

## Swift Observation of GRB 061126

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### 1 Introduction

BAT triggered on GRB 061126 at 08:47:56 UT (Trigger 240766) (Sbarufatti, *et al.*, *GCN Circ.* 5854). This was a 1.024 s rate-trigger on a long burst with  $T_{90} = 191$  s. Swift slewed to this burst after 23 minutes due to the Earth-limb constraint and XRT began follow-up observations at  $T+1603$  s, and UVOT at  $T + 1656$  s. Our best position is the UVOT location  $RA(J2000) = 86.6019deg$  ( $05h46m24.46s$ ),  $Dec(J2000) = 64.2107deg$  ( $+64d12'38.5''$ ) with an error of 0.5 arcsec (68% confidence, including bore-sight uncertainties).

### 2 BAT Observation and Analysis

Using the data set from  $T - 239$  to  $T + 574$  s, further analysis of BAT GRB 061126 has been performed by Swift team (Krimm, *et al.*, *GCN Circ.* 5860). The BAT ground-calculated position is  $RA(J2000) = 86.615deg$  ( $5h46m27.6s$ ),  $Dec(J2000) = +64.201deg$  ( $+64d12'3.0''$ )  $\pm 1.1$  arcmin, (radius, systematic and statistical, 90% containment). The partial coding was 49%.

The masked-weighted light curves (Fig.1) starts before the trigger time, at  $T - 10s$  with four main overlapping peaks. The brightest peak occurs at  $T + 7$  s. The last peak ends at  $\sim T + 25$  s with an on-going low level emission out to  $\sim T + 200$  s.  $T_{90}(15 - 350keV)$  is  $191 \pm 10s$  (estimated error including systematics).

The time-averaged spectrum from  $T - 6.0$  to  $T + 411.0$  s is best fitted by a simple power law model. This fit gives a photon index of  $1.34 \pm 0.08$ , ( $\chi^2 = 0.73$  for 57 d.o.f.). For this model the total fluence in the  $15 - 150$  keV band is  $(7.2 \pm 0.3) \times 10^{-6} ergs/cm^2$  and the 1-s peak flux measured from  $T + 6.66$  s in the  $15 - 150$  keV band is  $9.8 \pm 0.4 ph/cm^2/s$ . All the quoted errors are at the 90% confidence level.

### 3 XRT Observations and Analysis

Using the data from the first three orbits of XRT of GRB 061126 (6 ks in Photon Counting mode), the refined XRT position is  $RA(J2000) = 86.602deg$  ( $05h46m24.5s$ ),  $Dec(J2000) = 64.210 deg$  ( $+64d12'37.6''$ )  $\pm 3.5$  arcsec (90% confidence, including boresight uncertainties). This position is within 1.6 arcsec of the initial XRT position, and 0.95 arcsec from the optical afterglow candidate (UVOT), reported by Vanden Berk *et al.*, *GCN Circ.* 5856.

The  $0.3 - 10$  keV light curve (Fig.2) shows a powerlaw decay with a slope of  $1.32_{-0.01}^{+0.01}$ , from the beginning of the XRT observations up to  $T + 6 \times 10^4$  s.

The PC spectrum during the first three orbits (ending at  $T + 6000$  s) can be modeled with an absorbed power-law with spectral index  $2.01 \pm 0.09$ . The  $N_H$  column density is  $2.7 \pm 0.3 \times 10^{21} cm^{-2}$  slightly in excess with respect to the galactic absorption of  $1.0 \times 10^{21} cm^{-2}$ . The average observed (unabsorbed) flux over  $0.3 - 10$  keV for this spectrum (spanning a time of 1600 - 7600 seconds after the trigger) is  $5.0 \times 10^{-11}$  ( $7.7 \times 10^{-11}$ )  $ergs/cm^2/s$ .

The spectrum for the following part of the observations (up to  $T + 6 \times 10^4$  s) is still modeled as an absorbed power law with photon index  $1.85 \pm 0.15$  and  $N_H = (2.2 + / - 0.5) \times 10^{21} cm^{-2}$ . The average observed (unabsorbed) flux over  $0.3 - 10$  keV for this fraction of the observations is  $3.8 \times 10^{-12}$

$(5.2 \times 10^{-12}) \text{ ergs/cm}^2/\text{s}$ .

## 4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 061126 at 09:14:41 on 2006-11-26, 1605 s after the initial BAT trigger (Schady *et al.*, *GCN Circ.* 5861). An optical counterpart is detected in the V, B, U, UVW1 and UVM2 filters, as well as in the White-band filter (160 – 650nm) at a position consistent with that reported by Vanden Berk *et al.*, *GCN Circ.* 5856. We can, therefore, put a photometric upper limit on the redshift of GRB 061126 of  $z \lesssim 1.5$ .

