Swift Observations of GRB 120630A

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1 Introduction

BAT triggered and located GRB 120630A on 2012 June 30 (Trigger 525451) (Sakamoto, *et al.*, 2012, *GCN Circ.* 13405). BAT mask-weighted light curve showed single spike with $T_{90} = 0.6 \pm 0.2$ *sec*. There was not initial set of GCN notices, and rapid-response circular because of the power outage at GSFC when the burst occurred.

According to XRT follow-up observations in Photon Counting (PC) mode from $T+97$ *sec* to $T+1.5$ *ks*, the best Swift position were calculated as; RA, DEC (J2000) = 23h 29m 10.75s, +42d 33′ 17.4″ with and uncertainty of 3.9 arc sec (radius, 90% confidence).

GRB 120630A also observed by 2.5m Nordic Optical Telescope (NOT) with StanCam equipment starting from 27.8 hr after the BAT trigger. They have clearly detected an optical source with R=22.53 ± 0.15 mag in the 5×360 s stacked R-band image (Xu et al. *GCN Circ.* 13403)

2 BAT Observation and Analysis

Using the data set from $T-60.0$ to $T+243.0$ *sec*, analysis of BAT GRB 120630A has been performed by Swift team (Sakamoto, *et al.*, *GCN Circ.* 13405). The BAT ground-calculated position is RA($J2000$) = 352.3° ($23h29m12.0s$), Dec($J2000$) = +42.4955° (+42d29′41.5″) ± 2.7 *arcmin*, (radius, systematic and statistical, 90% containment). The partial coding was 65%.

The mask-weighted light curve shows a single spike (Fig.1) starting at $\sim T - 0.05$ sec and ending at $\sim$ T+65 sec. T_{90} (15-350 keV) is 0.6± 0.2 sec (estimated error including systematics).

The time-averaged spectrum from $T - 0.1$ to $T + 0.6$ sec is best fit by a simple power law. The power law index of the time-averaged spectrum is 1.04 ± 0.43. For this model the total fluence in the 15-150 keV band is $6.1 \pm 1.4 \times 10^{-8}$ erg cm^{-2} and the 1-sec peak flux measured from T+0.25 sec in the 15-150 keV band is 0.7 ± 0.2 ph cm^{-2} sec^{-1}. 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/525451/BA/`.

3 XRT Observations and Analysis

1.4 ks of Photon Counting (PC) data of XRT were analysed for GRB 120630A from 97 s to 1.5 ks after the BAT trigger. The enhanced XRT position is RA(J2000) = 23h 29m 10.75s, Dec(J2000) = +42d 33′ 17.4″ ± 3.9 ″ (90% confidence).

The $0.3 - 10$ *keV* light curve (Fig.2) can be modelled with power-law with a decay index of α =1.7 $(^{+0.5}_{-0.5})$.

A spectrum formed from the PC mode data can be fitted with an absorbed power-law with a photon spectral index of $1.7(^{+0.4}_{-0.4})$. The best-fitting absorption column is consistent with the Galactic value of $8.8 \times 10^{20} cm^{-2}$ (Kalberla et al. 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is $4.2 \times 10^{-11} (4.9 \times 10^{-11}) erg\ cm^{-2}\ count^{-1}$.

The results of the XRT-team automatic analysis are available at
`http://www.swift.ac.uk/xrt products/00525451`.

