Swift Observation of GRB 071003

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1   Introduction

BAT triggered on GRB 071003 at 07:40:55 UT (Trigger 292934) (Schady, et al., *GCN Circ.* 6837). This was a 1.024 sec rate-trigger with significance of 105.73 on long burst with $T_{90} = 150 \pm 10$ sec. At the time of this burst *Swift* was in the process of returning to normal operations, and automatic slewing to GRBs was currently disabled outside of business hours (US EDT). Our best position is the XRT location RA($J2000$) = 301.85102 deg ($20h07m24.25s$), Dec($J2000$) = 10.94688 deg ($10d56'48.8''$) with an error of 5.7 arcsec. Spectroscopic follow-up observations using Keck I + LRIS (range 3300–8630) set a lower limit on the redshift of $z > 1.100$ (Perley, et al., *GCN Circ.* 6850).

GRB 071003 was also detected by INTEGRAL/SPI-ACS (private communication; Volker Beckmann), showing the same, bright multi-peak structure as observed with the BAT, and it also triggered Konus-Wind (Golenetskii, et al., *GCN Circ.* 6849).

2   BAT Observation and Analysis

Using the data set from $T - 7.6$ to $T + 167.4$ sec, the BAT ground-calculated position is RA($J2000$) = 301.857 deg ($20h07m25.8s$), Dec($J2000$) = 10.954 deg ($10d57'16''$) $\pm$ 1.0 arcmin, (radius, systematic and statistical, 90% containment) (Ukwatta, et al., *GCN Circ.* 6842). The partial coding was 34%.

The masked-weighted light curves (Fig.1) shows a strong first peak with multiple overlapping sub-peaks starting at trigger time $\sim T - 20$ sec, peaking at $T + 0$ sec, and ending at $\sim T + 55$ sec. The second, much weaker peak starts at $\sim T + 130$ sec, peaks at $\sim T + 145$ sec, and ends at $\sim T + 220$ sec. T_{90} $(15 - 350$ keV$)$ is 150 ± 10 sec (estimated error including systematics).

The time-averaged spectrum of $T - 7.6$ to $T + 167.4$ sec is best fitted by a simple power law model. This fit gives a photon index of 1.36 ± 0.07, ($\chi^2 = 49.26$ for 57 d.o.f.). For this model the total fluence in the $15 - 150$ keV band is $(8.3 \pm 0.3) \times 10^{-6}$erg cm^{-2} and the 1-sec peak flux measured from $T + 0.37$ sec in the $15 - 150$ keV band is 6.3 ± 0.4 ph cm^{-2} sec^{-1}. All the quoted errors are at the 90% confidence level.

3   XRT Observations and Analysis

The XRT began observations of GRB 071003 22 ks after the BAT trigger and detected a bright X-ray source with an approximate count rate of 0.1 counts/sec. Using all the available data of the XRT for GRB 071003 (2650 sec in Photon Counting mode), the refined XRT position RA($J2000$) = 301.85102 deg ($20h07m24.25s$), Dec($J2000$) = 10.94688 deg ($10d56'48.8''$)$\pm$5.7 arcsec (90% confidence, including boresight uncertainties)(Starling, et al., *GCN Circ.* 6845). This position is within 35.5 arcsec of the BAT refined position (Ukwatta, et al.*GCN Circ.* 6842) and 3.6 arcsec from the optical afterglow position (Li, *GCN Circ.* 6838).

The $0.3 - 10$ keV light curve (Fig.2) decays as a power law decay with an approximate decay index of $\alpha = 1.0^{+0.3}_{-0.5}$.

The X-ray spectrum from all the available data can be fit with an absorbed power-law to give a photon index of $2.17^{+0.20}_{-0.17}$ and a column density of $1.84^{+0.06}_{-0.05} \times 10^{21}$ cm^{-2}, in excess of the Galactic value of 7.65×10^{20} cm^{-2} in this direction.

