Swift Observation of GRB 080805

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1 Introduction

BAT triggered on the long GRB 080805 at 07:41:34.7 UT (Trigger 319036) (Pagani, *et al.*, *GCN Circ.* 8059), a burst with $T_{90} = 78 \pm 7$ *sec*. *Swift* slewed immediately to the burst. The XRT detected the afterglow in observations starting 63.5 *sec* after the trigger. The UVOT did not detect the optical afterglow (Ward, *et al.*, *GCN Circ.* 8071). The optical/NIR afterglow was detected in observations by the GROND telescope (Kruehler,*et al.*, *GCN Circ.* 8060), with the VLT (de Ugarte Postigo, *et al.*, *GCN Circ.* 8061) and with the Faulkes Telescope South (Guidorzi, *et al.*, *GCN Circ.* 8076). The spectroscopic redshift of this burst is $z = 1.505$, measured using the FORS2 on the ESO Very Large Telescope (Jakobsson, *et al.*, *GCN Circ.* 8077).

2 BAT Observation and Analysis

Using the data set from $T - 240$ to $T + 302$ *sec*, further analysis of BAT GRB 080805 has been performed by the *Swift* team (Palmer, *et al.*, *GCN Circ.* 8068). The BAT ground-calculated position is RA($J2000$) = $314.231deg$ ($20h56m55.3s$), Dec($J2000$) = $-62.433deg$ ($-62d25'58.8''$) $\pm$ 1.0 $arcmin$, (radius, systematic and statistical, 90% containment). The partial coding was 100%.

The mask-weighted light curve (Fig.1) shows a FRED-like peak starting at $\sim T - 5$ *sec*, peaking at $\sim T + 3$ and ending at $\sim T + 140$ *sec*. $T_{90}(15 - 350keV)$ is 78 ± 7 *sec* (estimated error including systematics).

The time-averaged spectrum from $T - 6.1$ to $T + 93.3$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 1.53 ± 0.07. For this model the total fluence in the $15 - 150$ keV band is $(2.5 \pm 0.1) \times 10^{-6} ergs/cm^2$, and the 1-sec peak flux measured from $T + 2.62$ *sec* in the $15 - 150$ keV band is 1.1 ± 0.1 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level considering the statistical and usual systematic effects.

3 XRT Observation and Analysis

Using 728 *sec* of overlapping XRT Photon Counting mode and UVOT data for GRB 080805, we find an astrometrically corrected X-ray position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue): RA($J2000$) = $314.22312deg$ ($20h56m53.55s$), Dec($J2000$) = -62.44479 deg ($-62d26'41.2''$) $\pm$ 1.7 $arcsec$ (radius, 90% confidence) (Pagani, *et al.*, *GCN Circ.* 8072).

The $0.3 - 10$ keV light curve (Fig.2) shows an initial flare and a steep decay followed by a shallower phase. The decaying light curve can be fit with a broken power-law with an initial slope of 3.51 ± 0.27, a break at $\sim T + 475$ *sec* and a later decay index of 0.93 ± 0.08.

The X-ray spectrum of the first orbit of Windowed Timing mode data from $T + 70$ *sec* to $T + 251$ *sec* can be well fitted by an absorbed power law with spectral index 1.32 ± 0.06. The NH column density is $(3.3^{+1.1}_{-1.0}) \times 10^{21} cm^{-2}$ in excess of the Galactic column density of $3.5 \times 10^{20} cm^{-2}$ in that direction.

