Swift Observation of GRB 070714A

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1 Introduction

BAT triggered on GRB 070714A at 2007-07-14 03:20:30.6 UT (Barthelmy, *GCN Circ.* 6636). At the time of the burst due to a TDRSS outage all TDRSS messages were lost and only a limited circular on the detection of a possible burst (Trigger 284850; Grupe, et al., 2007, *GCN Circ.* 6619) was sent out. Also due to a planned power outage at GSFC no ground-based processed data were available until about 24 hours after the burst.

This burst is a soft short burst with an observed T_{90} = 2.0±0.2 s. Due to its softness it can be classified as an X-ray Flash (Barthelmy, et al., 2007, *GCN Circ.* 6622). Our best position of the afterglow is the XRT location RA($J2000$) = 42.93073 *deg* ($02h51m43.37s$), Dec($J2000$) = +30.24339 *deg* ($+30d14'36.2''$) with a 90% confidence statistical error radius of $2.0''$ as given in Grupe (2007, *GCN Circ.* 6628).

2 BAT Observation and Analysis

Using the data set from $T-240$ s to $T+962$s, analysis of BAT GRB 070612B has been performed by the Swift team (Barthelmy, *et al.*, *GCN Circ.* 6622). The BAT ground-calculated position is RA($J2000$) = 42.933*deg* ($02h51m43.8s$), Dec($J2000$) = +30.241 *deg* ($+30d14'28''$) with an uncertainty of $1.3'$, (radius, systematic and statistical, 90% containment). The partial coding was 96%.

The masked-weighted light curves (Fig.1) shows a single peak starting at $T+0$s, peaking at $T+0.7$s and ending at $T+2$s where the rise time is a little faster than the decay. $T_{90}(15-350keV)$ is 2.0 ± 0.3 s (estimated error including systematics).

The time-averaged spectrum from $T-0.7$s to $T+2.3$s is best fitted by a single power law model. This fit gives a photon spectral index of $\Gamma = 2.6 \pm 0.2$, ($\chi^2 = 59.8$ for 57 d.o.f.). For this model the total fluence in the $15-150$ keV band is $(1.5\pm0.2)\times10^{-7}$ ergs cm^{-2} and the 1-s peak flux measured from $T+0.30$s in the $15-150$ keV band is 1.8 ± 0.2 photons cm^{-2} s^{-1}. All the quoted errors are at the 90% confidence level.

We note that the fluence ratio in a simple power-law fit between the 25-50 keV band and the 50-100 keV band is 1.52. This fluence ratio is larger than 1.32, which can be achieved in the Band function of α=-1.0, β=-2.5, and $E_{\rm peak}$=30 keV. Thus, preliminary analysis shows that Epeak of the burst is very likely around or below 30 keV. Therefore the burst can be classified as an X-ray flash.

3 XRT Observations and Analysis

The refined XRT position as given in Grupe (2007, *GCN Circ.* 6628) is RA($J2000$) = 42.93073 *deg* ($02h51m43.37s$), Dec($J2000$) = +30.24339 *deg* ($+30d14'36.2''$) ($2.0''$ error radius ,90% confidence) This position is $11.1''$ away from the BAT position.

The $0.3-10$ keV light curve (Fig.2) shows a decaying source. The observations of GRB 070714A were

interrupted at 04:59:29 UT by triggering on GRB 070714B (Racusin, *et al.*. 2007, *GCN Circ.* 6620). GRB 070714A was upload again as a ToO at 2007-07-15 19:16 UT for a total exposure time of 14.8 ks. Together with this last data point the decay slope is $\alpha = 0.89 \pm 0.06$.

The X-ray spectrum can be fitted by an absorbed single power law with a photon spectral index $\Gamma = 1.68 \pm 0.23$ and an absorption column density consistent and fixed to the Galactic value of $N_{\rm H} = 9.24 \times 10^{21}$ cm^{-2} (Dickey & Lockman 1990).

4 UVOT Observation and Analysis

The UVOT began observing the field of GRB 070714A 44 s after the BAT trigger (Chester & Grupe, *GCN Circ.* 6633). The afterglow was not detected in any of the UVOT observations inside the XRT error circle. The 3σ upper limits are listed in Table 1. These magnitudes are not corrected for Galactic extinction E(B-V) = 0.186 (Schlegel et al. 1998).

