Swift Observation of GRB 070611

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1 Introduction

BAT triggered on GRB 070611 at 01:57:13 UT (Trigger 282003) (Stroh, *et al.*, *GCN Circ.* 6494). This was a 10 sec rate-trigger on a intermediate length burst with $T_{90} = 12.0$ *sec*. Due to an Earth limb constraint, the spacecraft did not slew promptly to the BAT position. XRT and UVOT began follow-up observations at 02:50 UT ($T + 3$ *ksec*).

Our best position is the XRT location RA($J2000$) = $1.9927deg$ ($00h07m58.3s$), Dec($J2000$) = -29.7557 *deg* ($-29d45'20.4''$) with an error of 4.0 arcsec (radius, 90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 240$ to $T + 962$ *sec*, further analysis of BAT GRB 070611 has been performed by the Swift team (Barbier, *et al.*, *GCN Circ.* 6502). The BAT ground-calculated position is RA($J2000$) = $2.003deg$ ($00h08m0.8s$), Dec($J2000$) = $-29.758deg$ ($-29d45'28''$) with an error of 1.8 *arcmin*, (radius, systematic and statistical, 90% containment). The partial coding was 50%.

The masked-weighted light curves (Fig.1) starts at trigger time $T - 26$ *sec* with a single mildly rapid rise, and returns to background at about $T + 15$ *sec*. $T_{90}(15 - 350keV)$ is 12.0 ± 0.1 (estimated error including systematics). There is also a possible second episode of emission starting at $T + 70$ and lasting for ~ 15 *sec*.

The time-averaged spectrum from $T - 6.3$ to $T + 7.3$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 1.66 ± 0.22. For this model the total fluence in the $15 - 150$ keV band is $(3.9 \pm 0.6) \times 10^{-7} ergs/cm^2$ and the 1-sec peak flux measured from $T + 2.76$ *sec* in the $15 - 150$ keV band is 0.8 ± 0.2 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using the data from the first four orbits of XRT data of GRB 070611 (8.9 *ksec* in Photon Counting mode), the refined XRT position is RA($J2000$) = $1.9927deg$ ($00h07m58.3s$), Dec($J2000$) = -29.7557 *deg* ($-29d45'20.4''$) with an error of 4.0 *arcsec* (radius, 90% confidence, including boresight uncertainties). This position is within 6.1 *arcsec* of the initial XRT position, and 3.4 *arcsec* from the ROTSE-III optical afterglow candidate, reported by Rykoff *et al.*, (*GCN Circ.* 6497).

The $0.3 - 10$ keV light curve (Fig.2) is described by a broken power-law. The initial decline has a slope of -4.7 ± 2.7 followed by a break near 6×10^4 *sec* and a plateau with a slope of -0.3 ± 0.4.

The PC spectrum can be fit with an absorbed power law with photon index of 1.9 ± 0.5 and column density of $(5 \pm 5) \times 10^{20} cm^{-2}$, consistent with the Galactic absorption column density ($1.34 \times 10^{20} cm^{-2}$; Dickey & Lockman, 1990).

The absorbed (unabsorbed) flux over $0.3 - 10$ keV for $T + 3$ ks to $T + 30$ ks is 6.056×10^{-13} (6.825×10^{-13}) $ergs/cm^2/sec$.

