Swift Observation of GRB 070506

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1 Introduction

BAT triggered on GRB 070506 at 05:35:58 UT (Trigger 278693) (Pagani, *et al.*, *GCN Circ.* 6375). This was an image-trigger on a burst with $T_{90} = 4.3 \pm 0.3$ *sec*. Swift slewed immediately to the burst. The XRT imaged the field at 05:38:05 UT, 127 seconds after the BAT trigger. Due to the SAA the observations were stopped and restarted at 05:42:51 UT. The UVOT started observing the field 459 seconds after the BAT trigger with a 100 seconds white filter exposure, detecting an optical counterpart of 19.4 magnitude. The redshift has been spectroscopically measured to be $z = 2.31$ with the VLT (Thoene, *et al.*, *GCN Circ.* 6379).

2 BAT Observations and Analysis

Using the data set from $T - 239$ to $T + 963$ *sec*, further analysis of BAT GRB 070506 has been performed by the Swift team (Barbier, *et al..*, *GCN Circ.* 6376). The BAT ground-calculated position is RA($J2000$) = $347.203deg$ ($23h08m48.8s$), Dec($J2000$) = $10.711deg$ ($10d42'40.3$")± 2 $arcmin$(radius, systematic and statistical, 90% containment). The partial coding was 96%. The mask-weighted light curve (Fig.1) begins to rises at $\approx T + 2$ *sec*, peaks at $\approx T + 6.5$ *sec*, and returns to the background level by $\approx T + 10$ *sec*, with trivial emission above 100 keV. $T_{90}(15 - 350keV)$ is 4.3 ± 0.3 *sec* (estimated error including systematics). The time-averaged spectrum from $T + 4.1$ to $T + 9.0$ *sec* is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.72 ± 0.17. The fluence in the $15 - 150$ keV band is $2.1 \pm 0.2 \times 10^{-07} ergs/cm^2$. The 1-sec peak flux measured from $T + 6.16$ *sec* in the $15 - 150$ keV band is 1.0 ± 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 Observations and Analysis

Using the data set of GRB070506 from $T + 432$ *sec* to $T + 8.1$ *ksec* (2.8 *ksec* in Photon Counting mode) the refined XRT position is RA($J2000$) = $347.2179deg$ ($23h08m52.30s$), Dec($J2000$) = $+10.7217deg$ ($10d43'18.2''$) ± 5.4 $arcsec$ (90% confidence, including boresight uncertainties). This position is within 5.1 $arcsec$ of the initial XRT position, Pagani *et al.*, *GCN Circ.* 6375. The $0.3 - 10$ keV X-ray light curve (Fig.2) shows a decaying source with hints of flaring activity. A power law fit yields a decay slope of 0.55 ± 0.06. The X-ray spectrum can be modeled with an absorbed power-law, with spectral index of 2.5 ± 0.5. The NH column density is $(1.8 \pm 1.1) \times 10^{21} cm^{-2}$, in excess of the Galactic value of $0.4 \times 10^{21} cm^{-2}$. The average unabsorbed flux over $0.3 - 10$ keV for this spectrum (spanning a time of $T + 413sec$ to $T + 8.1$ $ksec$) is 5.5×10^{-12} $ergs/cm^2/sec$.

4 UVOT Observations and Analysis

The Swift/UVOT began observing the field of GRB 070227 459 *sec* after the BAT trigger (W. Landsman, *et al.*, *GCN Circ.* 6378). A fading afterglow is weakly detected in the B, V and white UVOT filters, but not in the U or UV filters. We use the combined white image to obtain an improved position of RA($J2000$) = $347.2183deg$ ($23h08m52.39s$), Dec($J2000$) = $10.7224deg$ ($10d43'20.8''$) with an error of 0.5 *arcsec*. This is 0.5 *arcsec* from the UVOT position reported by Pagani, *et al.GCN Circ.* 6375 and 2.9 *arcsec* from the refined XRT position reported by Pagani, *et al.GCN Circ.* 6377. Photometry results are summerized in Table 1 for the 7 UVOT filters below. No correction has been made for the expected Galactic reddening of E(B-V) = 0.04 mag.

Filter	Start	Stop	Exposure	Mag
White	459	558	98	19.7 ± 0.18
	868	967	98	19.9 ± 0.22
	7371	7570	196	20.4 ± 0.28
V	974	1373	393	$19,1 \pm 0.2$
	7781	7980	197	$19.3(3\sigma\ UL)$
B	638	2245	136	19.8 ± 0.34
	7167	7366	197	$20.4(3\sigma\ UL)$
U	638	5853	261	$20.1(3\sigma\ UL)$
UVW1	614	5741	352	$20.4(3\sigma\ UL)$
UWM2	7984	8142	155	$19.6(3\sigma\ UL)$
UVW2	840	7775	294	$20.4(3\sigma\ UL)$

