

# Swift Observations of GRB 120819A

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## 1. Introduction

Beardmore *et al.* (GCN Circ. 13681) reported the initial Swift results. At 13:10:14 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 120819A (trigger=531428). Swift slewed immediately to the burst. **Table 1** contains the best reported positions from Swift. The latest XRT position can be viewed at [http://www.swift.ac.uk/xrt\\_positions](http://www.swift.ac.uk/xrt_positions).

Malesani *et al.* (GCN Circ. 13683) reported the position from NOT for the optical afterglow of this GRB. **Table 2** is a summary of GCN Circulars about this GRB from observatories other than Swift.

Standard analysis products for this burst are available at [http://gcn.gsfc.nasa.gov/swift\\_gnd\\_ana.html](http://gcn.gsfc.nasa.gov/swift_gnd_ana.html).

## 2. BAT Observations and Analysis

Analysis of the BAT data was reported by Sakamoto *et al.* (GCN Circ. 13689). The BAT ground-calculated position is RA, Dec = 235.887, -7.304 deg, which is RA(J2000) = 15h 43m 32.8s Dec(J2000) = -07d 18' 13.5" with an uncertainty of 2.9 arcmin, (radius, sys+stat, 90% containment). The partial coding was 30%.

The mask-weighted light curve (**Figure 1**) shows multiple peaks starting at  $\sim T-2$  sec, with the largest peak at  $\sim T+0$  sec, and returning to baseline at  $\sim T+180$  sec.  $T_{90}(15-350 \text{ keV})$  is  $71 \pm 21$  sec (estimated error including systematics).

The time-averaged spectrum from  $T+4.42$  to  $T+82.88$  sec is best fit by a simple power-law model. The power law index of the time-averaged spectrum is  $1.49 \pm 0.23$ . The fluence in the 15-150 keV band is  $1.4 \pm 0.2 \times 10^{-6} \text{ erg cm}^{-2}$ . The 1-sec peak photon flux measured from  $T+6.20$  sec in the 15-150 keV band is  $0.8 \pm 0.3 \text{ ph cm}^{-2} \text{ sec}^{-1}$ . 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/531428/BA/](http://gcn.gsfc.nasa.gov/notices_s/531428/BA/).

## 3. XRT Observations and Analysis

Analysis of the XRT data was reported by Littlejohns *et al.* (GCN Circ. 13687). We have analysed 10 ks of XRT data for GRB 120819A, from 159 s to 23.0 ks after the BAT trigger. The data comprise 67 s in Windowed Timing (WT) mode with the remainder in Photon Counting (PC) mode.

The light curve (**Figure 2**) can be modelled with a power-law decay with a decay index of  $\alpha=1.75 (+0.12, -0.09)$ .

A spectrum formed from the WT mode data can be fitted with an absorbed power-law with a photon spectral index of  $1.7 \pm 0.4$ . The best-fitting absorption column is  $3.3 (+2.0, -1.5) \times 10^{21} \text{ cm}^{-2}$ , in excess of the Galactic value of  $8.9 \times 10^{20} \text{ cm}^{-2}$  (Kalberla *et al.* 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this

spectrum is  $4.2 \times 10^{-11}$  ( $6.0 \times 10^{-11}$ )  $\text{erg cm}^{-2} \text{count}^{-1}$ .

The results of the XRT team automatic analysis are available at [http://www.swift.ac.uk/xrt\\_products/00531428](http://www.swift.ac.uk/xrt_products/00531428).

#### 4. UVOT Observations and Analysis

Analysis of the UVOT data was reported by Marshall and Beardmore (GCN Circ. 13702). The Swift/UVOT began settled observations of the field of GRB 120819A 158 s after the BAT trigger. No optical afterglow consistent with the optical position (Malesani et al. GCN Circ. 13683) is detected in the initial UVOT exposures. **Table 3** gives preliminary magnitudes using the UVOT photometric system (Breeveld *et al.* 2011, AIP Conf. Proc., 1358, 373). No correction has been made for the expected extinction in the Milky Way corresponding to a reddening of  $E_{B-V}$  of 0.17 mag. in the direction of the GRB (Schlegel *et al.* 1998).

