

Swift Observations of GRB 090306B

P.A. Evans (U. Leicester), A. Copete (Harvard) and E.A. Hoversten (PSU), for the Swift Team

1 Introduction

Swift observed the field of the BAT Slew Survey (BATSS) gamma ray burst GRB 090306B for 5.8 *ksec*, from $T + 67$ *ksec* to $T + 81$ *ksec*, and again for 6 *ksec* from $T + 484$ *ksec* to $T + 567$ *ksec*. Our best position for the afterglow is the XRT localisation $RA(J2000) = 231.2083deg$ (15h24m49.99s), $Dec(J2000) = -6.9682deg$ ($-06d58'05.6''$) with an error of 4.0 *arcsec* (radius, 90% confidence).

2 BAT Slew Survey Observation and Analysis

The BATSS detected a bright GRB in the slew that started on 2009-03-06 at 23:07:02 and which lasted 66 *sec*. The ground-calculated position is $RA(J2000) = 231.204deg$ (15h24m49s), $Dec(J2000) = -6.958deg$ ($-06d57'29''$) ± 2.87 *arcmin*, (radius, 90% confidence, including systematics). The detection was triggered by simultaneous independent detections of 35.6σ and 20.2σ from imaging in the 15 – 50 *keV* and 50 – 15 *keV* energy bands, respectively. The burst mask-tagged lightcurve in the 15 – 150 *keV* band shows a strong and broad emission peak starting at $T + 21$ *sec*, lasting 29 *sec*, and peaking twice at $T + 25$ *sec* and $T + 30$ *sec*. $T_{90}(15 - 150$ *keV*) is 20.4 *sec*.

The time-averaged spectrum over the 55 *sec* exposure time of the source is best fit by a power law with an exponential cutoff, with photon index 1.02 and high-energy cut at 133 *keV*. The fluence in the 15 – 150 *keV* band is 3.1×10^{-6} *ergs/cm²*, and the peak 1-sec flux is 2.5×10^{-7} *ph/cm²/sec* at $T + 30$ *sec*. The 200-*msec* binned light curve is shown in Fig. 1

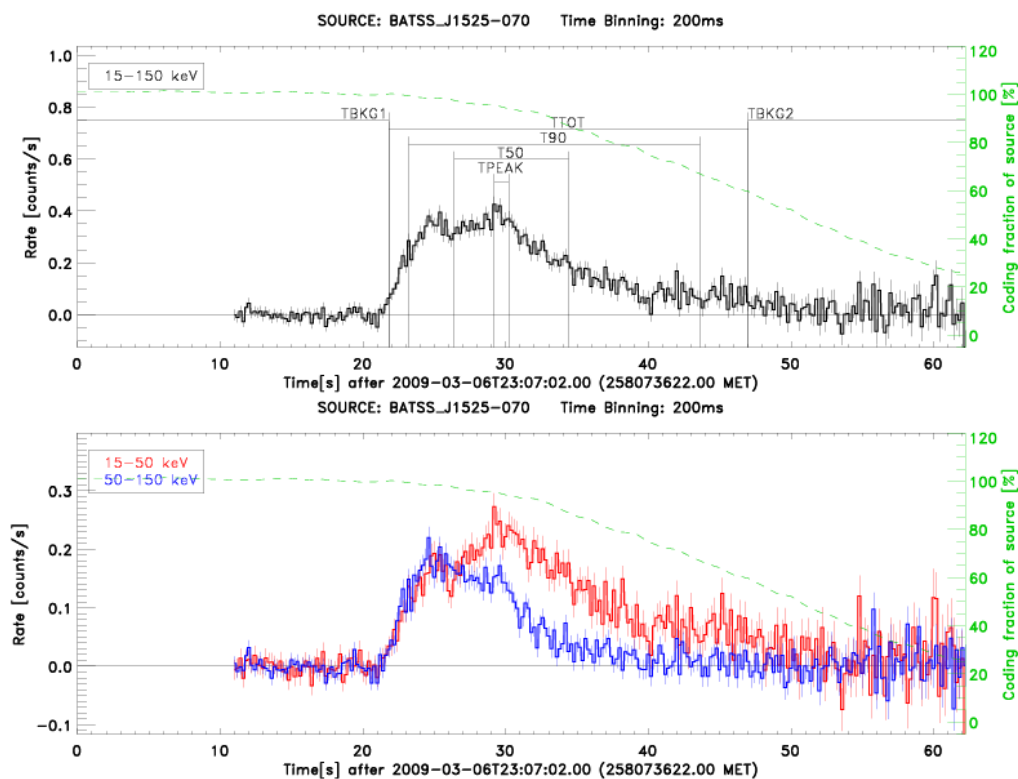
3 XRT Observations and Analysis

Swift-XRT observed the field of GRB 090306B for 5.8 *ksec*, from $T + 67$ *ksec* to $T + 81$ *ksec*, and again for 6 *ksec* from $T + 484$ *ksec* to $T + 567$ *ksec*. An uncatalogued, fading source was detected at $RA(J2000) = 231.2083deg$ (15h24m49.99s), $Dec(J2000) = -6.9682deg$ ($-06d58'05.6''$) with an error of 4.0 *arcsec* (radius, 90% confidence).

