

Swift Observations of GRB 120311B

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1. INTRODUCTION

At 15:08:10 UT the Swift Burst Alert Telescope (BAT) triggered on GRB 120311B (trigger 517489). Swift slewed to the burst after a delay of ~49 minutes due to an observing constraint, and XRT found a decaying, uncatalogued X-ray source (Osborne *et al.* GCN Circ. 13040). The best Swift position for this burst is the enhanced XRT position (Osborne *et al.* GCN Circ. 13042) of RA (J2000) = 17h 14m 14.90s and Dec (J200) = -13° 03' 05.2" with an uncertainty of 1.6" (radius, 90% confidence).

No optical afterglow was detected with UVOT (Breeveld & Marshall GCN Circ. 13047) or reported from ground-based observatories (Guidorzi *et al.* GCN Circ. 13045; Kuroda *et al.* GCN Circ. 13046; Leonini & Rosi GCN Circ. 13050; Kumar *et al.* GCN Circ. 13059).

Standard analysis products for this burst are available at http://gcn.gsfc.nasa.gov/swift_gnd_ana.html.

2) BAT OBSERVATION AND ANALYSIS

The BAT ground-calculated position (Ukwatta *et al.* GCN Circ. 13041) is RA (J2000) = 17h 14m 12.2s and Dec (J2000) = -13° 04' 05.0" with an uncertainty of 1.3' (90% containment radius including both statistical and systematic errors).

The mask-weighted light curve (Figure 1) shows two nearly separated peaks, the first starting at T-15 sec, peaking at ~T+0, and a minimum between the two peaks at ~T+5 sec. The second peak reaches a maximum at ~T+10 sec. and returns to baseline at ~T+22 sec. T_{90} (15-350 keV) is 28.2 ± 5.5 sec (estimated error including systematics).

The time-averaged spectrum from T-13.88 to T+21.63 sec is best fit by a simple power-law model with a photon spectral index of 1.96 ± 0.14 . The fluence in the 15-150 keV band is $1.0 \pm 0.1 \times 10^{-6}$ erg cm⁻². The 1-sec peak photon flux measured from T+9.04 sec in the 15-150 keV band is 1.5 ± 0.2 ph cm⁻² sec⁻¹. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATIONS AND ANALYSIS

The XRT began observing GRB 120311B about 3068 sec after the BAT trigger (Osborne *et al.* GCN Circ. 13040). 10 ks of data were taken in Photon Counting (PC) mode between 3.1 ks and 22.9 ks after the trigger. The best XRT position is reported in Section 1. The light curve can be modeled as a power-law decay with a decay index of 0.69 ± 0.11 (D'Avanzo & Marshall GCN Circ. 13044).

The spectrum formed from all the PC mode data can be fitted with an absorbed power-law with a photon spectral index of 2.01 (+0.21, -0.21). The best-fitting absorption column is $3.6 (+0.9, -0.8) \times 10^{21}$ cm⁻², in excess of the Galactic value of 1.6×10^{21} cm⁻² (Kalberla *et al.* 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced for this spectrum is 4.2×10^{-11} (7.0×10^{-11}) erg cm⁻² count⁻¹.

4. UVOT OBSERVATIONS AND ANALYSIS

UVOT began settled observations of the GRB 120311B 3072 sec after the BAT trigger. No optical afterglow was detected in the initial UVOT exposures (Breeveld & Marshall GCN Circ. 13047). The preliminary 3- σ upper limits using the UVOT photometric system (Breeveld *et al.* 2011, AIP Conf. Proc., 1358, 373) are given in Table 1. No correction has been made for the expected extinction in the Milky Way corresponding to a reddening of E_{B-V} of 0.52 mag. in the direction of the GRB (Schlegel *et al.* 1998).

