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 $10s$ rate-trigger on a intermediate length burst with $T_{90} = 12.0s$. 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 ($T + 3ks$).

Our best position is the UVOT location RA($J2000$) = $00h07m58.01s$, Dec($J2000$) = $-29d45'20.0''$ with an error of $0.5''$ (radius, 90% confidence) (Landsman, *et al.*, *GCN Circ.* 6504).

2 BAT Observation and Analysis

Using the data set from $T - 240$ to $T + 962s$, 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 $T - 26s$ with a single mildly rapid rise, and returns to background at about $T + 15s$. $T_{90}(15 - 350keV)$ is $12.0 \pm 0.1s$ (estimated error including systematics). There is also a possible second episode of emission starting at $T + 70s$ and lasting for $\sim 15s$.

The time-averaged spectrum from $T - 6.3s$ to $T + 7.3s$ 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 one second peak flux measured from $T + 2.76s$ in the $15 - 150\ keV$ band is $0.8 \pm 0.2\ ph/cm^2/s$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

The XRT began observing the field at $T + 3ks$. The refined XRT position is RA($J2000$) = $1.9927\ deg$ ($00h07m58.3s$), Dec($J2000$) = $-29.7557\ deg$ ($-29d45'20.4''$) with an error of $4.0''$ (radius, 90% confidence, including boresight uncertainties) (Stroh, *et al.*, *GCN Circ.* 6503). This position is within $6.1''$ of the initial XRT position, $33''$ from the BAT position, $3.8''$ from the UVOT position, and $3.4''$ 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 double broken power-law. The initial decline has a slope of $\alpha = 4.1 \pm 0.8$ followed by a break near $4.6ks$ and a plateau with a slope of $\alpha = 0.71 \pm 0.23$. The plateau breaks near $82ks$ followed by a decay with slope of $\alpha = 1.6 \pm 0.7$.

The PC spectrum can be fit with an absorbed power law with photon index of 1.76 ± 0.19 where the column density is fixed to the Galactic absorption column density ($1.31 \times 10^{20} cm^{-2}$; Dickey & Lockman, 1990).

The absorbed (unabsorbed) flux over $0.3 - 10\ keV$ is 1.172×10^{-13} (1.211×10^{-13}) $ergs/cm^2/s$.
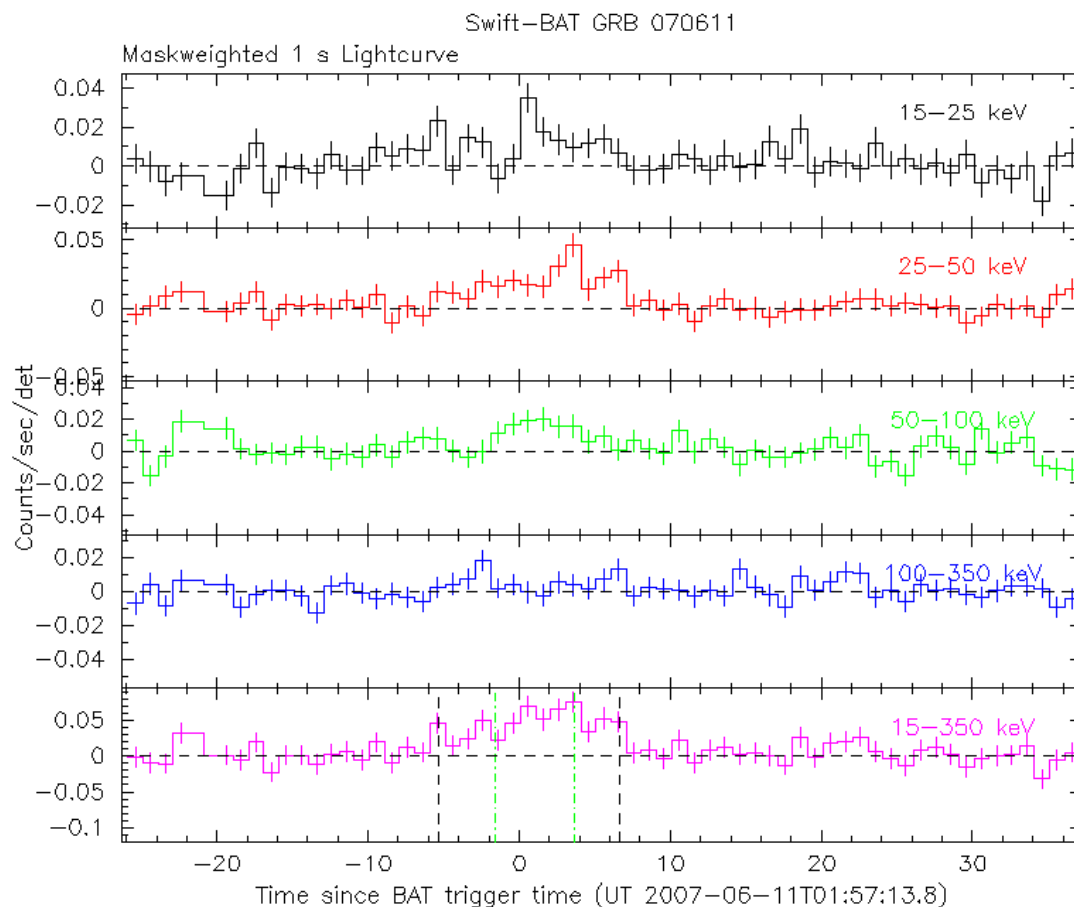
Figure 1: BAT Light curve. The mask-weighted light curves in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 01:57:13 UT.

