

## Swift Observations of GRB 070729

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### 1 Introduction

BAT triggered on GRB 070729 at 00:25:53 UT (Trigger 286373) (Guidorzi *et al.*, *GCN Circ.* 6678). This was a 1.024-s rate-trigger on a short-hard burst. XRT observations began at  $T + 87$  s and discovered a faint X-ray afterglow. UVOT began observing at  $T + 91$  s and did not find any optical counterpart. Our best position is the XRT refined position: RA(J2000)= 56.31385 deg (03<sup>h</sup>45<sup>m</sup>15.32<sup>s</sup>), Dec(J2000)= -39.32400 deg (-39<sup>d</sup>19'26.4'') with an error of 4.5 arcsec (90% confidence).

### 2 BAT Observation and Analysis

Using the data set from  $T - 239$  to  $T + 963$  s from recent telemetry downlinks, the BAT ground-calculated position is RA(J2000) = 56.296 deg (03<sup>h</sup>45<sup>m</sup>11.1<sup>s</sup>), Dec(J2000)= -39.330 deg (-39<sup>d</sup>19'47'') with an uncertainty of 2.2 arcmin (radius, sys+stat, 90% containment). The partial coding was 65%.

The mask-weighted light curve (Fig. 1) shows two overlapping peaks starting at  $\sim T - 0.2$  s, peaking at  $\sim T + 0.2$  and  $\sim T + 0.8$  s, and ending at  $\sim T + 1.2$  s.  $T_{90}$  (15–350 keV) is  $0.9 \pm 0.1$  s (estimated error including systematics).

The time-averaged spectrum from  $T - 0.1$  to  $T + 1.1$  s is best fit by a simple power-law model. The power law index of the time-averaged spectrum is  $0.96 \pm 0.27$ . The fluence in the 15–150 keV band is  $(1.0 \pm 0.2) \times 10^{-7}$  erg cm<sup>-2</sup>. The 1-s peak photon flux measured from  $T + 0.03$  s in the 15–150 keV band is  $1.0 \pm 0.2$  ph cm<sup>-2</sup> s<sup>-1</sup>. All the quoted errors are at the 90% confidence level (Sato *et al.*, *GCN Circ.* 6681).

### 3 XRT Observations and Analysis

Using the data of the first five orbits with a total net exposure of 9.1 ks in Photon Counting (PC) mode, the refined XRT position is RA(J2000) = 56.31385 deg (03<sup>h</sup>45<sup>m</sup>15.32<sup>s</sup>), Dec(J2000)= -39.32400 deg (-39<sup>d</sup>19'26.4'') with an error radius of 4.5 arcsec (90% confidence). This is 3.2 arcsec from the initial XRT position (Guidorzi *et al.*, *GCN Circ.* 6678) and 53 arcsec from the BAT ground-calculated position (Sato *et al.*, *GCN Circ.* 6681).

The XRT light-curve (Fig. 2) of the first orbit, in the time interval from  $T + 95$  s to  $T + 600$ s, shows a fading behaviour with a power-law index  $\alpha_x = 1.5 \pm 0.6$ . The 3- $\sigma$  upper limit on the flux derived from the data of the following orbits is consistent with the extrapolation of the power-law fit.

The spectrum extracted from  $T + 95$  s to  $T + 22$  ks (35 photons) can be fit using Cash statistics with an absorbed power law with a photon index  $\Gamma_x = 1.8 \pm 0.4$  and a column density consistent with the Galactic value ( $2.6 \times 10^{20}$  cm<sup>-2</sup>; Kalberla *et al.* 2005). The absorbed (unabsorbed) 0.3–10.0keV flux for the spectrum is  $(2.2 \pm 0.7) \times 10^{-13}$  ( $(2.4 \pm 0.7) \times 10^{-13}$ ) erg cm<sup>-2</sup> s<sup>-1</sup>, at mean time of  $T + 0.13$  d. Quoted errors are given at the 90% confidence level (Guidorzi *et al.*, *GCN Circ.* 6682).

Detailed light curves in both count rate and flux units are available in both graphical and ASCII formats at [http://www.swift.ac.uk/xrt\\_curves/](http://www.swift.ac.uk/xrt_curves/).

## 4 UVOT Observation and Analysis

The UVOT observed the field of GRB 070729 starting 91 s after the BAT trigger. We do not find any new source in any of the UVOT observations inside the refined XRT error circle (Guidorzi *et al.*, *GCN Circ.* 6682).

The  $3\text{-}\sigma$  upper limits (in the UVOT photometric system, Breeveld *et al.*, *GCN Circ.* 6614) for detecting a source inside the XRT error circle in the first finding chart (FC) exposure and the co-added frames (including the finding chart) are listed in Table 1 (Cucchiara & Guidorzi, *GCN Circ.* 6683).

The values are not corrected for the expected Galactic extinction corresponding to a reddening of  $E_{B-V} = 0.02$  mag towards the direction of the burst (Schlegel *et al.* 1998).