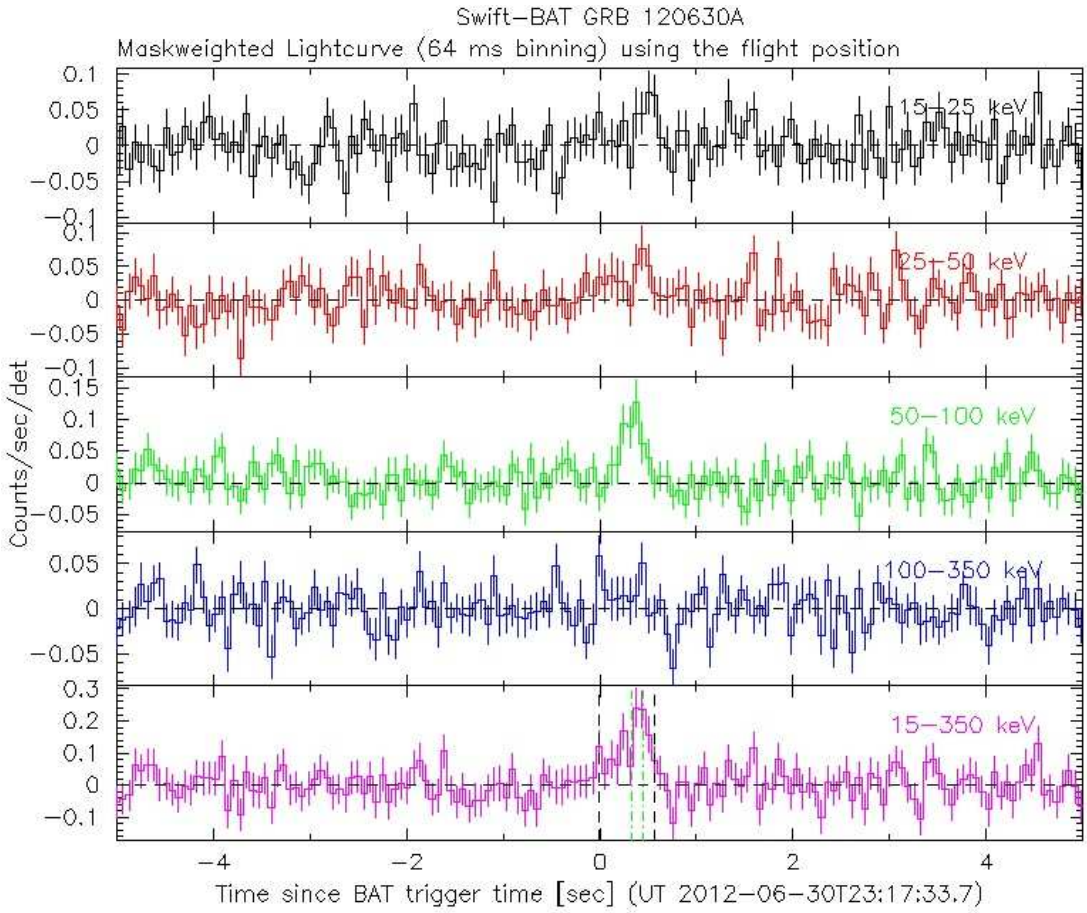

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts $\sec^{-1}$illuminated-detector^{-1} and T_0 is 23:17:33.7 UT.

4 UVOT Observation and Analysis

The Swift/UVOT began settled observations of the field of GRB 120630A, 150 s after the BAT trigger (Trigger 525451, Sakamoto et al., *GCN Circ.* 13405).

No optical afterglow consistent with the refined XRT position (Sakamoto et al., *GCN Circ.* 13405) nor with the candidate optical afterglow (Xu et al., *GCN Circ.* 13403) is detected in the initial UVOT exposures. Preliminary 3-sigma upper limits using the UVOT photometric system (Breeveld et al. 2011, AIP Conf. Proc. 1358, 373) for the first finding chart (FC) exposure and subsequent exposures are shown in the Table 1.

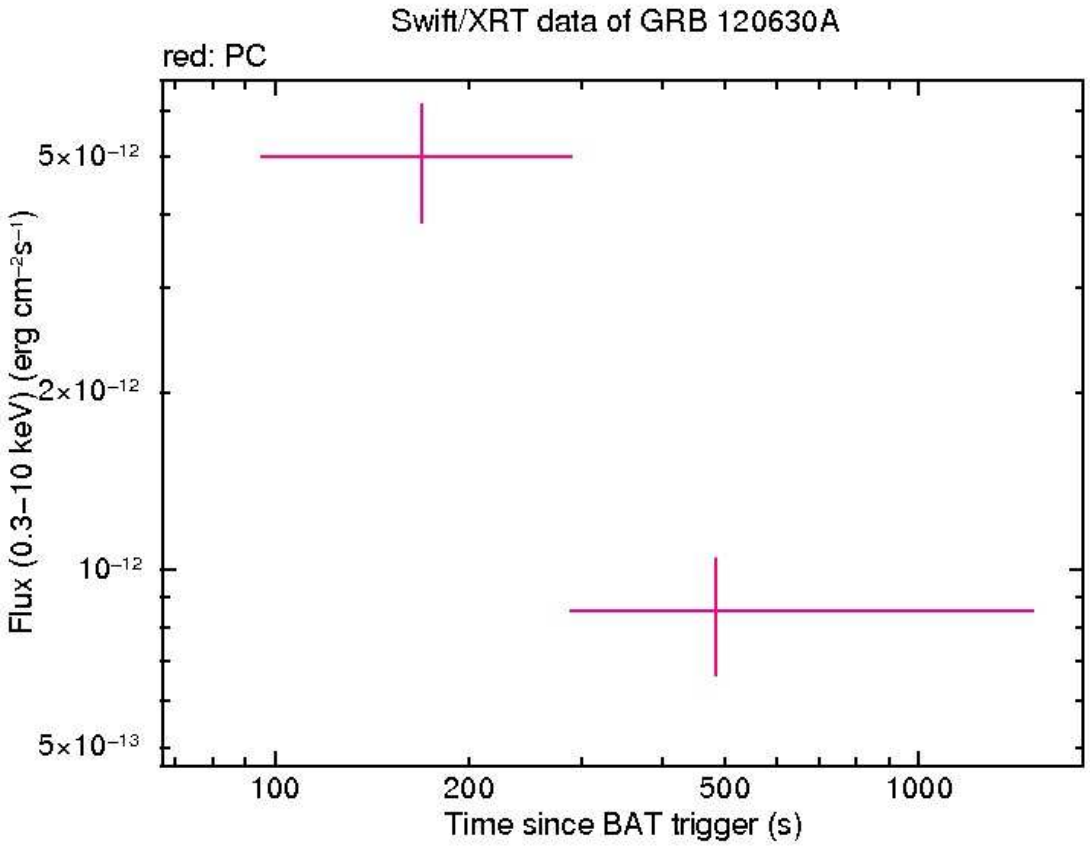

Figure 2: XRT Lightcurve in the 0.3-10 keV band: Photon Counting mode (red). The conversion factor for this burst is 1 count $= 4.2 \times 10^{-11}$ $erg\ cm^{-2}$.

References

[1] Breeveld, A. A. et al. 2011, AIP Conf. Proc. 1358, 373

[2] Sakamoto, T. et al. 2012, GCN Circ. 13405

[3] Schlegel, D. J. et al. 1998, ApJ. v.500, p.525

[4] Xu et al., GCN Circ. 13403

Filter	T_{Start}	T_{Stop}	Exposure (s)	Mag.
u-FC	150	400	246	>20.2
v	457	1409	117	>19.0
b	406	1508	156	>20.0
u	150	1032	393	>20.3
uvw1	506	1458	117	>19.3
uvm2	481	1434	97	>19.0
uvw2	432	1530	131	>19.5

Table 1: Magnitude limits from UVOT observations .The magnitudes in the table are not corrected for the Galactic extinction due to the reddening of E(B-V) = 0.106 in the direction of the burst (Schlegel et al. 1998).