The photometry results for each UVOT filter (Fig. 3) are given in Table 1.  $T_{middle}$  is the average time of the exposure, in seconds, since the BAT trigger. For those filters in which the afterglow is detected we report the magnitude of the afterglow in the first and last exposures taken before the spacecraft slewed to another target 4.3hrs after the BAT trigger. The upper limit ( $3\sigma$ ) reported for the UVW2 filter is taken from a co-added exposure and for all detections that are less than  $3\sigma$  above background, the significance of the detection is given. The quoted errors do not include the 0.1 mag systematic uncertainty in the photometric zero points. These values are not corrected for the expected Galactic extinction of  $E_{B-V} = 0.18 \text{ mag}$  (Schlegel et al. 1998).

Filter	$T_{middle}$	Exposure	Mag	Err
V	3423	197	19.29	0.58 ( $1.9\sigma$ )
	9178	295	19.86	0.78 ( $1.4\sigma$ )
B	2809	197	19.75	0.24
	7097	197	21.04	0.75 ( $1.5\sigma$ )
U	7702	197	19.54	0.27
	15331	110	>18.72	
UVW1	5664	279	19.34	0.37
	14515	886	>20.04	
UVM2	3627	197	19.79	0.56
	13608	886	21.38	0.85 ( $1.3\sigma$ )
UVW2	5767	393	>20.00	
White	1655	98	18.50	0.12
	8111	197	19.72	0.22

Table 1: Magnitude values from UVOT observations.

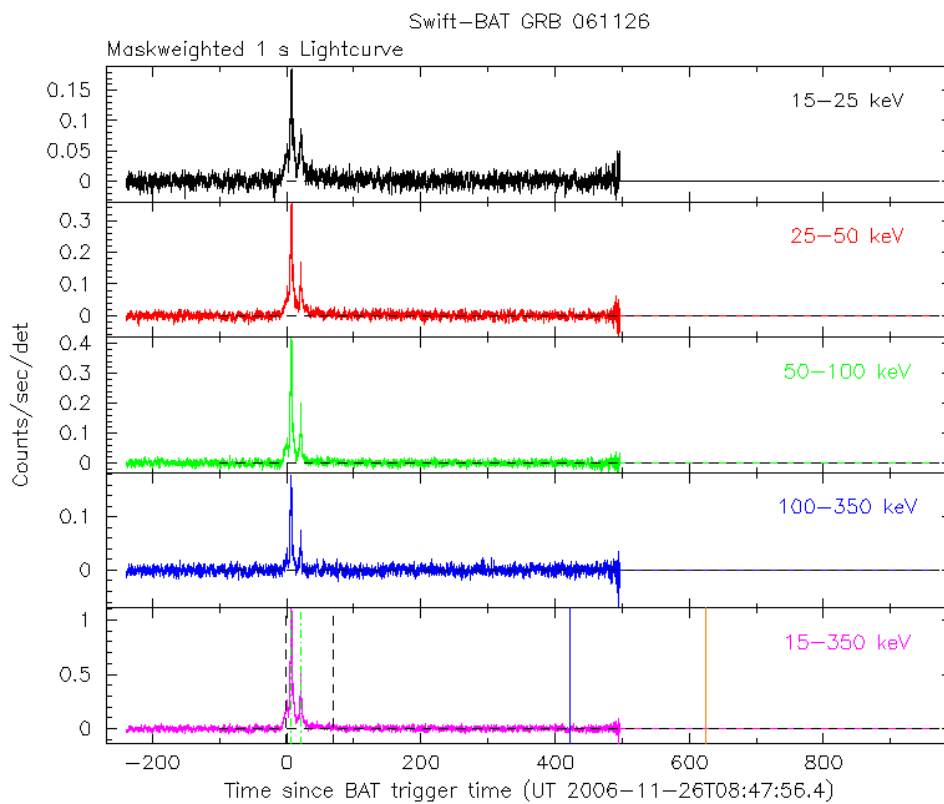


Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/s/illuminated-detector and  $T_0$  is 08:47:56.4 UT. Green dot-dash line:  $T_{50}$ , Black dashed line:  $T_{90}$ , Blue: Slew start, Orange: Slew end. Time of each bin is in the middle of the bin.

