

Swift Observations of GRB 061202

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1. INTRODUCTION

At 08:11:44 UT, the Swift-BAT triggered and located GRB 061202 (trigger=241963) (Sakamoto, et al., GCN Circ. 5886 and 5887). Swift slewed immediately to the burst. XRT and UVOT began observing the field at 08:13:43 UT, 119 seconds after the BAT trigger. Our best position is the XRT position RA,Dec(J2000) = 07h 02m 05.55s, -74d 41m 54.6".

2. BAT OBSERVATION AND ANALYSIS

The BAT ground-calculated position is RA, Dec = 105.180, -74.587 deg which is RA(J2000) = 07h 00m 43.2s, Dec(J2000) = -74d 35' 12.5" with an uncertainty of 5.8 arcmin, (radius, sys+stat, 90% containment). The partial coding was 76%.

The mask-weighted lightcurve (Fig 1) shows that it started with low-level emission at $\sim T-95$ sec, then BAT triggered on a small peak at T+0 sec which returned to instrumental background level at $\sim T+20$ sec. Then some low level emission starting at $\sim T+45$ sec, then a much larger FRED peak started at $\sim T+70$ sec, peaking at T+75 sec, and ending at T+200 sec. T90 (15-350 keV) is 91 \pm 5 sec (estimated error including systematics).

The time-averaged spectrum from T-0.8 to T+147.4 is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.63 ± 0.07 . The fluence in the 15-150 keV band is $3.5 \pm 0.1 \times 10^{-6}$ erg/cm². The 1-sec peak photon flux measured from T+75.04 sec in the 15-150 keV band is 2.6 ± 0.2 ph/cm²/sec. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATION AND ANALYSIS

We have analysed the first five orbits of Swift XRT data on the BAT GRB 061202. A 7.6ks photon counting mode image provides a refined XRT position: RA(J2000) = 07h 02m 05.55s Dec(J2000) = -74d 41m 54.6" with an uncertainty of 3.5" (90% containment). This is 8.6' away from the centre of the refined BAT position quoted in GCN Circ. 5887 (Sakamoto et al.), and 4.0" away from the initial XRT position quoted in GCN Circ. 5886 (Sakamoto et al.).

The early X-ray light curve (Fig 2) displays a large flare peaking at a count rate of approximately 115 counts/s at T+140s followed by a shallow phase up to about T+13ks. At later times the afterglow curve shows a decline with a power-law decay with index $\alpha = -1.6 \pm 0.4$.

The X-ray spectrum covering the time period from T+126s to T+310s is well fit by an absorbed power-law with a photon index of 1.9 ± 0.1 and column density of $(6.0 \pm 0.5) \times 10^{21}$ /cm² (errors are at 90% confidence level). We note the Galactic column density in the direction of the source is 1.16×10^{21} /cm². The observed 0.3-10 keV flux for this spectrum is 1.5×10^{-9} erg/cm²/s and the unabsorbed flux is 2.5×10^{-9} erg/cm²/s.

Assuming the X-ray emission continues to decline at the same rate, we predict a 0.3-10 keV XRT count rate of 0.02 count/s at T+24hr, which corresponds to an observed 0.3-10 keV flux of 1.2×10^{-12} erg/cm²/s and the unabsorbed flux of 2.0×10^{-12} erg/cm²/s.

4. UVOT OBSERVATION AND ANALYSIS

The Swift/UVOT began its first finding chart exposure of the field of GRB 061202 129 seconds after the BAT trigger. No afterglow candidate is detected in the XRT error circle reported by Sakamoto et al. in this or any of the other early UVOT exposures.

The initial photometry upper limits for each UVOT filter are given below (Table 1) where Tmid is the average time of the exposure, in seconds, since the BAT trigger and Mag_Lim is the 3-sigma upper limit for the magnitude. The quoted errors do not include the 0.1 mag systematic uncertainty in the photometric zero points.