Filter	Start (s)	End (s)	Exposure (s)	Mag
White (FC)	91	191	99.7	>20.27
White	91	6079	491	>21.30
V	200	33740	1767	>20.45
B	4241	19519	1163	>20.97
U	4036	25507	2828	>21.12
UVW1	3831	24911	3049	>21.53
UVM2	606	27229	2764	>21.34
UVW2	4652	28966	2164	>21.46

Table 1:  $3\text{-}\sigma$  upper limits from UVOT observations.

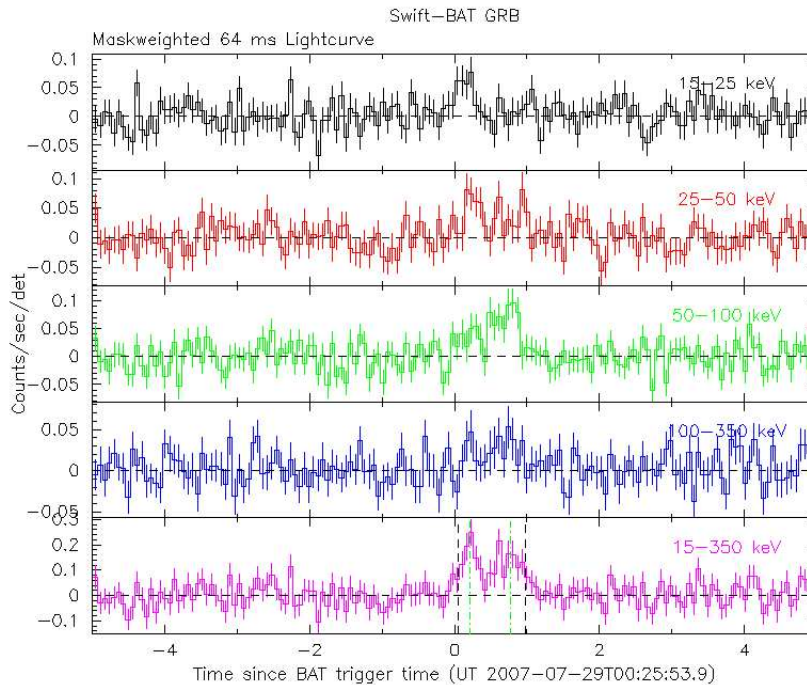


Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/s/illuminated-detector (note illum-det =  $0.16\text{ cm}^2$ ) and  $T_0$  is 00:25:53.9 UT.

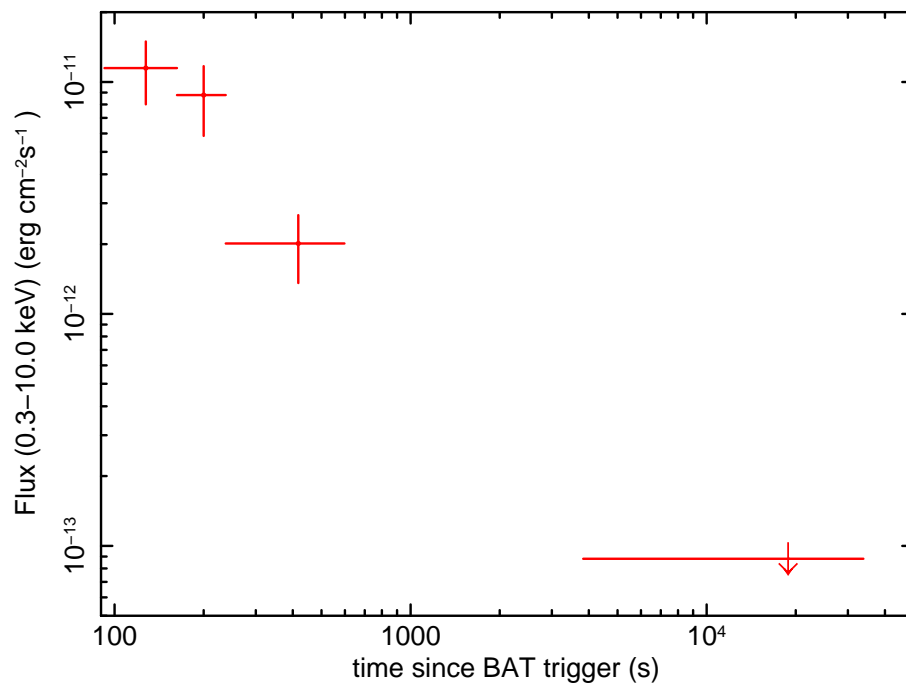


Figure 2: XRT Lightcurve. Flux in the 0.3-10 keV band: Photon Counting mode. The approximate conversion is 1 count/s  $\sim 5.8 \times 10^{-11}$  erg cm<sup>-2</sup> s<sup>-1</sup>.