Swift Observation of GRB 070411

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1 Introduction

At 20:12:33 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 070411 (trigger=275087, GCN 6267). Swift slewed immediately to the burst. The XRT imaged the field at 20:14:09 UT, 96 seconds after the BAT trigger and stopped the observation because of the SAA. It restarted the observation at 20:20:17. The Swift/UVOT began observing the field at 20:16:37 UT, 243s after the BAT trigger. The redshift has been spectroscopically measured (z=2.954) by Jakobsson et al. (GCN 6283).

2 BAT Observation and Analysis

The BAT ground-calculated position is RA(J2000) = 7h 9m 22.9s Dec(J2000) = 1d 3' 4.9" (RA, Dec = 107.345, 1.051) with an uncertainty of 1.5 arcmin, (radius, sys+stat, 90% containment). The partial coding was 74%. The mask-weighted lightcurve shows two main peaks. The first starts at T-60 sec, peaks at T+5 sec with a minimum at T+45s. The second peaks at T+65 sec and ends at T+135s. T90 (15-350 keV) is 101± 5 sec (estimated error including systematics). The time-averaged spectrum from T-20 to T+109.5 is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.71± 0.10. The fluence in the 15-150 keV band is 2.5± 0.1 x 10^{-6} erg cm^{-2}. The 1–sec peak photon flux measured from T+70.22 sec in the 15-150 keV band is 1.0±0.1 ph cm^{-2} sec^{-1}.

3 XRT Observations and Analysis

The currently available data consist of 4.2 ks in Photon Counting (PC) starting 465 seconds after the BAT trigger and splitted in 4 orbits. Using PC data we obtain a refined position of RA(J2000) = 07h 09m 19.96s Dec(J2000)= +01d 03' 51.8" (RA, Dec = 107.3331, 1.0644), with an estimated uncertainty radius of 3.7 arcsec (90% containment). This location is 1.4 arcseconds from the UVOT position (see below). The afterglow shows a decay which can be fitted well by a single power law (α=0.87±0.08) up to the end of the fourth orbit (t=17.0 ks). At this point the observed count rate was 6.8 10^{-2} counts per second, corresponding to an unabsorbed flux of 5.2 10^{-12} erg cm^{-2}s^{-1}. The spectrum formed from the PC data can be modelled with a an absobed power-law of photon index Γ = 2.1±0.2 and and an absorption column density consistent with the Galactic value (2.9±0.9 10^{21} cm^{-2}; Dickey & Lockman, 1990).

4 UVOT Observation and Analysis

The Swift/UVOT began observing the field of GRB 070411 on 2007-04-11 at 20:16:37 UT, 243s after the BAT trigger (Moretti et al., GCN 6267). A weak afterglow is detected in the WHITE, V and B filters at a refined position: RA(J2000) = 07h 09m 19.90s Dec(J2000) = +01d 03' 52.9",(RA, Dec = 107.3329, 1.0647) The magnitudes and 3 sigma upper limits are provided in the table below.

Filter	Start	Exposure	Mag
WHITE	242.9	342.7	18.76 ± 0.13
WHITE	4418.0	4617.8	20.56 (3sigma UL)
V	349.2	368.9	17.40 ± 0.33
V	4827.9	4911.8	18.81 (3sigma UL)
B	445.9	455.7	19.02 ± 0.65
B	4213.5	4413.2	20.56 ± 0.51
U	421.5	4208.2	19.87 (3sigma UL)
UVW1	397.5	16931.8	20.89 (3sigma UL)
UVM2	373.1	16297.4	21.38 (3sigma UL)
UVW2	474.9	4823.2	20.37 (3sigma UL)

Table 1: Magnitudes from UVOT observations The values quoted above are not corrected for the expected Galactic extinction of E(B-V)=0.285.

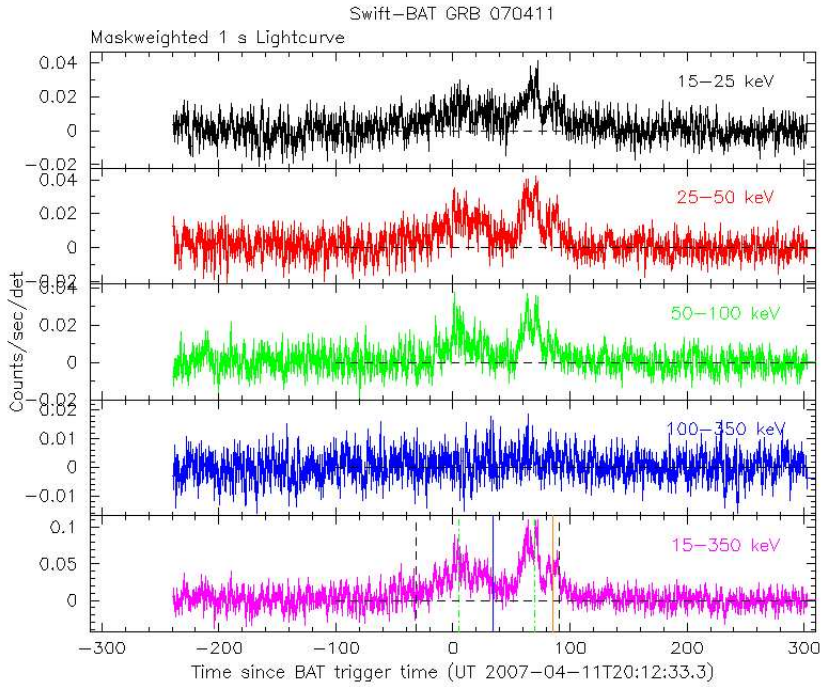

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector. T_0 is 2007 Apr 11, 20:12:33 UT.

