

Swift Observations of GRB 070917

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1. INTRODUCTION

At 07:33:57 UT on September 17, 2007, the Swift Burst Alert Telescope (BAT) triggered and located GRB 070917 (trigger=291292, Cummings et al. GCN 6791). Swift slewed immediately to the burst. The BAT light curve (Figure 1) shows a single FRED peak structure with a T₉₀ duration of 7.3 ± 0.2 sec. The peak count rate was ~ 22000 counts/sec (15-350 keV), at ~ 0 sec after the trigger. Swift automatic targets were disabled during the period due to gyro problems (see Gehrels GCN circ. #6760; Barthelmy et al. GCN circ #6781; Burrows et al. GCN circ. #6791; and Gehrels GCN circ. #6825). The XRT began taking data at T+35 ksec. The XRT found a fading, uncatalogued source within the BAT error circle.

The best location is the optical afterglow position (Cenko et al. GCN circ #6800) at RA, Dec (J2000) = 293.91887, 2.411222 deg, which is equivalent to:

RA (J2000): 19h 35m 40.53s

Dec (J2000): +02d 24' 40.4"

2) BAT OBSERVATION AND ANALYSIS

Using the data set from T-120 to T+129. RA, Dec = 293.923, 2.420 deg which is

RA(J2000) = 19h 35m 41.5s

Dec(J2000) = 02d 25' 12"

with an uncertainty of 1.0 arcmin, (radius, sys+stat, 90% containment). The partial coding was 79%.

The time-averaged spectrum from T-0.1 to T+11.4 sec is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.52 ± 0.05 . The fluence in the 15-150 keV band is $2.0 \pm 0.1 \times 10^{-6}$ erg/cm². The 1-sec peak photon flux measured from T+0.21 sec in the 15-150 keV band is 8.5 ± 0.3 ph/cm²/sec. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATION AND ANALYSIS

Using 2.3 ksec of XRT Photon Counting mode data, we find an X-ray position:

RA, Dec (J2000) = 293.91897, 2.41104 deg, which is equivalent to:

RA(J2000) = 19 35 40.55

Dec(J2000) = +02 24 39.8

with an estimated uncertainty of 6.0 arcsec (radius, 90% containment including boresight uncertainty). This is 35 arcsec from the BAT refined position and 0.7 arcsec from the optical position.

The 0.3-10 keV X-ray light curve shows a single power-law decay (Figure 2). The decay slope is $\alpha = 1.1 \pm 0.2$. The count rate to flux conversion using the spectrum below is 1 count/sec = $5E-11$ erg/cm²/sec.

Using the C-statistic in xspec we fit the PC mode spectrum from T₀+35000 to 42000 sec with an absorbed power-law. The absorption is consistent with the Galactic value of $1.73E21$ cm⁻² (Kalberla et al. 2005). The spectral slope is $\gamma = 1.17 (+0.44/-0.45)$, which is consistent with the BAT value of 1.52 ± 0.04 . The observed (unabsorbed) flux is $1.31E-12$ ($1.44E-12$) erg/cm²/s.

4. UVOT OBSERVATION AND ANALYSIS

The UVOT was not operating during observations of this burst.

5. OTHER OBSERVATIONS

The burst was also observed by other spacecraft and ground observatories. The Suzaku-WAM observations are reported in Endo et al. GCN circ. #6817. The optical afterglow was detected using the P60 (Cenko et al. GCN circ #6800) and confirmed using NOT (Fynbo et al. GCN circ. #6803). Other observatories recorded upper limits.

