Swift Observation of GRB 071101


1 Introduction

BAT triggered on GRB 071101 at 17:53:46 UT (Trigger 295779) (McBreen, et al., GCN Circ. 7030). This was rate-trigger on a burst with $T_{90} = 9 \pm 1$ sec. Swift slewed to this burst immediately and XRT began follow-up observations at $T + 85$ sec, and UVOT at $T + 82$ sec. Our best position is the XRT location RA(J2000) = 48.1772deg (03h12m42.53s), Dec(J2000) = +62.5002deg (+62d30'00.7") with an error of 7 arcsec (90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

Using the data set from $T - 240$ to $T + 962$ sec, further analysis of BAT GRB 071101 has been performed by Swift team (Ukwatta et al., GCN Circ. 7039). The BAT ground-calculated position is RA(J2000) = 48.179deg (03h12m42.9s), Dec(J2000) = +62.524deg (+62d31'27") with an uncertainty of 2.7 arcmin, (radius, systematic and statistical, 90% containment). The partial coding was 99% (the boresight angle was 12.73 deg).

The mask-weighted light curves (Fig.1) shows a single peak starting at a low level at T-20, then spiking at $T + 1$ sec and ending at $T + 10$ sec. $T_{90}(15 - 350keV)$ is $9 \pm 1$ sec (estimated error including systematics).

The time-averaged spectrum from $T - 1.9$ to $T + 6.1$ sec is best fitted by a simple power law model. This fit gives a photon index of $2.25 \pm 0.58$, ($\chi^2 = 52.1$ for 59 d.o.f.). For this model the total fluence in the $15 - 150$ keV band is $(7.6 \pm 2.6) \times 10^{-8}$ergs/cm$^2$ and the 1-sec peak flux measured from $T + 0.07$ sec in the $15 - 150$ keV band is $0.4 \pm 0.1$ ph/cm$^2$/sec. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using the first 13 ksec of data of GRB 071101, the refined XRT position for GRB 071101 is RA(J2000) = 48.1772deg (03h12m42.53s), Dec(J2000) = +62.5002 deg (+62d30'00.7") with an error radius of 7 arcsec (90% confidence, including boresight uncertainties) (Pagani et al., GCN Circ. 7034, Godet et al., GCN Circ. 7038).

The 0.3 – 10 keV light curve (Fig.2) shows a decline with a slope of $0.9 \pm 0.2$ (Evans et al., 2007).

The X-ray spectrum using the full 36 ksec of data can be modeled with an absorbed power-law with spectral indices of $3.0^{+1.5}_{-1.3}$ and a total absorbing column of $NH = (2.2^{+2.0}_{-1.2}) \times 10^{22} cm^{-2}$. The Galactic value is $5.7 \times 10^{21} cm^{-2}$ in the direction of the burst. The average observed (unabsorbed) flux over $0.3 - 10$ keV for this spectrum (spanning a time of 85 sec – 92 ksec seconds after the trigger) is $1.0 \times 10^{-13} (8.9 \times 10^{-13})$ ergs/cm$^2$/sec.
4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 071101 82 sec after the initial BAT trigger (McBreen et al., GCN Circ. 7030).

UVOT took a finding chart exposure of 100 seconds with the White (160-650 nm) filter starting 82 seconds after the BAT trigger. No afterglow candidate has been found in the initial data products. The 2.7’x2.7’ sub-image covers 25% of the BAT error circle. The typical 3-sigma upper limit has been about 18.5 mag. The 8’x8’ region for the list of sources generated on-board covers 100% of the BAT error circle. The list of sources is typically complete to about 18 mag. No correction has been made for the large, but uncertain extinction expected.

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 $T_0$ is 17:53:46 UT.
Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Photon Counting mode (red). The approximate conversion is $1 \text{ count/sec} \sim 1.1 \times 10^{-10} \text{ ergs/cm}^2/\text{sec}$. 