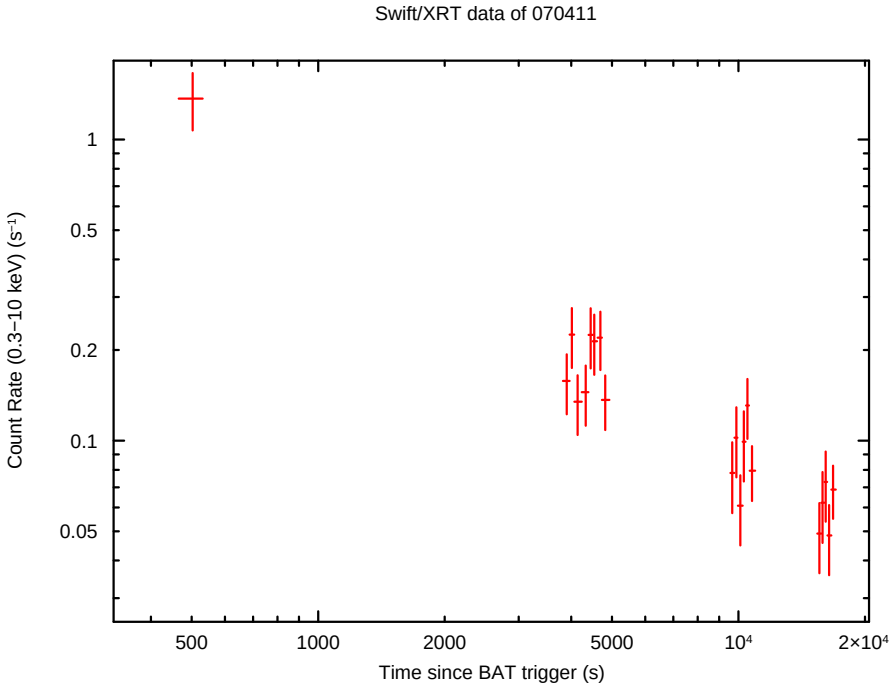

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band. The approximate conversion is for the unabsorbed flux is 1 count/sec $\sim 6.8 \times 10^{-11}$ $erg\ cm^{-2}\ sec^{-1}$.

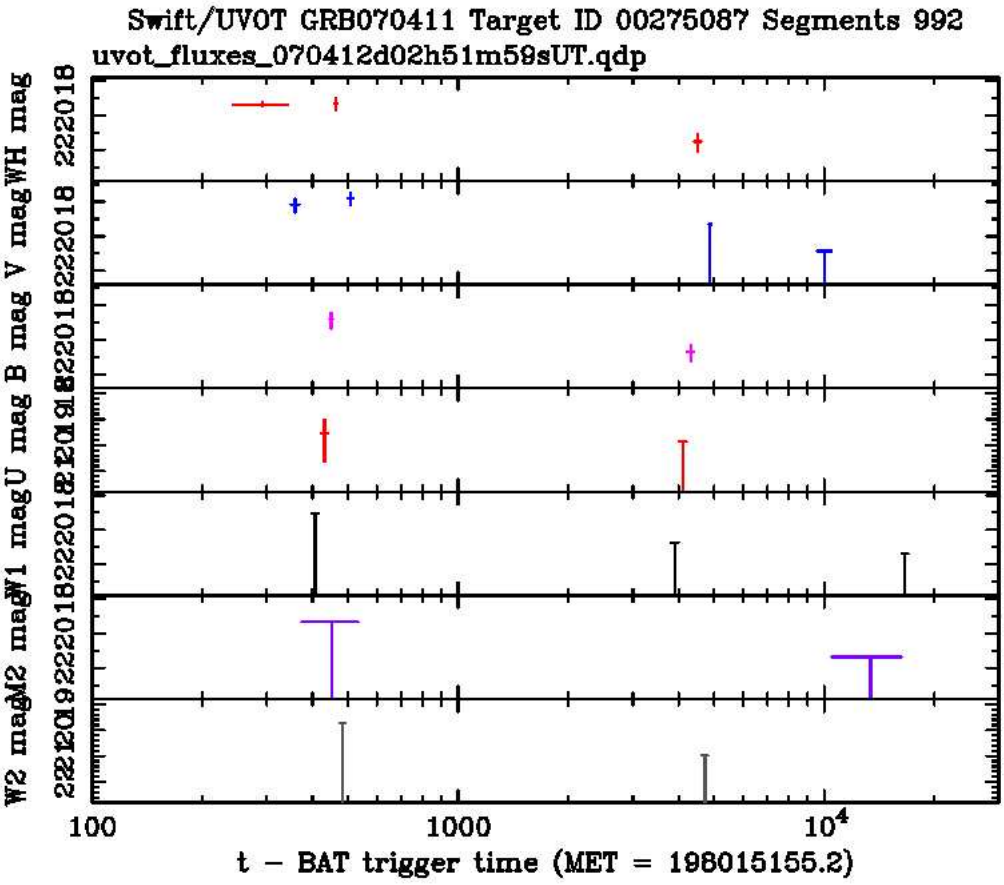

Figure 3: UVOT Lightcurve.