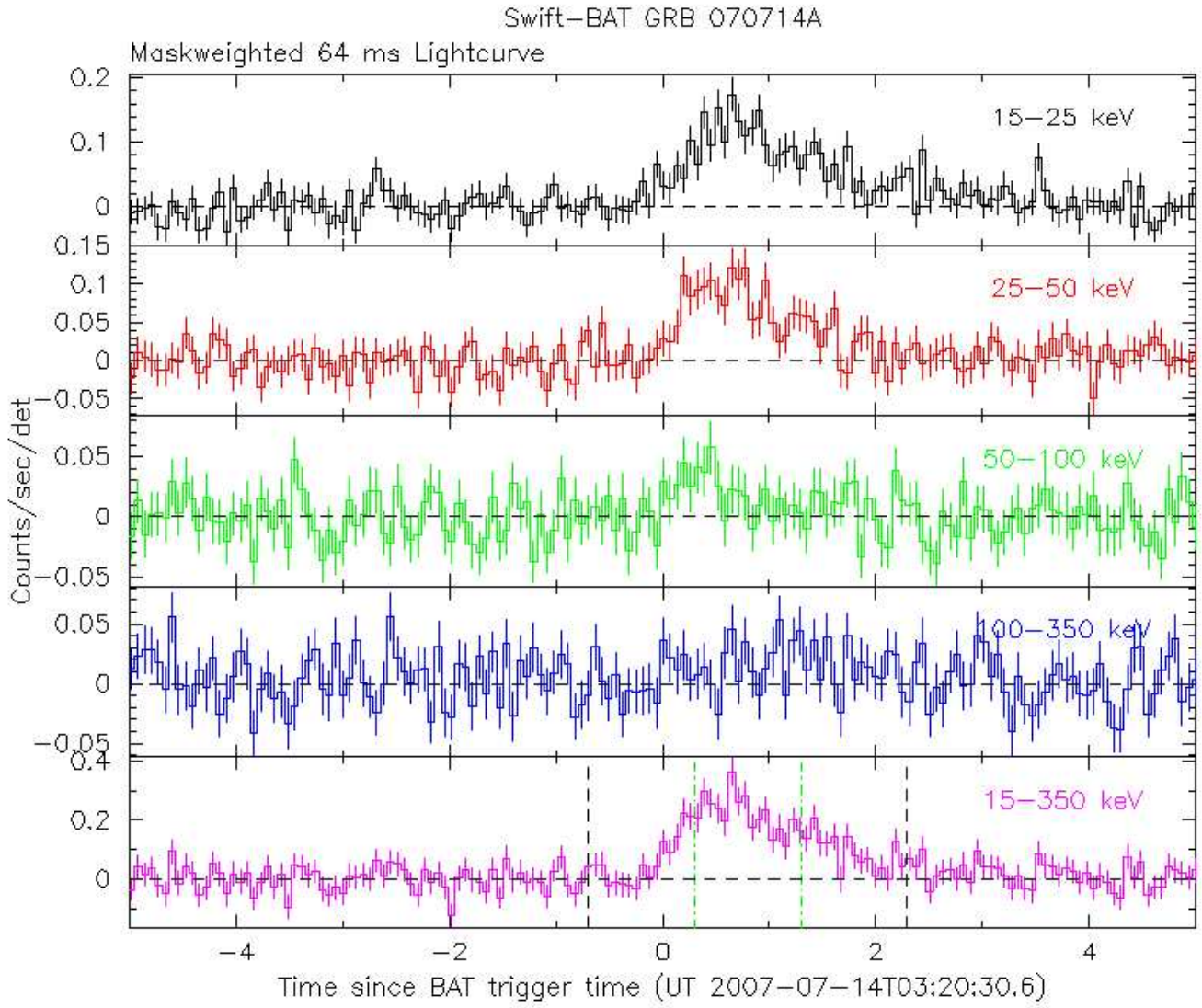

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts s^{-1} illuminated-detector^{-1} and T_0 is 2007-July-14 03:20:30.6 UT.

