Swift Observation of GRB 071028B

D. Grupe (PSU), J.R. Cummings (NASA/GSFC), P. Schady (MSSL), S. D. Barthelmy (GSFC), D.N. Burrows (PSU), P. Roming (PSU), and N. Gehrels (NASA/GSFC) for the Swift Team

1 Introduction

At 02:43:46 UT on 2007 October 28, the Swift Burst Alert Telescope (BAT) triggered on GRB 071028B (Cummings & Greiner GCN Circ. 7019). The burst was on the edge of the field of view and a source was found during later ground analysis. Therefore no immediate slew was performed. The Swift XRT and UVOT began observing the field of GRB 071028B 212 ks after the burst. There were two faint sources found in the BAT error circle (Grupe & Schady, GCN Circ. 7040). Because of the ambiguity of these two sources the field was re-observe about two weeks after the burst and one source was found to have faded away. The best position of the afterglow is the XRT position at RA-2000 = 23 36 39.1, Dec-2000 = -31 37 13.8.

2 BAT Observation and Analysis

At 02:43:46 UT on 2007 October 28, the Swift BAT triggered on GRB 071028B (trigger #295492). The burst was on the edge of the field of view (4.1% coded) and no source was found automatically onboard. A source was found during later ground analysis at a location RA, Dec 354.163, -31.630 which is

RA(J2000) = 23h 36m 39s
Dec(J2000) = -31d 37’ 47”

with an uncertainty of 3 arcmin (radius, 90% containment, including systematic uncertainty). The BAT light curve shows two FRED peaks, the first at T+1 sec about 4 seconds long, the second at T+48 sec about 9 seconds long. The peak count rate was about 1500 counts/sec (15-350 keV), at about 1 s after the trigger. Using the data set from T-3.5s to T+6.5s and T+44.5s to T+54.5 s, $T_{90}$ (15-350 keV) is (55±2) s (estimated error including systematics).

The power law index of the time-averaged spectrum is 1.45±0.25. The fluence in the 15-150 keV band is $(2.5±0.8)\times10^{-7}$ ergs cm$^{-2}$. The 1-sec peak photon flux measured from T-0.5 s in the 15-150 keV band is $(1.4±0.5)$ photons cm$^{-2}$ s$^{-1}$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

The Swift XRT began observing the field of GRB 071028B (Cummings & Greiner 2007, GCN Circ. 7019) on 2007 October 30 13:36 UT approximately 212 ks after the burst (Grupe & Schady, GCN Circ. 7040). There are clearly three sources within the 3’ BAT error circle. The brightest of these (0.01 counts/s) coincides with a known source listed in the USNO catalogue. Because the other two sources were rather faint (in the order of 0.001 counts s$^{-1}$), Swift re-observed the field of GRB 071028B on 2007 November 07 for 9 ks and 2007 November 10 for 11ks. Clearly the first source listed in GCN Circ 7040 (Grupe & Schady, 2007) had faded while the second source is still visible at a similar level as
reported in GCN 7040. Therefore the position of the X-ray afterglow is RA-2000, Dec-2000 354.16300, -31.62050 which corresponds to

RA-2000 = 23 36 39.1
Dec-2000 = -31 37 13.8

with a 4.8” XRT error circle.

4 UVOT analysis

UVOT observed the field of GRB 071028B for a total of 6443s in the V-filter on 2007 October 30. There is no optical counterpart within the XRT error circles of the first and second source. The 3-sigma upper limit at the position of the X-ray afterglow is $V > 21.3$mag (Grupe & Schady, GCN Circ. 7040. These values are not corrected for the expected Galactic extinction corresponding to a reddening of $E(B-V) = 0.02$ mag in the direction of the burst (Schlegel et al. 1998). There are no counterparts at either of the source positions in the USNO catalogue within the XRT error radius (90% containment).
Figure 1: BAT Light curve of GRB 071028B.