

## Swift Observation of GRB 071117

*T. N. Ukwatta (GSFC/GWU), H. Krimm (GSFC/USRA), C. Guidorzi (Univ. Bicocca/INAF-OAB), P. Romano (Univ. Bicocca/INAF-OAB), D. E. Vanden Berk (PSU), J. Norris (U Denver), S.D. Barthelmy (GSFC), D.N. Burrows (PSU), P. Roming (PSU), N. Gehrels (GSFC), for the Swift Team*

### 1 Introduction

BAT triggered on GRB 071117 at 15:06:46 UT (Trigger 296805) (Ukwatta, *et al.*, *GCN Circ.* 7098). This was a 1.024 sec rate-trigger on a long burst with  $T_{90} = 6.6 \pm 1.8$  sec.

Because of an Earth limb constraint, the spacecraft did not slew promptly to the BAT position, and hence there was no immediate XRT position. Narrow field instruments started observations at  $\sim T+43$  minutes, and our best position is the XRT location  $RA(J2000) = 335.04579$  deg (22h20m10.99s),  $Dec(J2000) = -63.44278$  deg ( $-63d26'34.0''$ ) with an error of 3.8 arcsec (90% confidence, including boresight uncertainties), reported by Guidorzi *et al.*, *GCN Circ.* 7103.

### 2 BAT Observation and Analysis

Using the data set from  $T - 119$  to  $T + 183$  sec, further analysis of BAT GRB 071117 has been performed by Swift team (Krimm, *et al.*, *GCN Circ.* 7102). The BAT ground-calculated position is  $RA(J2000) = 335.026$  deg (22h20m06.3s),  $Dec(J2000) = -63.442$  deg ( $-63d26'31''$ )  $\pm 1.0$  arcmin, (radius, systematic and statistical, 90% containment). The partial coding was 53% (the bore sight angle was 39.40 deg).

The mask-weighted light curve (Fig. 1) shows a single FRED-like peak starting at  $\sim T - 0.5$  sec, peaking at  $\sim T + 0.5$  sec, and decaying away out to  $\sim T + 15$  sec.  $T_{90}$  (15-350 keV) is  $6.6 \pm 1.8$  sec (estimated error including systematics).

The time-averaged spectrum from  $T - 0.4$  to  $T + 13.9$  sec is best fitted by a simple power-law model. The power law index of the time-averaged spectrum is  $1.57 \pm 0.06$  ( $\chi^2 = 34.93$  for 57 d.o.f.). The fluence in the 15 – 150 keV band is  $2.4 \pm 0.1 \times 10^{-6}$  erg cm<sup>2</sup>. The 1-sec peak photon flux measured from  $T + 0.02$  sec in the 15 – 150 keV band is  $11.3 \pm 0.4$  ph/cm<sup>2</sup>/sec. All the quoted errors are at the 90% confidence level.

The spectral lags for this burst are,  $634_{-40}^{+47}$  ms for the 50 – 100 to 15 – 25 keV bands,  $168_{-20}^{+18}$  ms for the 50 – 100 to 25 – 50 keV bands,  $573_{-38}^{+38}$  ms for the 100 – 350 to 25 – 50 keV bands, and  $999_{-66}^{+49}$  ms for the 100 – 350 to 15 – 25 keV bands.

### 3 XRT Observations and Analysis

Swift XRT observed the GRB 071117 beginning 2.8 ks after the BAT trigger. In 4.4 ks of Photon Counting mode data spanning 2.8-14.7 ks after the trigger the position of the X-ray afterglow is  $RA(J2000) = 335.04579$  deg,  $Dec(J2000) = -63.44278$  deg, which corresponds to

$RA(J2000) = 22h 20m 10.99s$   
 $Dec(J2000) = -63d 26' 34.0''$

with error circle of radius 3.8 arcsec (90%, including boresight uncertainties). This lies 3.6 arcsec from the previous XRT position (Romano *et al.*, *GCN Circ.* 7100) and 32 arcsec from the BAT refined position (Krimm *et al.*, *GCN Circ.* 7102).