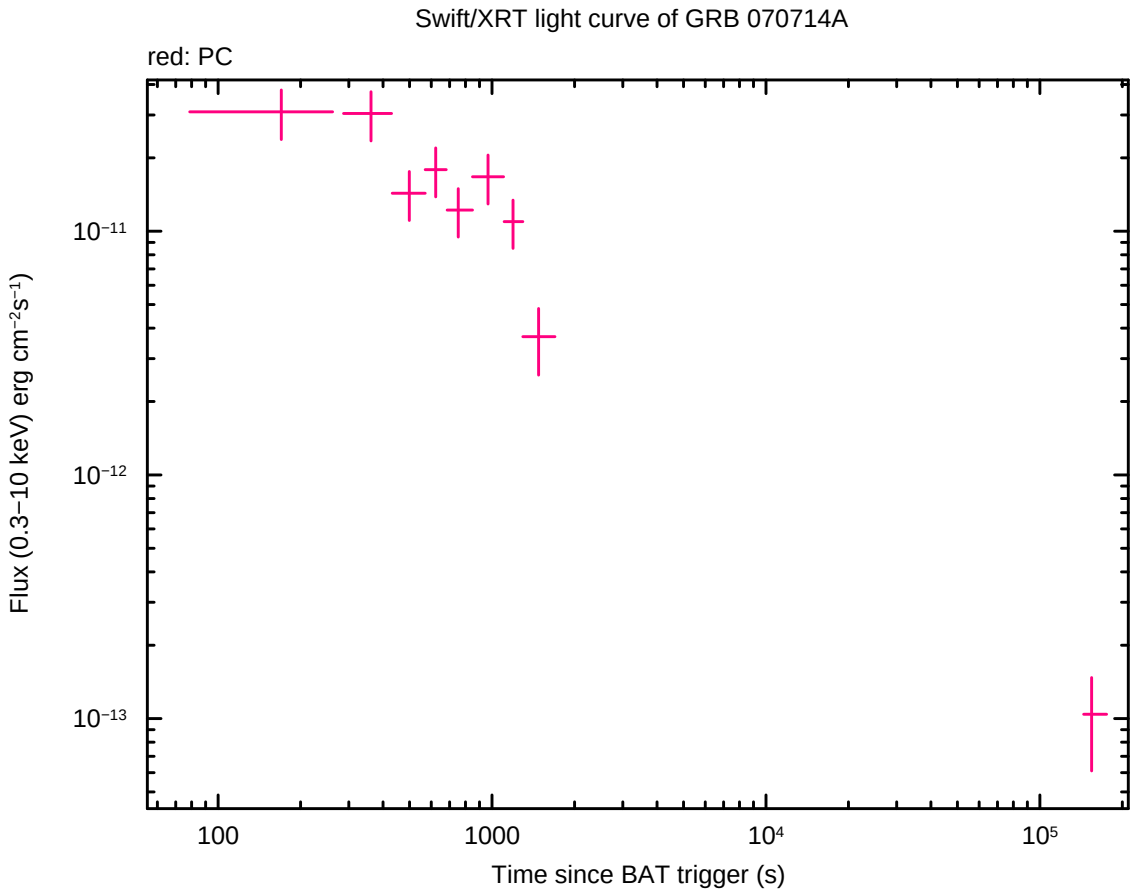

Figure 2: XRT Lightcurve. Counts s^{-1} in the 0.3-10 keV band: The approximate conversion is 1 count $s^{-1} = \sim 9.24 \times 10^{-11}$ $ergs\ s^{-1}cm^{-2}$ for an unabsorbed flux corrected for photon pileup.

Filter	$T_{\rm Start}$	$T_{\rm Stop}$	Exposure	Mag (3σ UL)
Wh (FC)	61	161	98.2	>20.19
Wh	61	1641	235	>20.63
V	44	1690	855	>19.69
B	647	5955	138	>19.55
U	622	5868	274	>19.71
UVW1	598	5664	274	>19.03
UVM2	5258	5458	197	>18.96
UVW2	677	1666	77.8	>18.49

Table 1: Magnitude from UVOT observations. The start, stop, and exposure times are given in s.