4   UVOT Observation and Analysis

The UVOT began observing the field of GRB 070611 $3.2 ks$ after the initial BAT trigger. The afterglow candidate reported by Rykoff *et al.*(*GCN Circ.* 6497) was easily detected in the white filter at a position of RA($J2000$) $= 00h07m58.01s$, Dec($J2000$) $= -29d45'20.0''$ with an error of $0.5''$ (radius, 90% confidence) (Landsman, *et al.*, *GCN Circ.* 6504). There is also a 3.5 sigma detection in the UVW1 exposure. The lack of detections in UVM2 and UVW2 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. No correction has been made for the Galactic extinction corresponding to an expected reddening of $E_{B-V} = 0.012 \ mag$ (Schlegel et al., 1998)
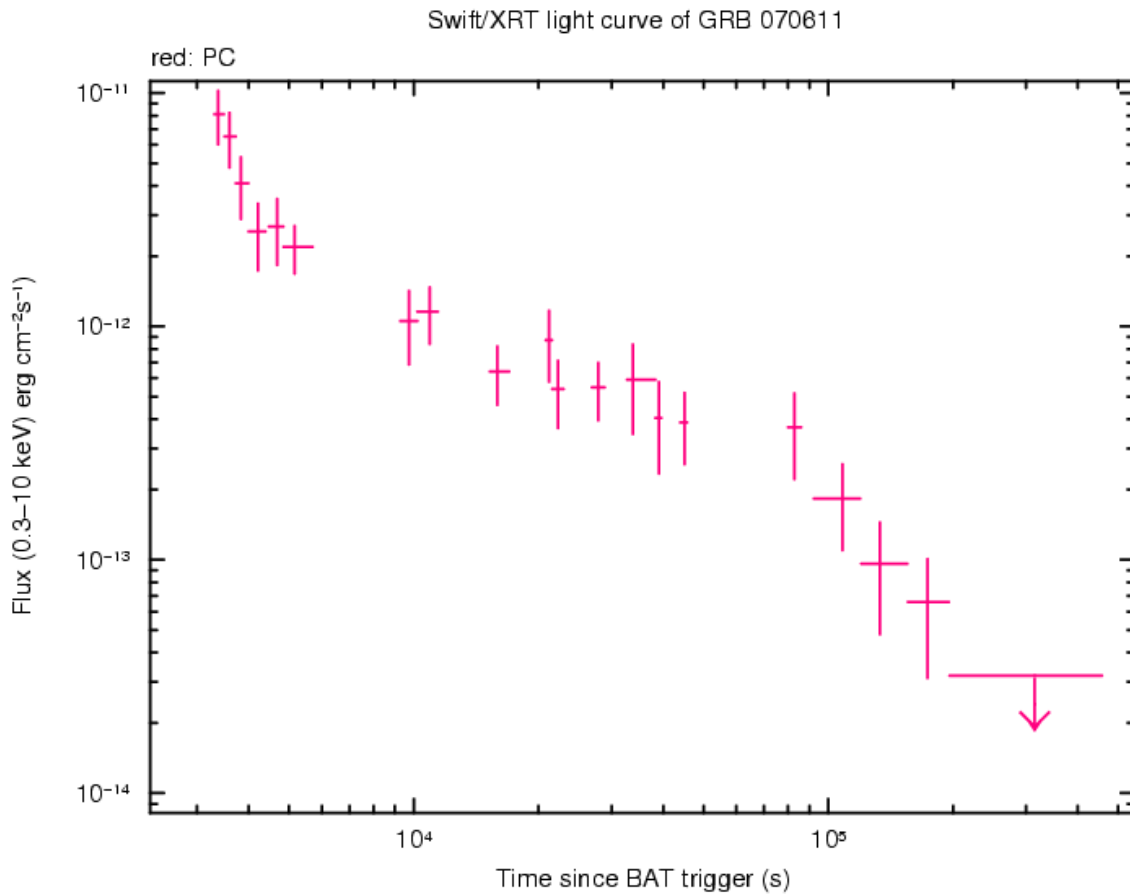
Swift/XRT light curve of GRB 070611

Figure 2: XRT Lightcurve. Flux in the 0.3-10 keV band. The approximate conversion is 1 count/s = $5.259 \times 10^{-11} \ ergs/cm^2/s$.

Filter	Start (seconds after trigger)	Exposure (s)	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