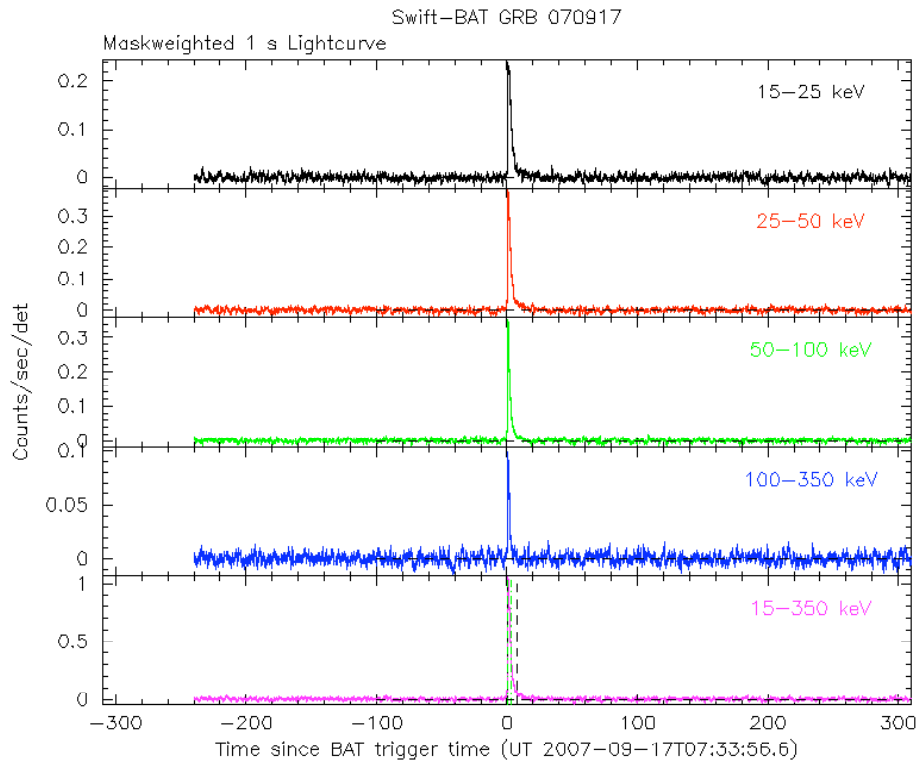


Fig.1: BAT Lightcurve. The light curve in the 4 individual plus total energy bands.
GRB 070917

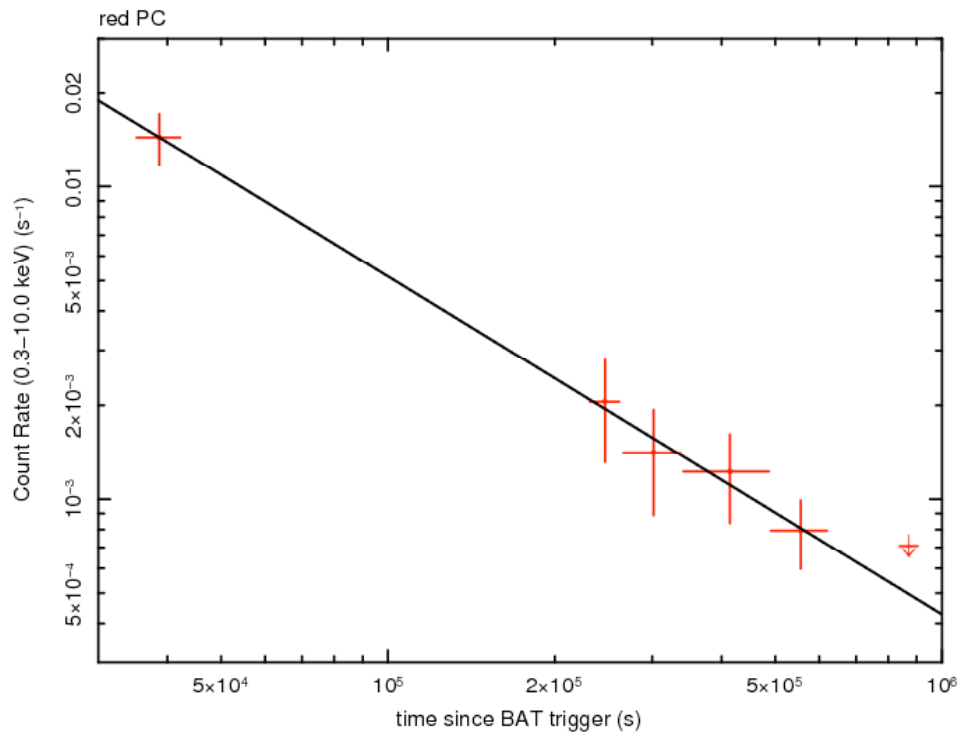


Fig. 2: XRT Lightcurve