Swift Observations of the Short Burst GRB 070810B

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1. INTRODUCTION

At 15:19:17 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 070810B (trigger 287409; Marshall *et al.* GCN Circ. 6743). Swift slewed immediately to the burst, and the XRT began taking data ~62 seconds after the trigger. The first UVOT finding chart began ~66 seconds after the trigger.

Since neither XRT (Starling et al. GCN Circ. 6754) nor UVOT (Brown & Marshall GCN Circ. 6755) found a secure afterglow identification, the best Swift position for the burst is from the BAT (Sakamoto *et al.* GCN Circ. 6753). Ground-based optical observations also failed to find an afterglow (e.g., Thoene et al. GCN Circ. 6756; Guidorzi *et al.* GCN Circ. 6758).

2) BAT OBSERVATION AND ANALYSIS

The BAT ground-calculated position (Sakamoto *et al.* GCN Circ. 6753) is RA (J2000) = 00h 35m 48.4s and Dec (J2000) = +08° 49' 18" with an uncertainty of 2.5'(90% containment including both statistical and systematic errors). The partial coding was 100%.

The light curve is a single FRED-like peak starting at T+0, and ending at T+0.12 sec. T90 (15-350 keV) is 80 ± 10 msec (estimated error including systematic uncertainties).

The time-averaged spectrum from T+0.008 to T+0.092 sec is best fit by a simple power-law model. The power-law index of the time-averaged spectrum is 1.44 ± 0.37. The fluence in the 15-150 keV band is $1.2 \pm 0.3 \times 10^{-8}$ erg-cm^{-2}. The 1-sec peak photon flux measured from T-0.45 sec in the 15-150 keV band is 1.8 ± 0.4 photons-cm^{-2}-sec^{-1}. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATIONS AND ANALYSIS

We have analyzed 7.2 ks of Swift XRT photon counting mode data, beginning at T+70 s and ending T+13.8 ks. We do not detect any X-ray sources at greater than 3-σ significance within the refined BAT error circle.

Two low significance (2-σ) sources are found within the BAT refined error circle. Source 1 is at RA (J2000) = 00h 35m 51.2s and Dec (J2000) = +08° 51' 21.3", and Source 2 is at RA (J2000) = 00h 35m 50.0s and Dec (J2000) = +08° 48' 45.0". Using the Bayesian method, we find that both sources have between 4 and 26 counts at the 99% confidence level. It is not possible to determine at this time whether either of these sources is fading.

We note that Source 2 lies 1.1' from the galaxy 2MASX J00355339+0849273 (= LEDA 1354367; RA (J2000) = 00h 35m 53.39s and Dec (J2000) = +08° 49' 27.3"), which has an angular size of approximately 0.7'x0.3'.

4. UVOT OBSERVATIONS AND ANALYSIS

UVOT began its usual automated observing program at about T+66s with a 100-s finding chart exposure with the white filter. No afterglow was detected in any of the early observations (Brown & Marshall GCN Circ. 6755). Table 1 gives the 3-σ upper limits for the early UVOT observations.

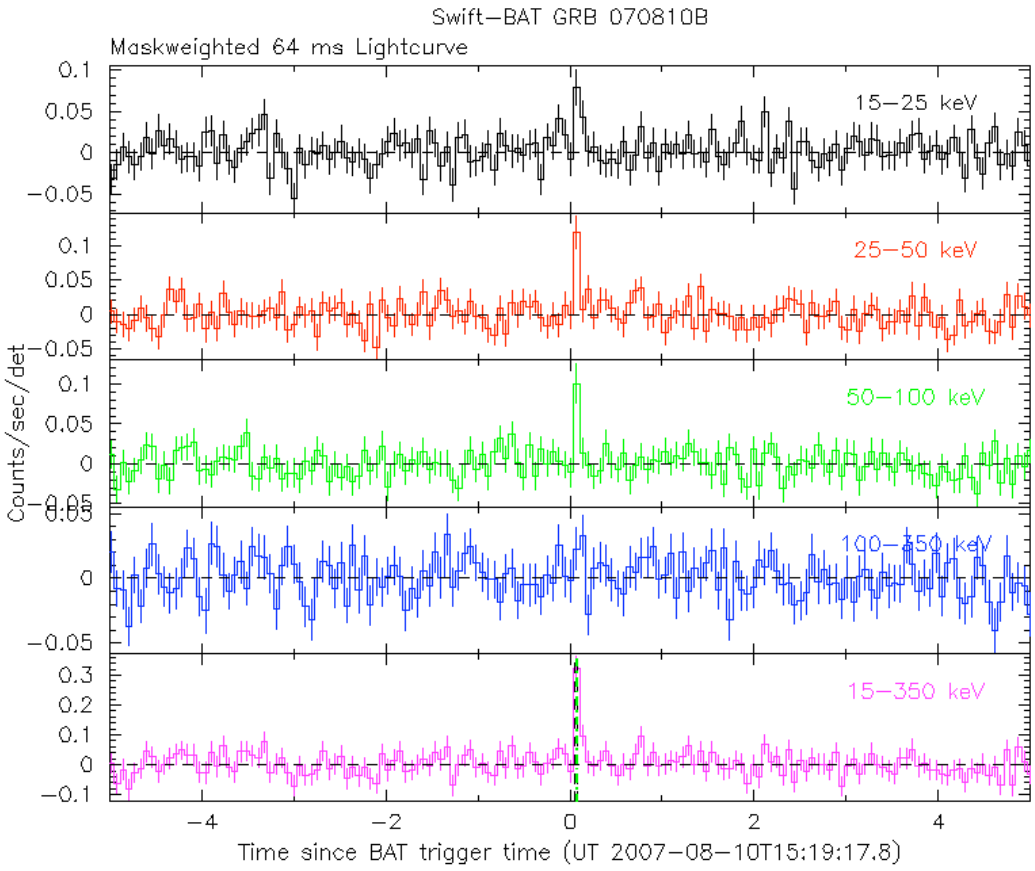

Fig.1: The BAT mask-weighted light curve in the 4 individual plus total energy bands. The units are counts s^{-1} illuminated-detector^{-1}. Each illuminated detector has an area of 0.16 cm^2.

Filter	Start Time (sec.)	Stop Time (sec.)	Exposure (sec.)	Upper Limit (Mag.)
white (FC)	66	165	98	20.5
white	66	13,134	1,345	22.0
v	172	7,372	1,296	20.4
b	653	12,222	1,299	21.2
u	628	7,987	549	20.3
uvw1	604	7,782	549	20.5
uvm2	579	7,577	549	20.4

Table 1: UVOT Observations. The start and end times of the exposures are given in seconds since the BAT trigger. No corrections have been made for the expected extinction in the Milky Way corresponding to E(B-V) of 0.053 (Schlegel *et al*. 1998)