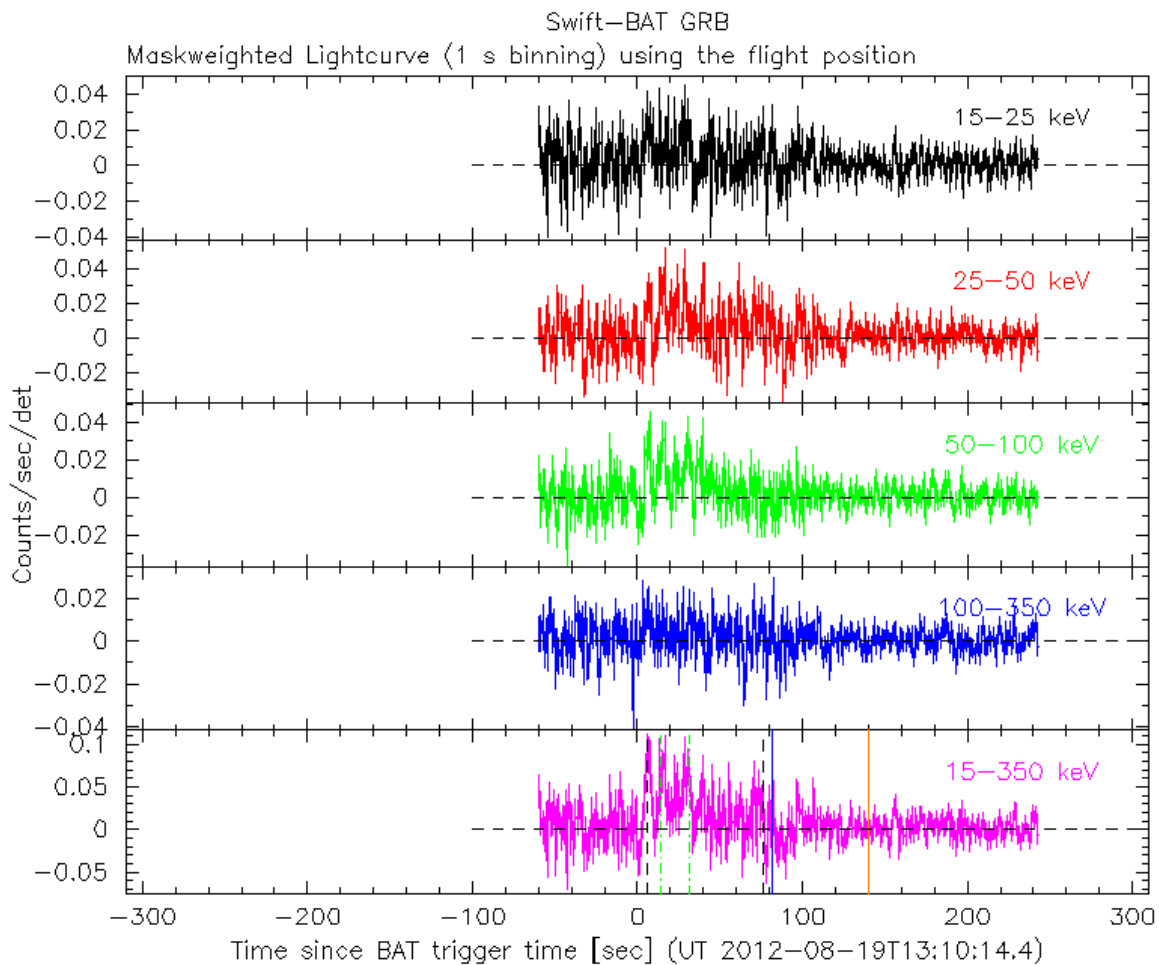


Figure 1. The BAT mask-weighted light curve in the four individual and total energy bands. The units are counts  $\text{sec}^{-1}$  illuminated-detector $^{-1}$ .