4 UVOT Observation and Analysis

Swift is in the process of returning to normal operations, thus there are no UVOT observations for this burst.
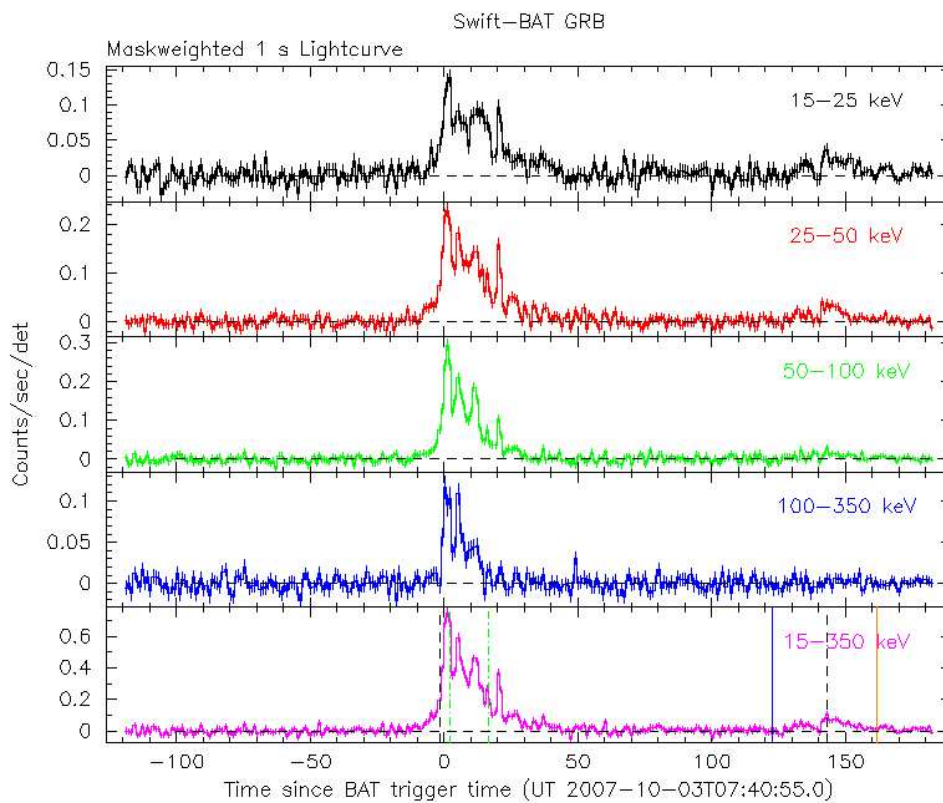

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T is 07:40:55.0 UT.
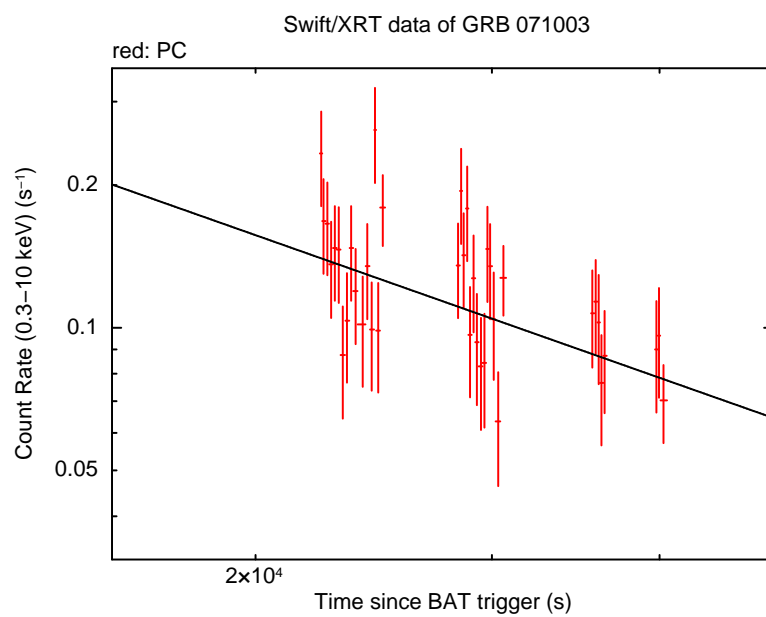
Figure 2: XRT Light curve. Counts/sec in the $0.3 - 10$ keV band taken in Photon Counting mode (red). The power low fit with decay index $\alpha = 1.0$ is shown in black. The approximate conversion of the absorbed flux is 1 count/sec 4.43×10^{-11} erg cm^{-2} sec^{-1}.