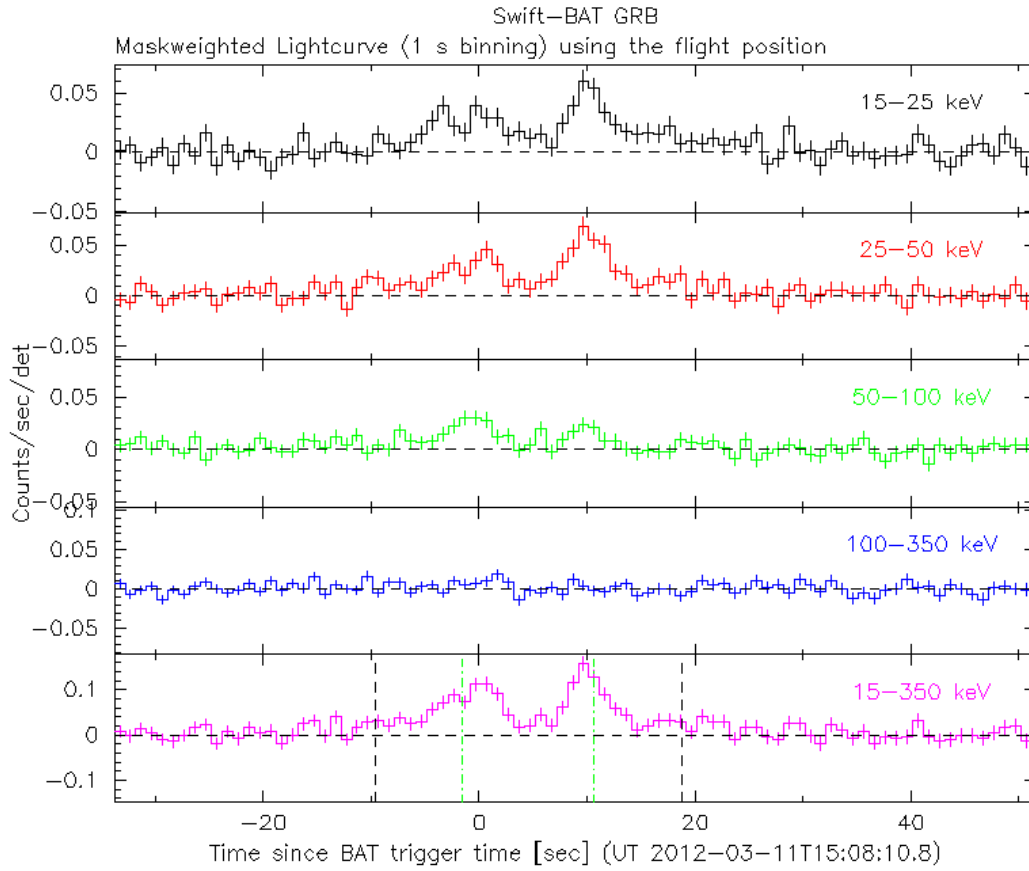


Figure 1: The BAT light curve in multiple energy bands.

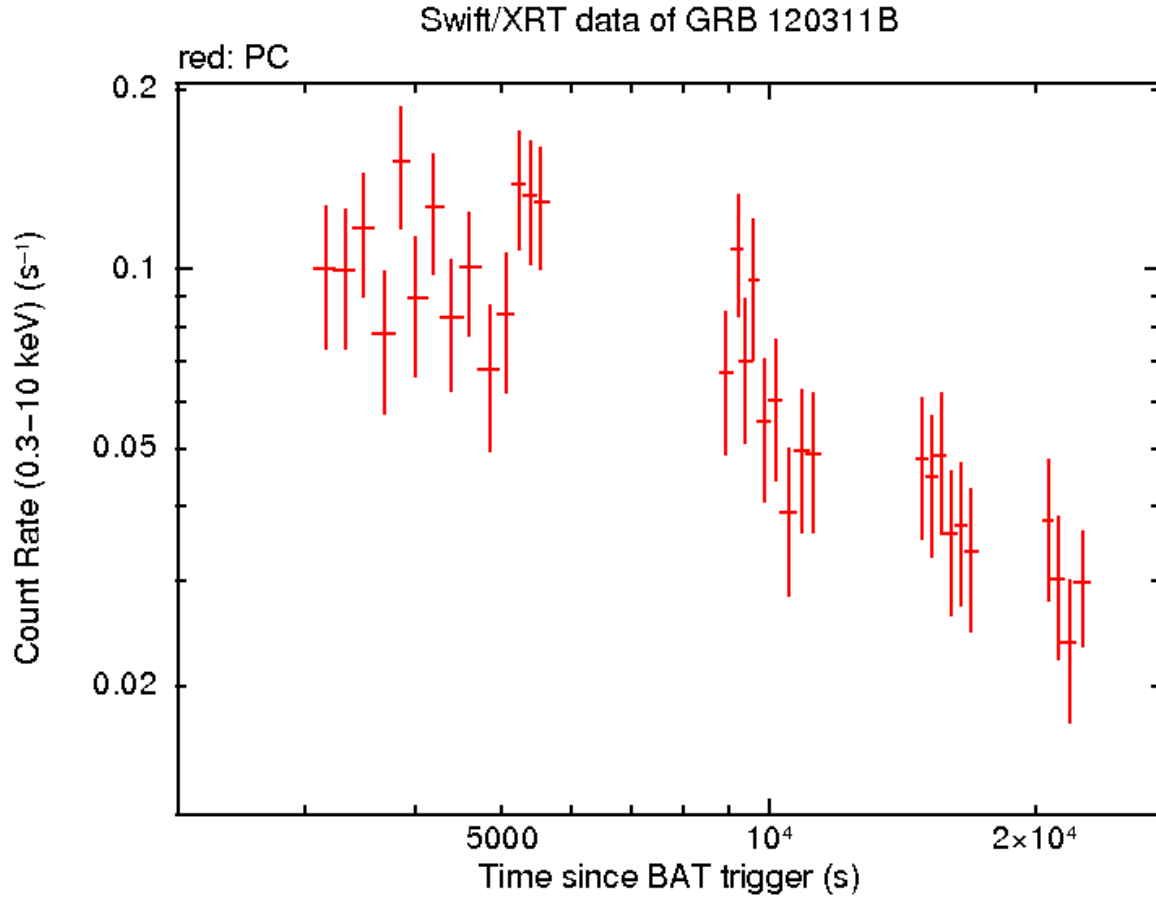


Figure 2: The XRT light curve.

Filter	T_{start}	T_{stop}	Exposure	Magnitude
	(seconds)	(seconds)	(seconds)	
white (FC)	3072	3222	147	>21.4
white	3072	16503	2114	>22.8
v	3228	21300	2013	>20.3
b	4048	15591	1233	>20.7
u	3843	5479	393	>19.7
uvw1	3638	22969	1136	>20.9
uvm2	3433	22206	1082	>20.8
uvw2	4460	17192	1754	>21.9

Table 1: UVOT Observations. The start and stop times of the exposures are given in seconds since the BAT trigger. The preliminary 3- σ upper limits are given. No correction has been made for the expected extinction in the Milky Way (Schlegel *et al.* 1998).