

Swift Observation of GRB 090509

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1 Introduction

At 05:10:03 UT on 2009 May 09, the Swift Burst Alert Telescope (BAT) triggered on GRB 090509 (Grupe et al. *GCN Circ.* 9325). Swift could not slew to the GRB because it was moon-constrained until May 12. No further observations were planned or performed.

Although the burst was moon-constrained, there were several ground-based optical followup observation. Olivares et al. (*GCN Circ.* 9326, 9328) reported of detections by GROND in all 7 filters, and also Cobb et al. (*GCN Circ.* 9333) reported of a bright optical/NIR afterglow seen by the ANDICAM on the 1.3m CTIO telescope.

2 BAT Observation and Analysis

At 05:10:03 UT on 2009 May 09, the Swift BAT triggered on GRB 090509 (trigger #351525, Grupe et al., *GCN Circ.* 9325). The BAT ground-calculated position is RA, Dec = 241.422, -28.385 deg (Krimm et al. *GCN Circ.* 93..), which is

$$\text{RA(J2000)} = 16\text{h } 05\text{m } 41.3\text{s}$$

$$\text{Dec(J2000)} = -28^{\circ}23'04.4''$$

with an uncertainty of $2.1'$ (radius, 90% containment, including systematic uncertainty). The partial coding was 29%.

The mask weighted light curve consists of two sets of peaks widely separated in time. The first complex contains multiple overlapping peaks starting at $T-4$ s, peaking at $T+21$ s, and ending at $T+40$ s. The second complex also contains multiple overlapping peaks starting at $T+240$ s, peaking at $T+250$ s and continuing until at least $T+300$ s, when a pre-planned slew caused the source to move out of the BAT field of view. We do not know whether source activity continued beyond this point. T_{90} (15-350 keV) is 355 ± 32 s (estimated error including systematics).

The time-averaged spectrum from $T-62.6$ to $T+298.7$ s is best fit by a simple power-law model. The photon index of the time-averaged spectrum is $\Gamma=1.75 \pm 0.20$. The fluence in the 15-150 keV band is $(3.3 \pm 0.4) \times 10^{-6}$ ergs cm^{-2} . The 1s peak photon flux measured from $T+20.73$ s in the 15-150 keV band is (1.5 ± 0.1) photons $\text{cm}^{-2} \text{s}^{-1}$. The results of the batgrbproduct analysis are available at http://gcn.gsfc.nasa.gov/notices_s/351525/BA/

3 XRT and UVOT

Due to the moon-constraint, no XRT and UVOT observations were obtained.

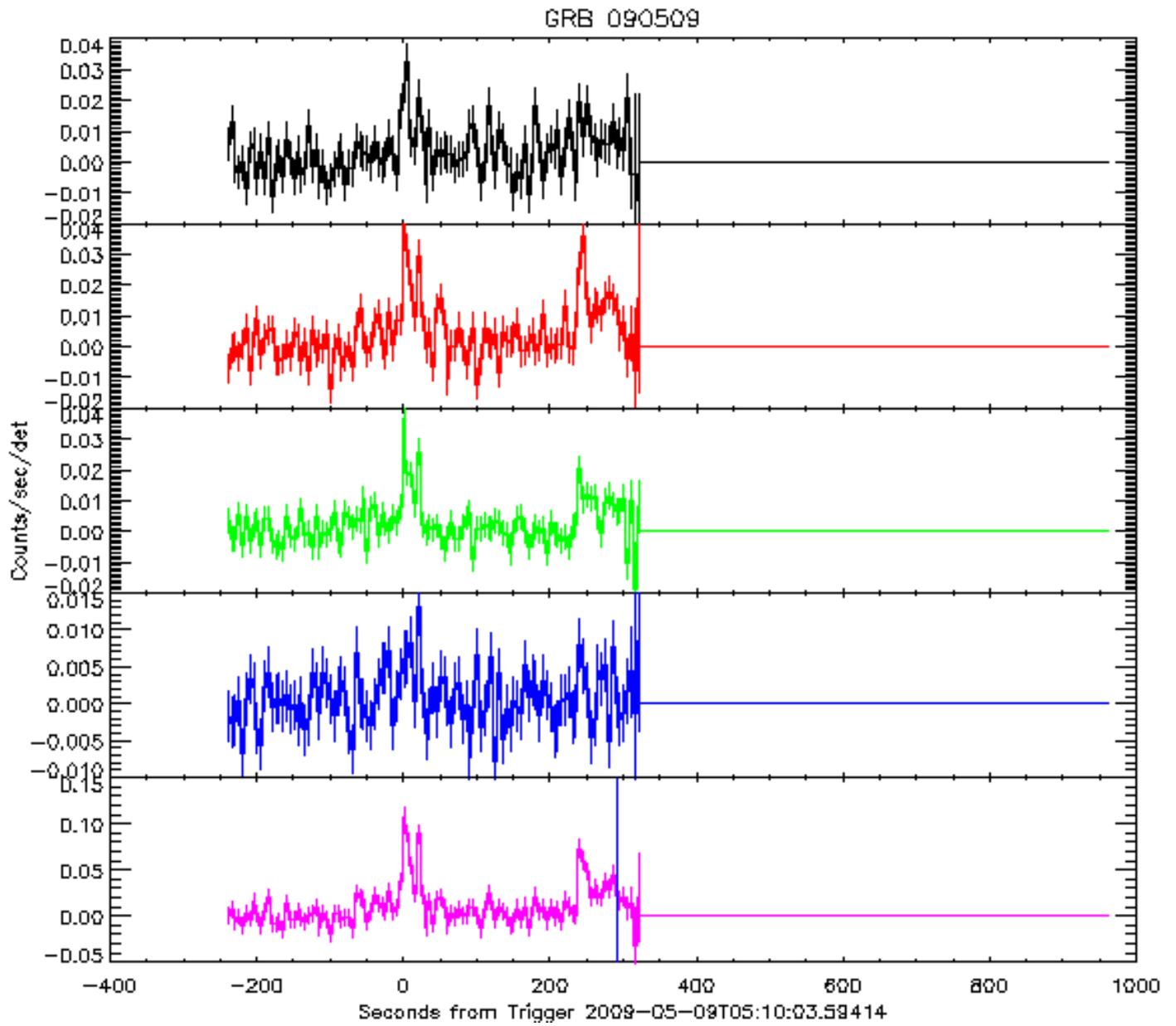


Figure 1: BAT Light curves of GRB 090509