The X-ray light curve (Fig. 2) up to  $T + 57$  ks can be fit with a broken power law. Fit parameters are given by  $\alpha_1 = 0.1 \pm 0.1$ ,  $t_{break} = 9.1^{+2.6}_{-2.2}$  ks and  $\alpha_2 = 1.1 \pm 0.2$  ( $\chi^2 = 28.2$  for 21 d.o.f.).

The Photon Counting spectrum can be modelled with an absorbed power-law, with a photon index of  $2.2^{+0.4}_{-0.3}$  and a total absorbing column of  $NH = (2.3^{+0.9}_{-0.8})10^{21} \text{cm}^{-2}$ . The Galactic value is  $2.3 \times 10^{20} \text{cm}^{-2}$  in the direction of the burst. The  $0.3 - 10$  keV observed (unabsorbed) flux during this time is  $3.0 \times 10^{-12} (5.0 \times 10^{-12}) \text{erg cm}^{-2} \text{s}^{-1}$ . Uncertainties are given at 90% confidence.

## 4 UVOT Observation and Analysis

UVOT took a finding chart exposure of 100 seconds with the White (160-650 nm) filter starting 2852 seconds after the BAT trigger. No afterglow candidate has been found in the initial data products. The  $2.7' \times 2.7'$  sub-image covers 100% of the XRT error circle. The typical 3-sigma upper limit has been about 18.5 mag. The  $8' \times 8'$  region for the list of sources generated on-board covers 100% of the XRT error circle. The list of sources is typically complete to about 18 mag. No correction has been made for the extinction of  $E(B-V) = 0.024$  (Vanden *et al.*, *GCN Circ.* 7099).

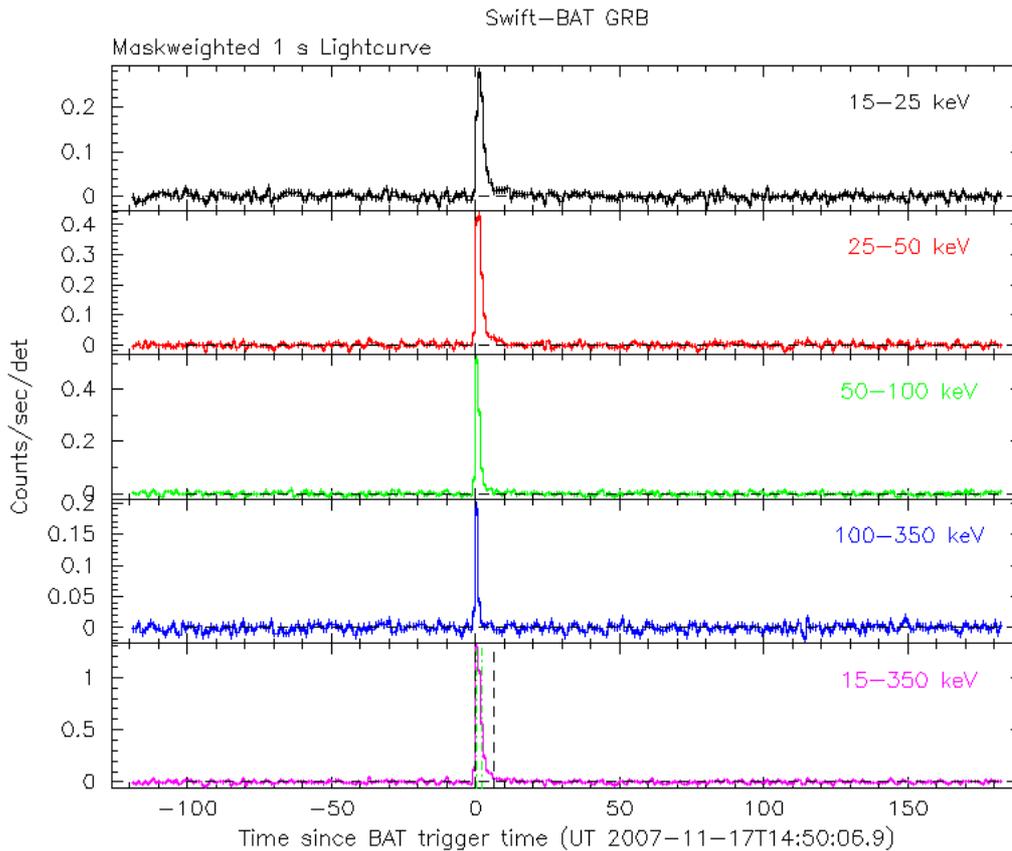


Figure 1: The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and  $T_0$  is 15:06:46 UT.