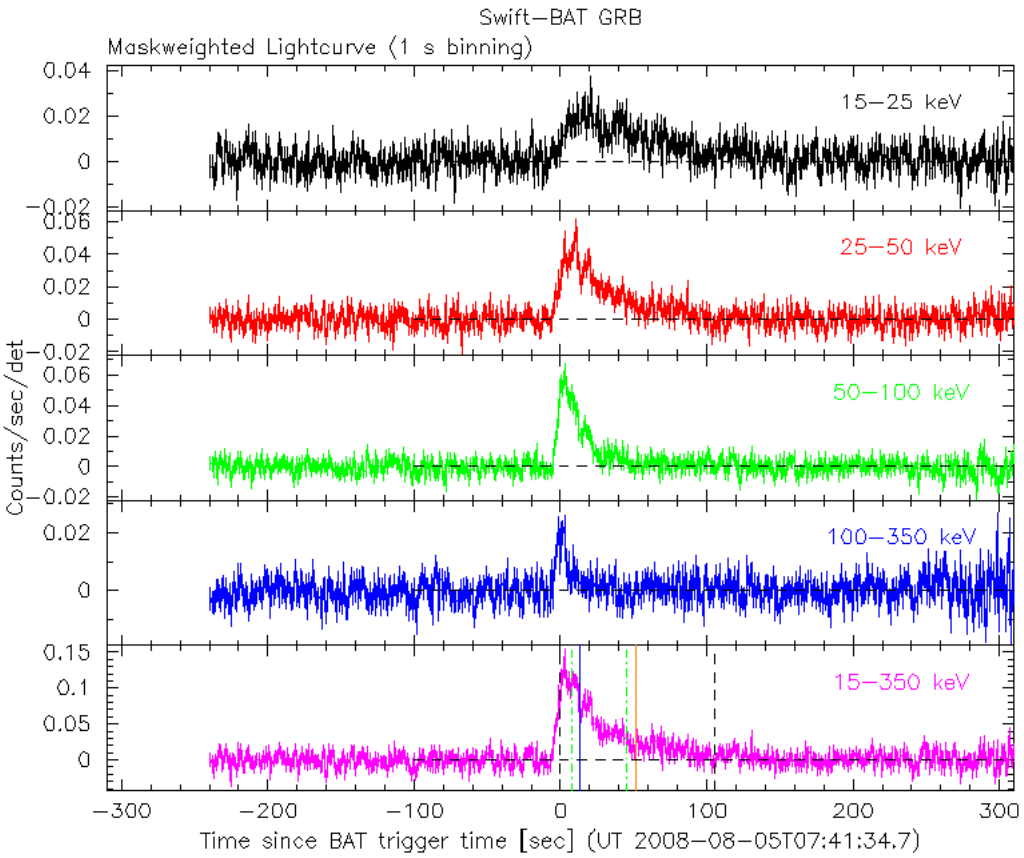

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 07:41:34.7 UT.

The average absorbed flux over $0.3 - 10$ keV for this spectrum is 1.75×10^{-10} $ergs/cm^2/sec$, which corresponds to an unabsorbed flux of 1.9×10^{-10} $ergs/cm^2/sec$.

4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 080805 74 *sec* after the BAT trigger (Ward *et al.*, *GCN Circ.* 8071). We do not find a source in any of the UVOT observations inside the XRT error circle or at the position reported by Kruehler et al. (GCN 8060). The 3σ upper limits for detecting a source are in Table 1. These values are on the UVOT Photometric System described in Poole et al. (2008, *MNRAS*, 383,627). These values are not corrected for the Galactic extinction in the direction of the burst corresponding to a reddening of $E_{B-V} = 0.043$ mag (Schlegel *et al.*, *ApJ.* 500:525-553, 1998).