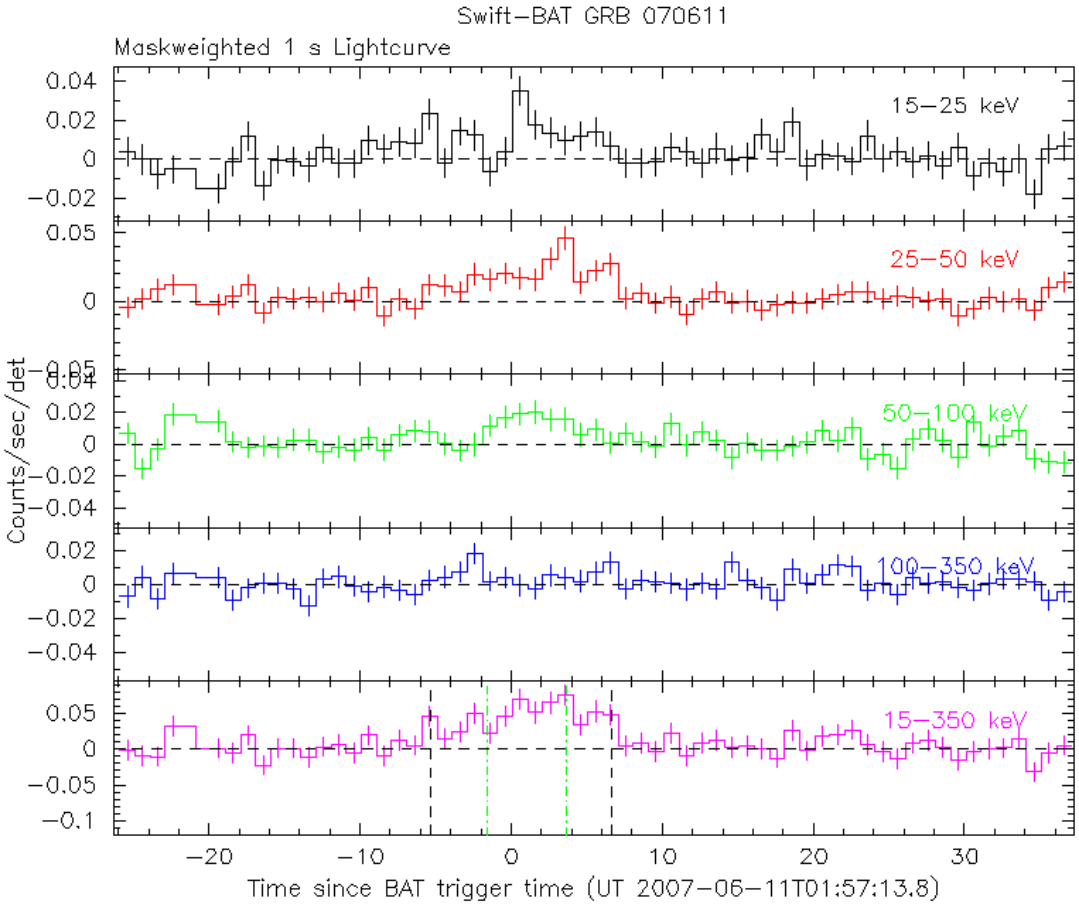

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 01:57:13 UT.

4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 070611 3295 sec after the initial BAT trigger (Stroh *et al.*, *GCN Circ.* 6494). The afterglow candidate reported by Rykoff *et al.*(*GCN Circ.* 6497) was easily detected in the white filter at a position of RA($J2000$) = $00h07m58.3s$, Dec($J2000$) = $-29d45'20.4''$ with an error of 0.5 *arcsec* (radius, 90% confidence). There is also a 3.5 sigma detection in the UVW1 exposure. The lack of detections in UVM2 and UVW3 filters are consistent with the redshift of z=2.04 reported by Thoene *et al.*(*GCN Circ.* 6499). Magnitudes and upper limits are summarized in Table 1. These upper limits correspond to a Galactic extinction reddening of $E_{B-V} = 0.012$ *mag*.

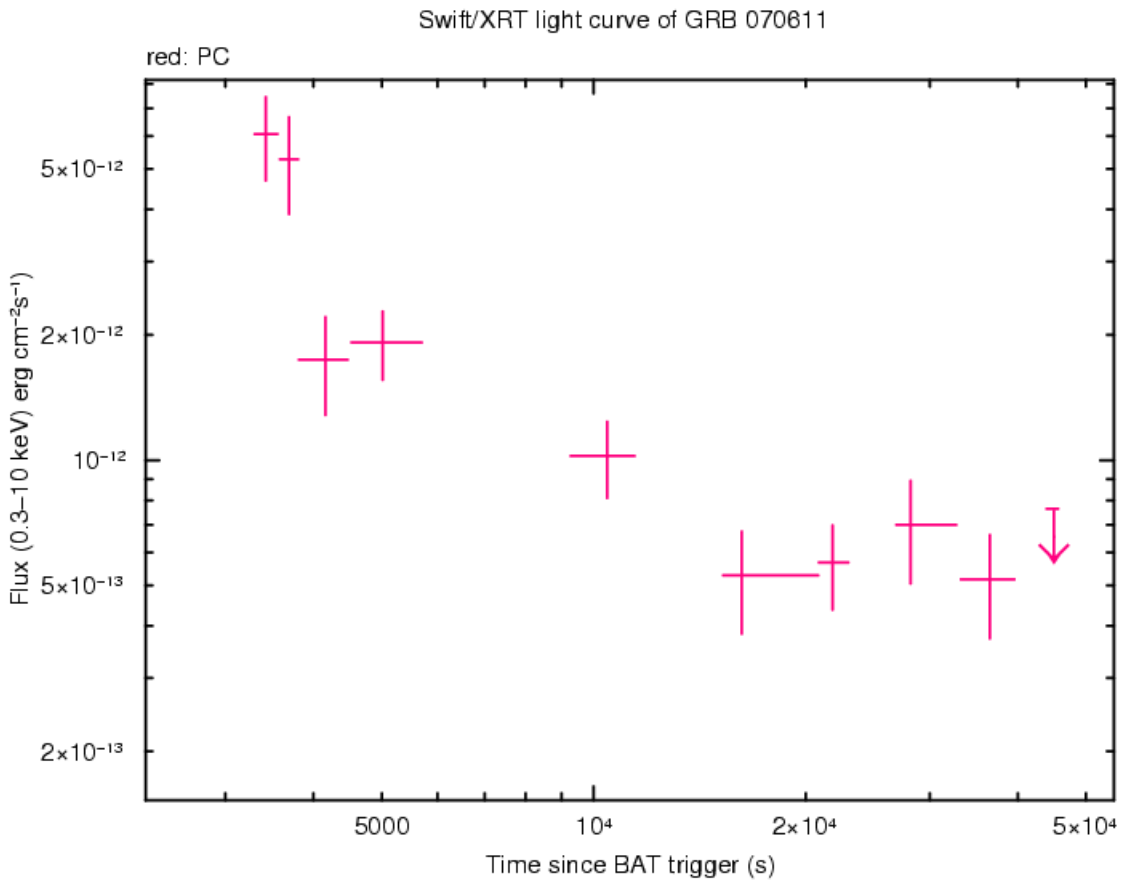

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Photon Counting mode (red). The approximate conversion is 1 count/sec = 4.876×10^{-11} $ergs/cm^2/sec$.

Filter	Start	Exposure	Mag
WHITE	3295	98	19.12 ± 0.11
UVW1	4632	197	19.51 ± 0.31
UVW1	10046	886	>20.72 (3 sigma)
UVM2	4427	197	>19.64 (3 sigma)
UVW2	4019	197	>19.97 (3 sigma)

Table 1: Magnitudes and 3 sigma upper limits from UVOT observations