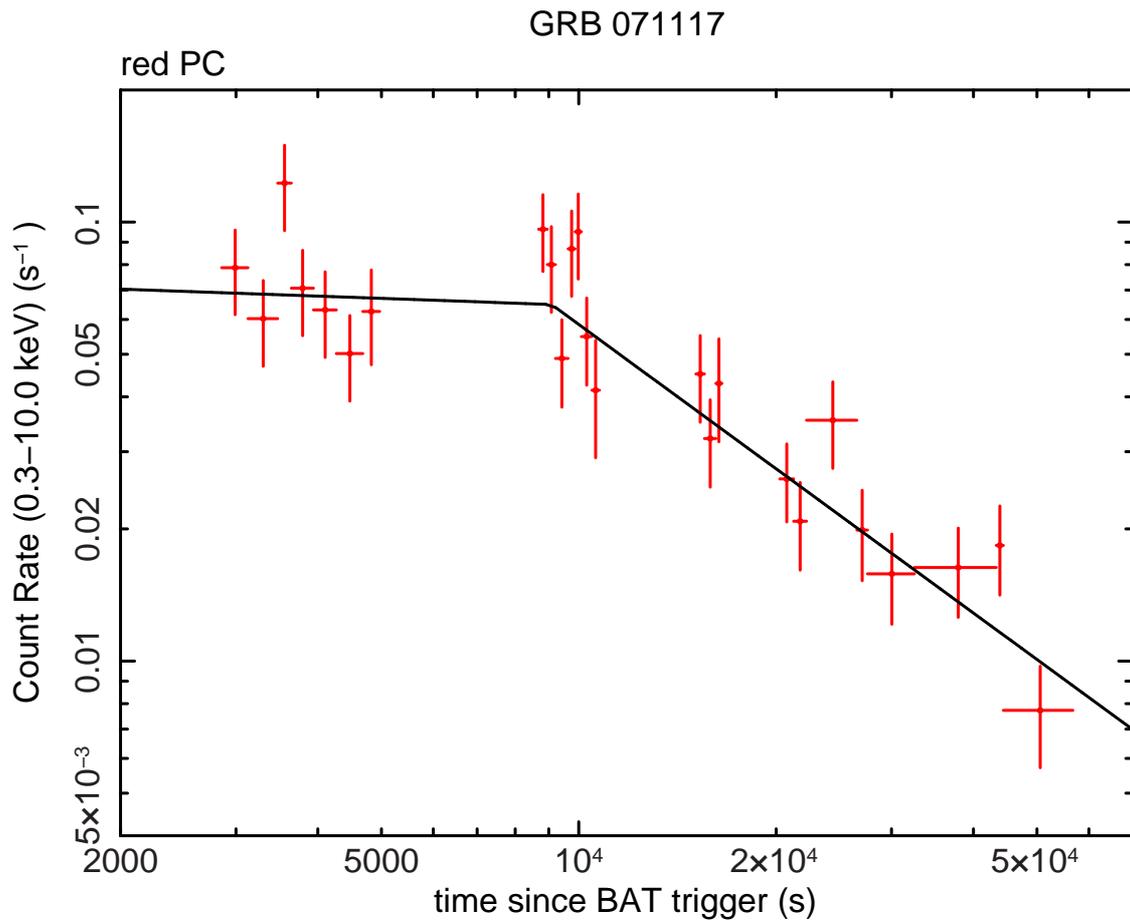


Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Photon Counting mode (red). The approximate conversion is 1 count/sec =  $\sim 6.0 \times 10^{-11}$  ergs/cm<sup>2</sup>/sec.)