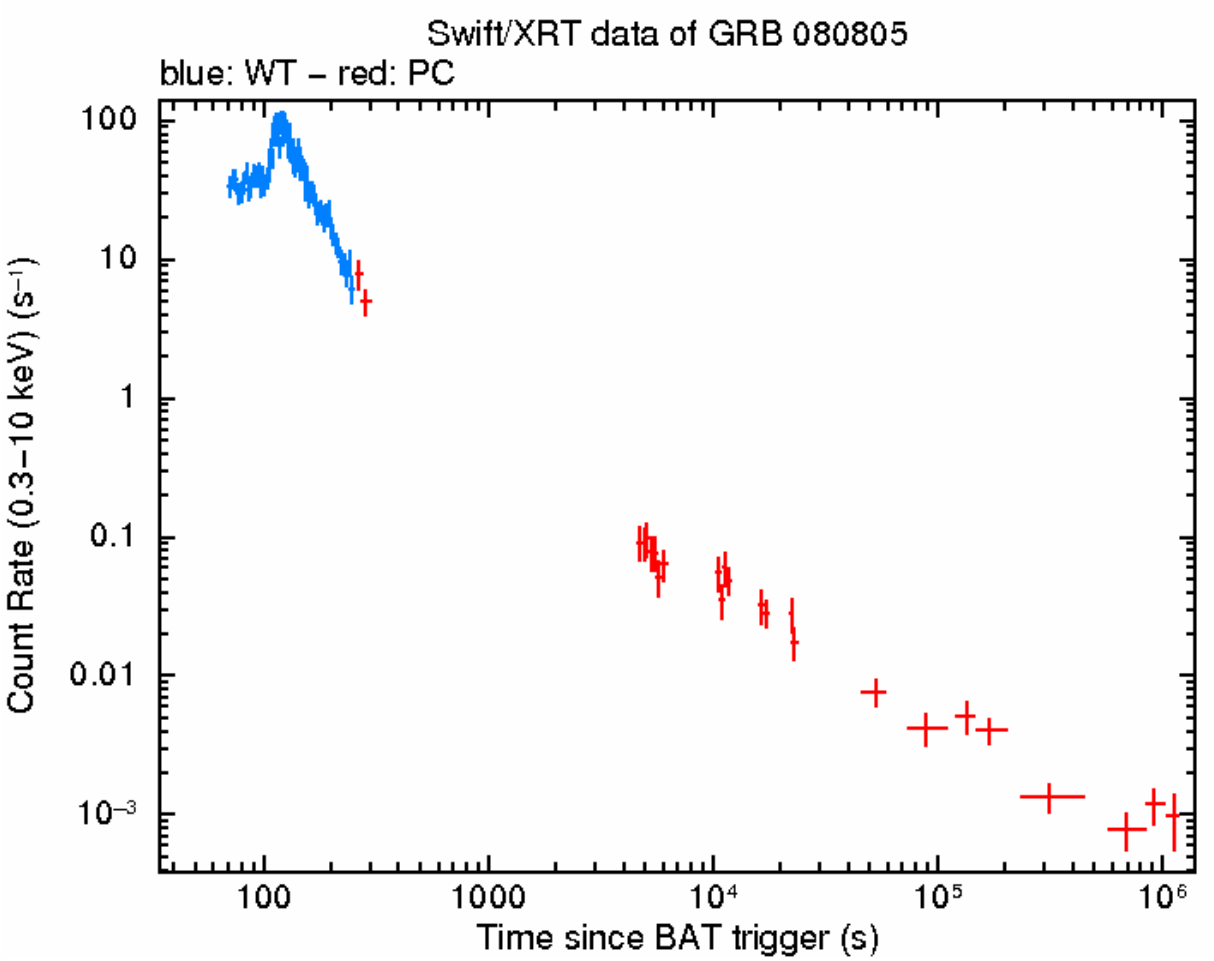

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Window Timing mode (blue), Photon Counting mode (red). The approximate conversion is 1 count/sec = $\sim 5.2 \times 10^{-11}$ $ergs/cm^2/sec$.

Filter	T_{start}	T_{stop}	Exposure	Mag
White	76	175	98.5	> 20.70
White	5473	18024	1082	> 22.12
V	182	6083	332	> 19.81
B	5268	17112	1082	> 21.43
U	5061	5260	197	> 20.11
UVW1	4856	5055	197	> 20.0
UVM2	4650	6267	371	> 20.09
UVW2	5680	18053	219	> 20.12

Table 1: Upper limits from UVOT observations