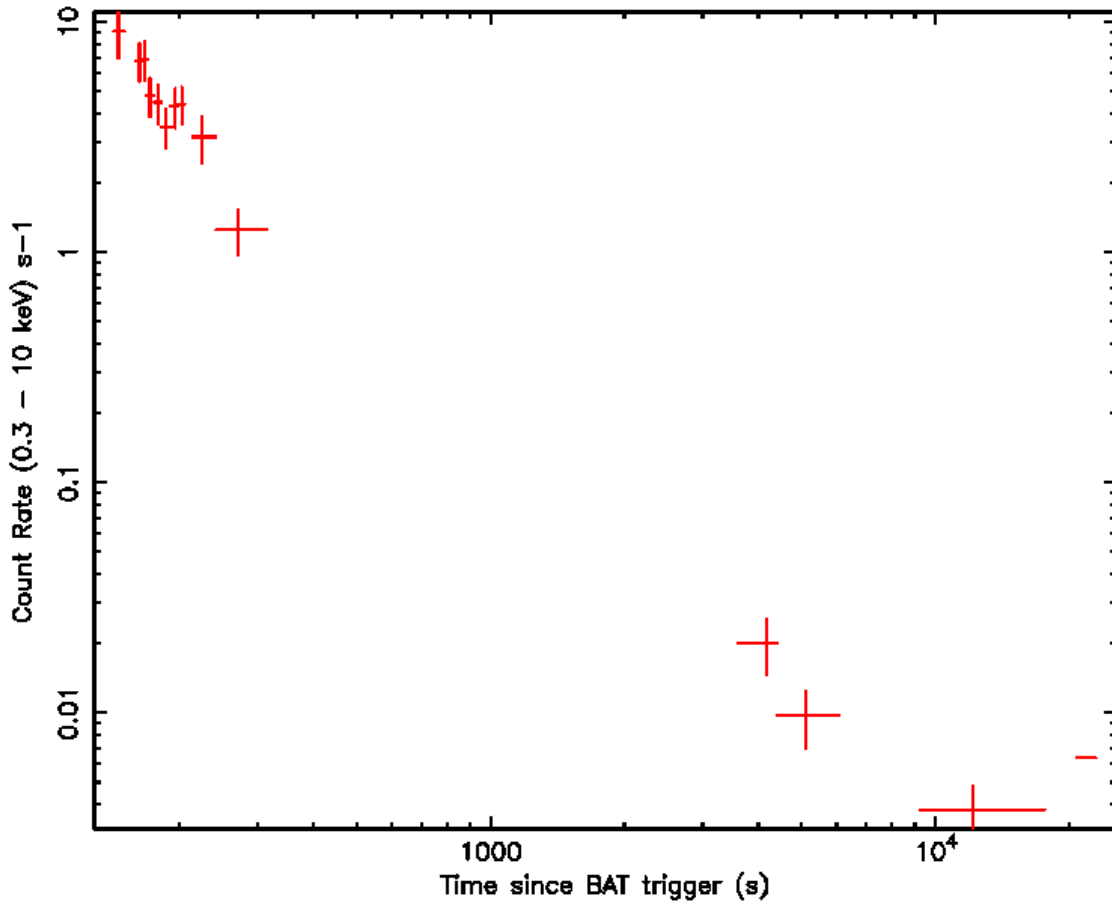


Figure 2. The XRT light curve.

RA	Dec	Error	Note	Reference
15 <sup>h</sup> 43 <sup>m</sup> 37.81 <sup>s</sup>	-07 <sup>o</sup> 18' 32.7"	1.8"	XRT-enhanced	Evans <i>et al.</i> GCN Circ. 13684
15 <sup>h</sup> 43 <sup>m</sup> 32.8 <sup>s</sup>	-07 <sup>o</sup> 18' 13.5"	2.9'	BAT-refined	Sakamoto <i>et al.</i> GCN Circ. 13689

Table 1. Positions from the Swift instruments.

Band	Authors	GCN Circ.	Observatory	Notes
Optical	Yurkov <i>et al.</i>	13682	MASTER	
Optical	Malesani <i>et al.</i>	13683	NOT	detection
Optical	Kuroda <i>et al.</i>	13685	MITSuME	upper limits
Optical	Kuroda <i>et al.</i>	13686	MITSuME	upper limits
Optical	Sudilovsky <i>et al.</i>	13688	GROND	detection
Optical	Quadri and Strabla	13690	Bassano Bresciano Obs.	
Optical	Gorbovskoy <i>et al.</i>	13691	MASTER	upper limits
Optical	Krugly <i>et al.</i>	13713		upper limits

Table 2. Summary of GCN Circulars from other observatories sorted by band and then circular number.

<b>Filter</b>	<b>T_start(s)</b>	<b>T_stop(s)</b>	<b>Exp(s)</b>	<b>Mag</b>
white <sub>FC</sub>	158	308	147	>21.1
white	158	5439	541	>21.7
v	4214	22619	1278	>20.9
b	3598	11864	1164	>21.1
u	4829	17638	1858	>21.6
w1	4625	16836	1998	>21.4
m2	4418	22980	1629	>21.7
w2	4009	21706	1279	>21.8

Table 3. UVOT Observations. The start and stop times of the exposures are given in seconds since the BAT trigger. The preliminary 3- $\sigma$  upper limits are given. No correction has been made for extinction in the Milky Way.

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