

Swift Observations of GRB 080325

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report on behalf of the Swift Team*

1. Introduction

At 04:09:17 UT, BAT triggered and located GRB 080325 (trigger=307604, Vetere et al., GCN Circ. 7512). Swift slewed immediately to the burst. XRT found a bright, uncatalogued X-ray source. XRT field was observed with MOIRCS on the Subaru Telescope in J and Ks bands starting at 12:51 UT, March 25, about 8.7 hours after the trigger. Both the host galaxy and the NIR afterglow were detected at:

RA(J2000) = 18h 31m 34.24s
Dec(J2000) = +36d 31' 24.3"

with an uncertainty 0.3 arcsec (Tanaka et al., GCN Circ. 7524).

2. BAT Observations and Analysis

Using the data set from T-323 to T+963 sec from all of the telemetry, the BAT ground-calculated position is RA, Dec = 277.906, 36.516 deg which is

RA(J2000) = 18h 31m 37.5s
Dec(J2000) = +36d 30' 57.9"

with an uncertainty of 2.0 arcmin, (radius, sys+stat, 90% containment). The partial coding was 10%.

The mask weighted light curve has a broad FRED-like structure, with a rise to peak within ~20 sec, followed by a gradual decay extending out to T+200 sec. The low partial coding in the initial part of the burst makes it difficult to distinguish between statistical and real fluctuations. T_{90} (15-350 keV) is 128.4 ± 34.2 sec (estimated error including systematics).

The time-averaged spectrum from T-29.3 to T+170.5 sec is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.68 ± 0.17 . The fluence in the 15-150 keV band is $4.9 \pm 0.4 \times 10^{-6}$ erg/cm². The 1-sec peak photon flux measured from T+38.02 sec in the 15-150 keV band is 1.4 ± 0.6 ph/cm²/sec. All the quoted errors are at the 90% confidence level.

The results of the batgrbproduct analysis are available at
http://gcn.gsfc.nasa.gov/notices_s/307604/BA/

3. XRT Observations and Analysis

The XRT began observing the field at 04:11:49.2 UT, 151.9 seconds after the BAT trigger. XRT found a bright, uncatalogued X-ray source.

Using 199s of overlapping XRT Photon Counting mode and UVOT data for GRB 080325, we find an astrometrically corrected X-ray position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue) RA, Dec = 277.89272, +36.52381 which is equivalent to (Osborne et al. GCN Circ. 7513):

RA (J2000): 18h 31m 34.25s
Dec (J2000): +36d 31' 25.7"

with an uncertainty of 2.6 arcsec (radius, 90% confidence). Position enhancement is described by Goad et al. (2007, *A&A*, 476, 1401 http://www.swift.ac.uk/xrt_positions/Goad.pdf), the current algorithm is an extension of this method (Evans et al. GCN Circ. 7328).

The early WT light-curve shows flaring activity followed by a fast decay that can be fit by a power law with a slope of $\alpha_1 = 5.7 \pm 0.5$. The following PC light curve starts at 3.6 ks after BAT trigger and shows a much slower decay with a slope of $\alpha_2 = 0.98 \pm 0.07$.

The spectrum formed from all the WT data can be modeled with a power-law of photon index $\Gamma = 2.4 \pm 0.1$, with an absorbing column of $N_H = (3.0 \pm 0.1)e^{21} \text{ cm}^{-2}$, significantly in excess with respect to the Galactic value of $3.81e^{20} \text{ cm}^{-2}$ (Vetere & Racusin, GCN Circ. 7521). The approximate conversion is $1 \text{ count/sec} \sim 7.2e^{-11} \text{ ergs/cm}^2/\text{sec}$.

4. UVOT Observations and Analysis

The Swift/UVOT began settled observations of the field of GRB 080325 (trigger=307604) starting 163 s after the BAT trigger (Vetere et al., GCN Circ. 7512).

We did not detect an optical/uv afterglow at the enhanced XRT position (Osborne et al., GCN Circ. 7513), or NIR candidate in the initial finding chart observations or subsequent summed images down to the 3 sigma upper limits in Tab 1 (Brown & Vetere, GCN Circ. 7518).

