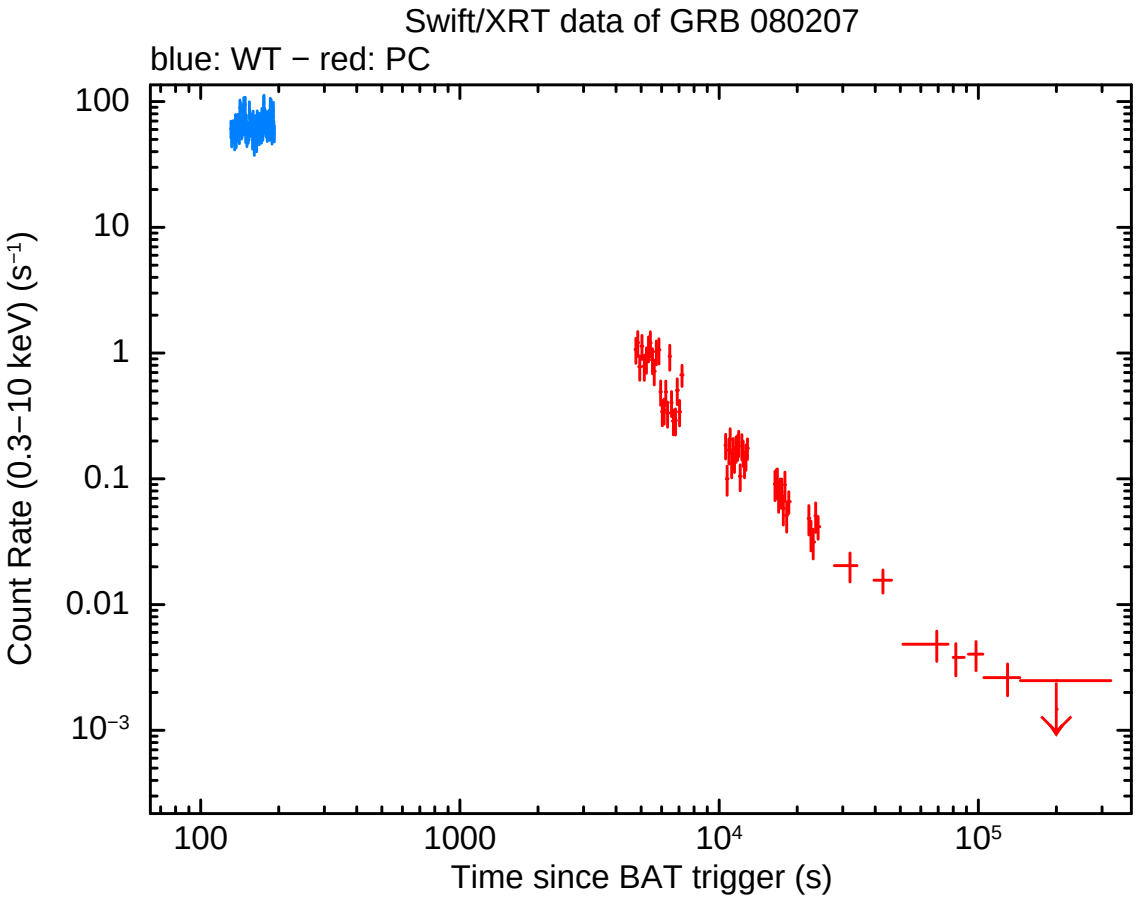

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Window Timing mode (blue), Photon Counting mode (red). The approximate conversion is 1 count/sec = $\sim 8.9 \times 10^{-11}$ $ergs/cm^2/sec$.

Filter	Start	Stop	Exposure	3-Sigma UL
white	55	11428	1167	22.40
v	4733	13063	1097	20.50
b	5553	16909	983	21.53
u	5347	6982	393	20.57
uvw1	5143	6777	393	20.75
uvm2	4937	6572	393	20.58
uvw2	5963	12334	1082	21.62

Table 1: Magnitude limits from UVOT observations