Table 1: UVOT observations

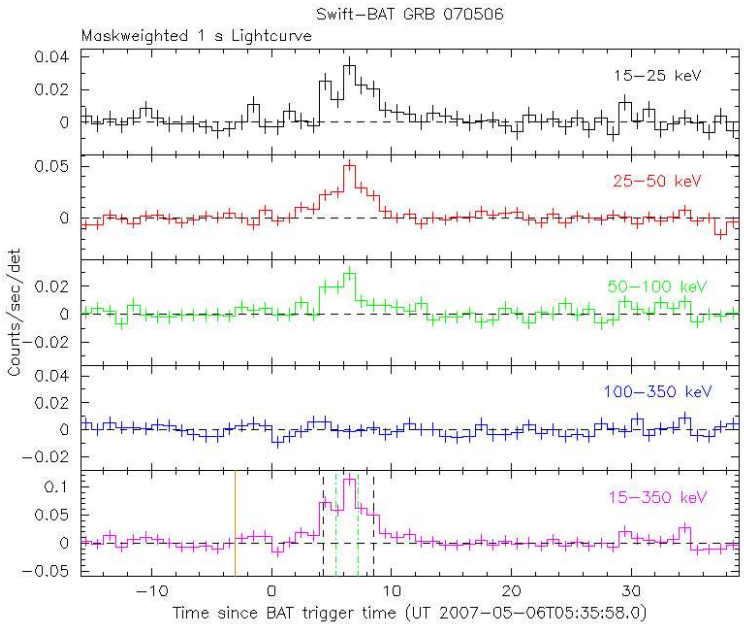

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 05:35:58.0 UT.

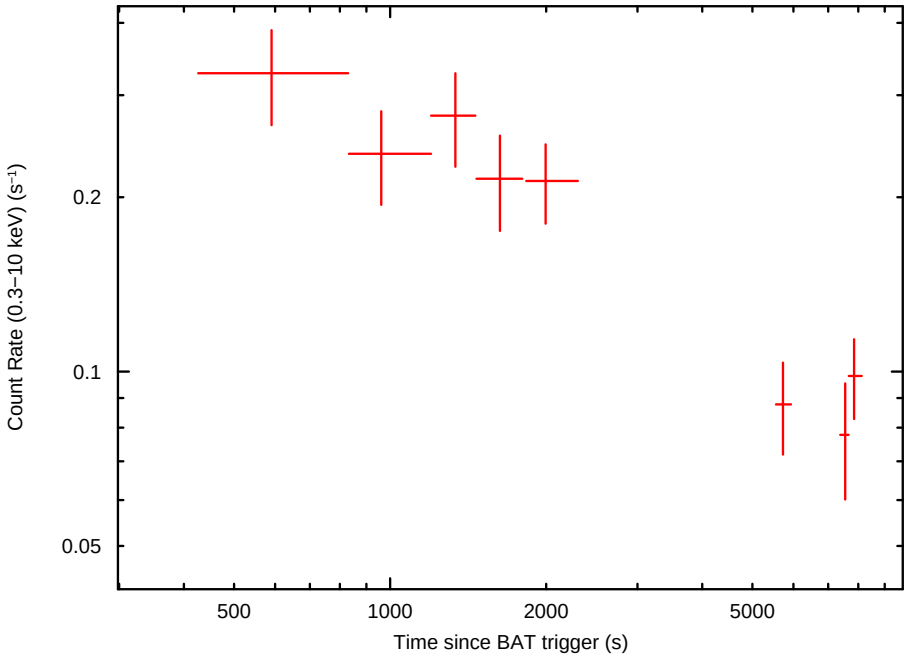

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Photon Counting mode. The approximate conversion is 1 count/sec = $\sim 6.9 \times 10^{-11}$ $ergs/cm^2/sec$.

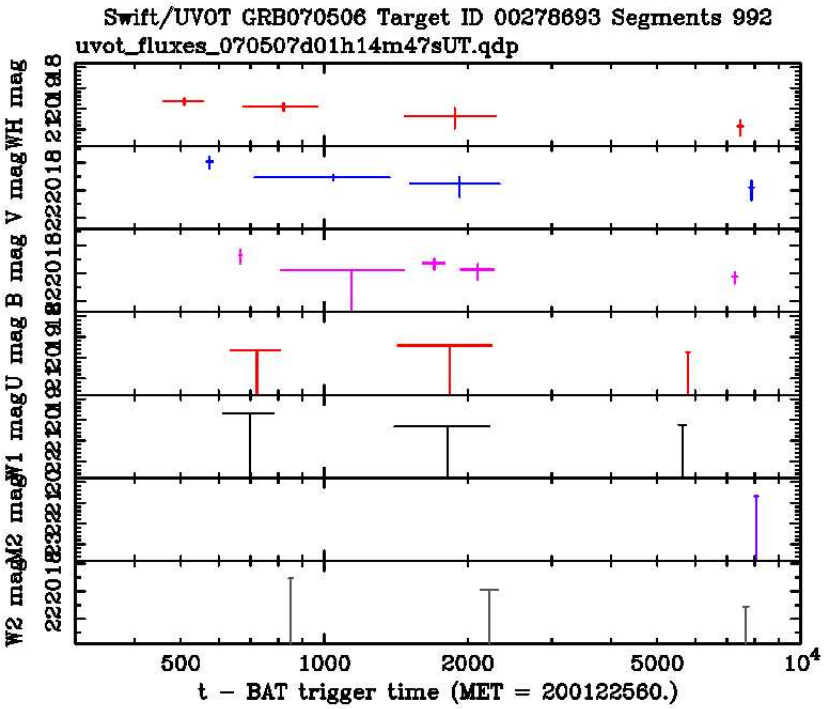

Figure 3: UVOT Lightcurve.