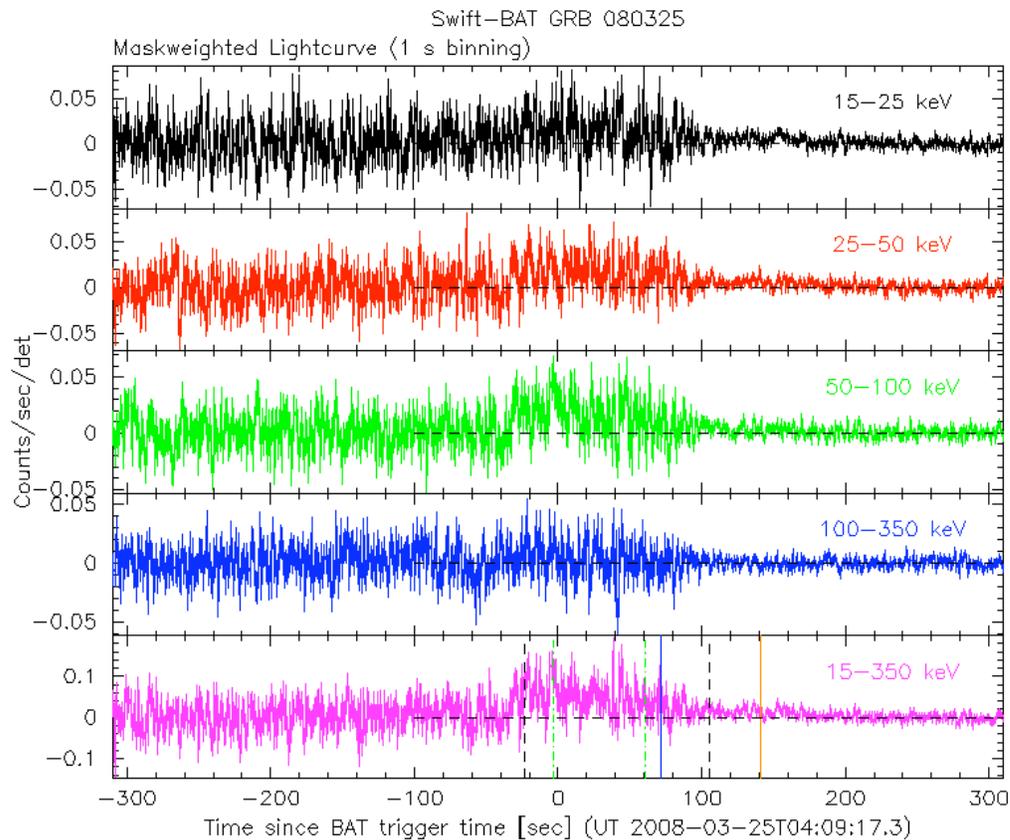


Fig.1: BAT Lightcurve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector and T_0 is 04:09:17 UT.

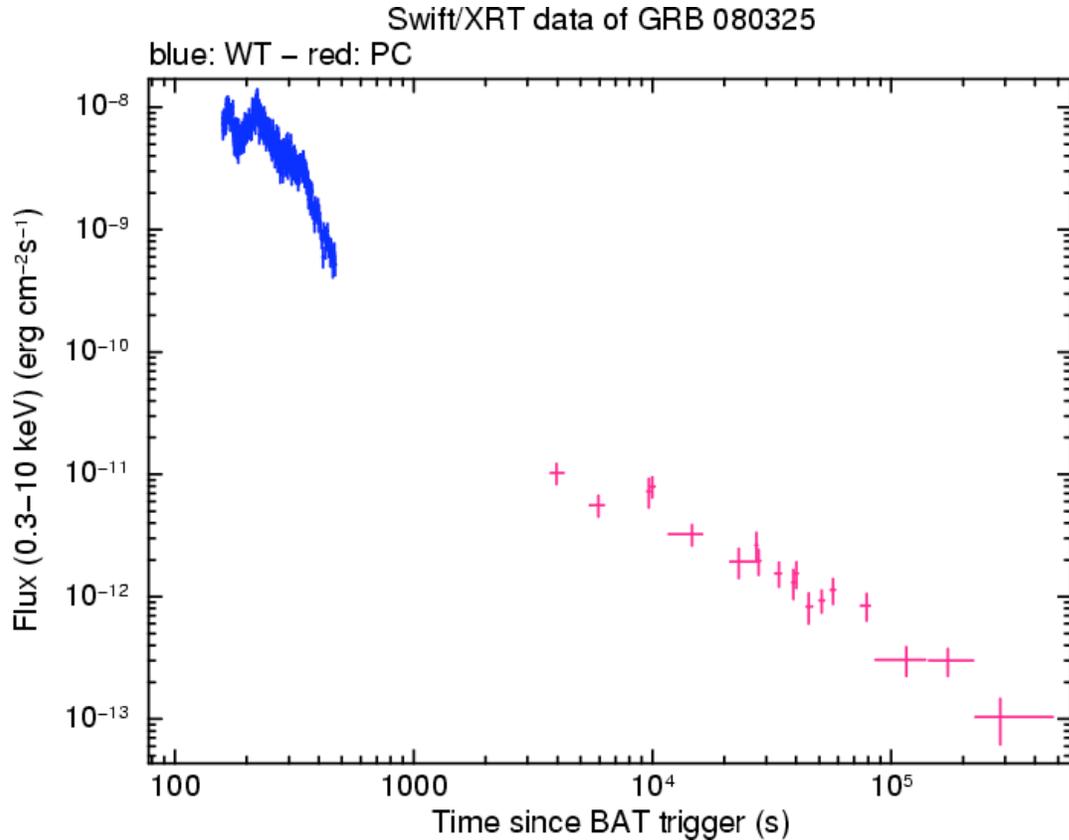


Fig. 2: XRT Lightcurve. Counts/sec in the 0.3-10keV band. Blue is for WT mode while red is for PC mode.

Table 1: UVOT Observations. The reported magnitudes are not corrected for the Galactic extinction corresponding to a reddening of $E(B-V) = 0.064$ mag (Schlegel et al., 1998, ApJS, 500, 525). The photometry is on the UVOT flight system described in Poole et al. (2008, MNRAS, 383, 627).

Filter	T_start (s)	T_stop	Expo(s)	Mag
white	163	262	98	>20.6
white	163	5905	392	>21.5
v	269	513	240	>19.3
v	269	6297	419	>19.6
b	5501	5700	197	>20.6
u	4131	22211	353	>20.9
uvw1	3925	21975	2371	>21.8
uvm2	3720	10211	891	>21.1
uvw2	5912	6111	197	>20.1

References:

- 1) L. Vetere, et al., GCN Circ. 7512, 2008.
- 2) J. Osborne et al., GCN Circ. 7513, 2008.
- 3) P. J Brown & L. Vetere, GCN Circ. 7518, 2008.
- 4) L. Vetere & J. L. Racusin, GCN Circ. 7521, 2008.
- 5) I. Tanaka et al., GCN Circ. 7524, 2008.