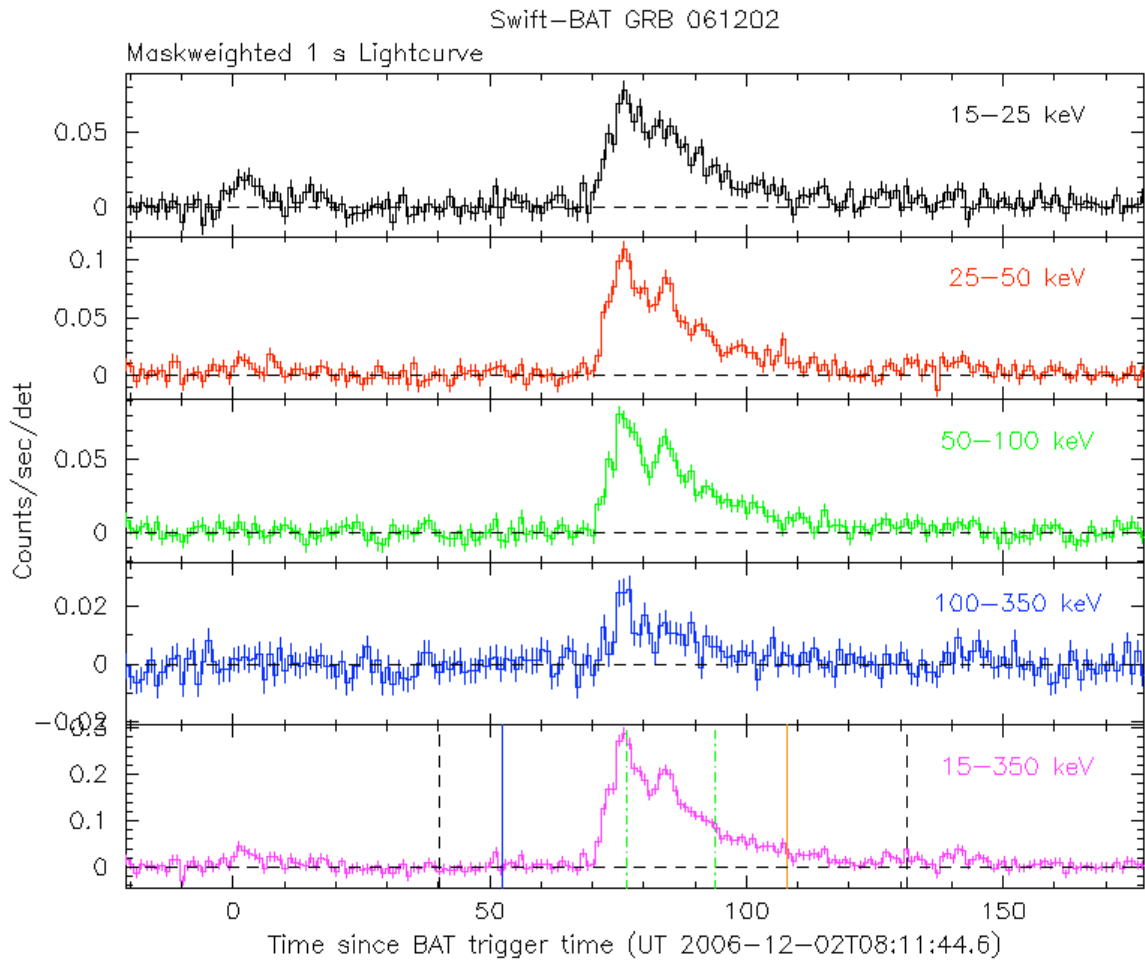


Fig.1: BAT Lightcurve. The light curve in the 4 individual plus total energy bands. Green dotted line: T50, Black dotted line: T90, Blue: Slew start, Orange: Slew end. An illuminated detector is 0.16 cm².