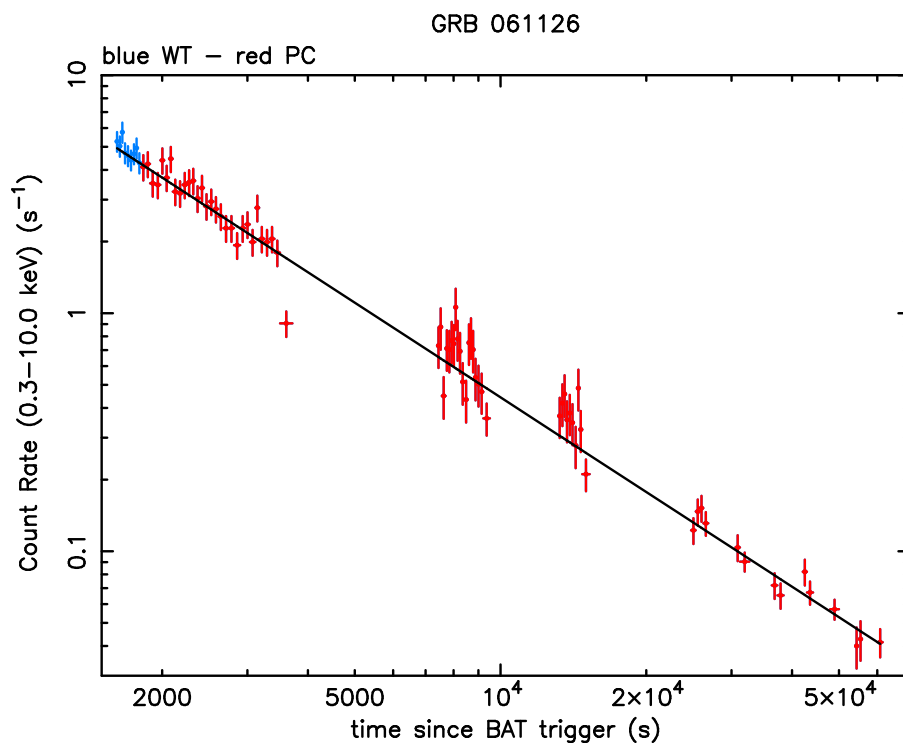


Figure 2: XRT Lightcurve. Counts/s in the 0.3-10 keV band: Window Timing mode (blue), Photon Counting mode (red). The approximate conversion is  $1 \text{ count/s} = \sim 6.5 \times 10^{-11} \text{ ergs/cm}^2/\text{s}$ .

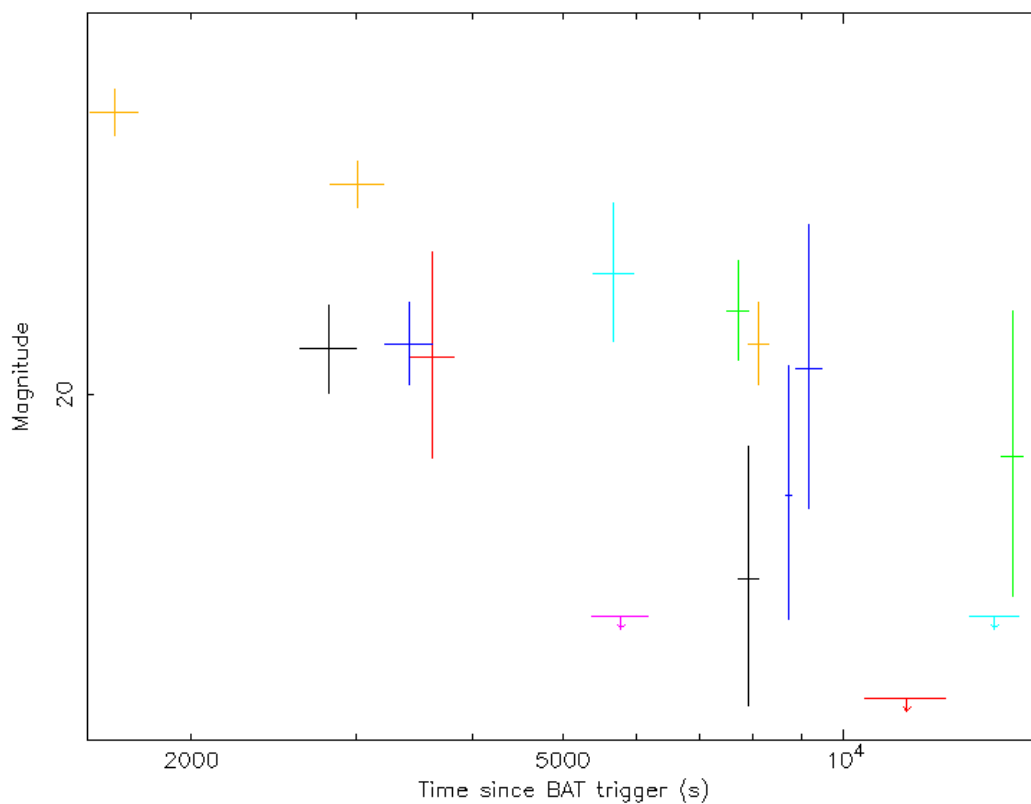


Figure 3: UVOT Lightcurve, using data from all 7 filters; White (orange), V (navy blue), B (black), U (green), UVW1 (cyan), UVM2 (red), UVW2 (magenta).