The light curve (Fig. 2) shows only two points: a detection at a rate of $(3.6 \pm 1.0) \times 10^{-3}$ *count/sec* and a $3\text{-}\sigma$ upper limit at a rate of 1.4×10^{-3} *count/sec*.

4 UVOT Observation and Analysis

The Swift-UVOT began settled observations of the field of GRB 090306B 66.9 *ksec* after the BAT Slew Survey detection. We do not detect any source at the Swift XRT position. UVOT magnitude $3\text{-}\sigma$ upper limits summarized in Table 1. These upper limits are not corrected for Galactic extinction $E(B - V) = 0.11$. All photometry is on the UVOT photometric system described in Poole et al. (2008, MNRAS, 383, 627).

Figure 1: The BATSS 200-*msec* binned light curve.

Filter	Start	Stop	Exposure	3-Sigma UL
v	68980	80919	396	19.78
b	68302	80640	396	20.81
u	68165	80581	552	20.74
uvw1	66884	80523	1627	21.35
uvm2	69117	81068	1141	20.86
uvw2	68441	80860	1588	21.46

Table 1: Magnitude limits from UVOT observations

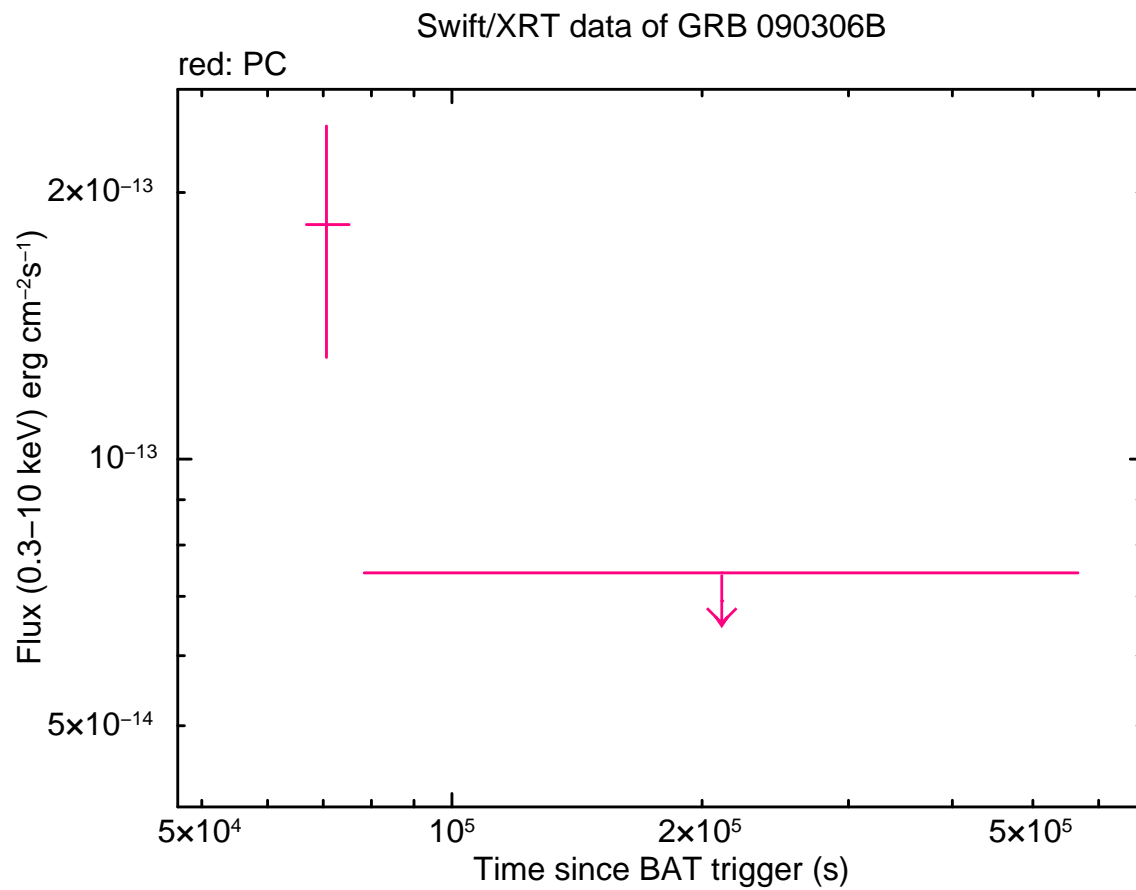


Figure 2: XRT Lightcurve. Flux in the 0.3-10 keV band. The counts-to-flux conversion is $1 \text{ count/sec} = 5 \times 10^{-11} \text{ ergs/cm}^2/\text{sec}$.