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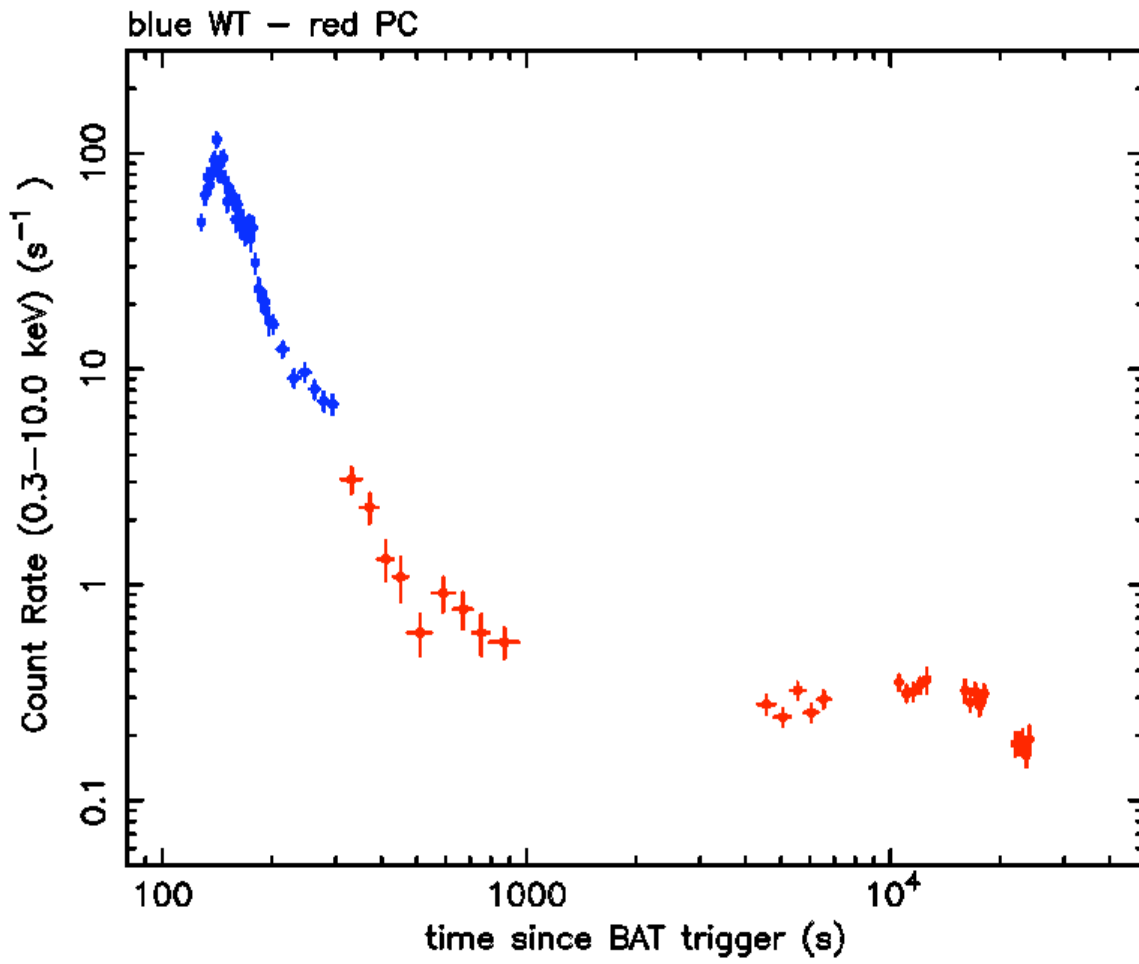


Fig. 2: XRT Lightcurve in the 0.3-10 keV band. The count rate to observed flux conversion factor is 5.8e-11 erg/cm2/s.

Table 1: UVOT 3-Sigma Upper Limits.

Filter	T_mid(s)	Expo(s)	Lim_Mag
White	179	98	20.4
White	911	98	20.4
V	434	393	20.1
B	5054	197	20.7
U	4850	197	20.3
UVW1	4645	197	20.1
UVM2	4440	197	20.1
UVW2	5464	197	20.5