Swift Observations of GRB 070429A

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1. INTRODUCTION

BAT triggered on a long burst, GRB 070429A, at 01:35:10 UT (trigger=277571) (Barthelmy, et al., GCN Circ. 6355, Cannizzo, et al., GCN Circ. 6362, Starling, et al., GCN Circ. 6363, Schady, et al., GCN Circ. 6364). Swift slewed immediately to the burst. Our best position is from the XRT: RA,Dec = (297.70333, −32.40497), which is {19h 50m 48.80s −32d 24' 17.9"} (J2000) with an estimated uncertainty of 2.4 arcsec (90% error radius).

2. BAT OBSERVATION AND ANALYSIS

Using data from T-239.0 to T+963.1 sec (Barthelmy, et al., GCN Circ. 6355), the BAT ground-calculated position is RA,Dec = 297.695, −32.420 deg, which is {19h 50m 46.9s −32d 25' 12.1"} (J2000) ±2.5 arcmin, (radius, sys+stat, 90% containment). The partial coding was 68%.

The masked weighted light curve shows a single somewhat broad peak, extending out to $T + 50$ sec, followed by several smaller peaks. T90 ($15 - 350$ keV) is 163 ± 5 sec (estimated error including systematics).

The time-averaged spectrum from $T - 12.4$ to $T + 178.0$ is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 2.11 ± 0.27. The fluence in the $15 - 150$ keV band is $9.2 \pm 1.4 \times 10^{-07}$ erg cm^{-2}. The 1−sec peak photon flux measured from $T + 3.99$ sec in the $15 - 150$ keV band is 0.4 ± 0.2 ph cm^{-2} sec^{-1}. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATION AND ANALYSIS

From 380s of overlapping XRT PC mode data and UVOT V-band data from the first three orbits, the refined X-ray position (astrometrically corrected − using the USNO-B1 catalogue) is RA,Dec = (297.70333, −32.40497), which is {19h 50m 48.80s −32d 24' 17.9"} (J2000) with an estimated uncertainty of 2.4 arcsec (90% error radius). This is 1.0 arcsec from the XRT position in GCN 6355 and 1.6 arcsec from the possible K-band optical transient report by de Ugarte Postigo et al. (GCN Circ 6361).

The lightcurve is well fitted by a broken power law with $\alpha_1 = 6.4 + 0.3/ - 0.4$, $T_{\rm break} = 235 + 2/ - 20$ s and $\alpha_2 = 3.2 + 0.3/ - 0.2$.

The PC mode spectrum can be fit with a single absorbed power law. The photon index is $1.8 + 0.4/ - 0.2$ and the absorption is centred at 1.3×10^{21} cm^{-2} but is poorly constrained. The Galactic column towards this position is 0.9×10^{21} cm^{-2}. The $0.3 - 10$ keV flux is 1.25×10^{-11} erg cm$^{=2}$ s^{-1}, corresponding to 0.11 ct s^{-1}.

4. UVOT OBSERVATION AND ANALYSIS

Swift/UVOT observed the field of GRB 070429A starting 211s after the BAT trigger. No new source is detected either within the refined XRT position (GCN 6363) or at the position reported by Ugarte Postigo et al. (GCN 6361) in any of the UVOT filters, in either single or co-added exposures. The 3σ upper limits for the co-added exposures in each filter are as follows:

Filter	T_mid(s)	Exp(s)	3-sigma UL (mag)
White	850	253	19.43
V	1104	903	19.75
B	1700	107	19.30
U	1598	117	18.96
UVW1	3535	259	19.19
UVM2	3951	333	19.61
UVW2	1659	117	19.07

where $T_{\rm mid}$ is the weighted mid time of the co-added images. The reported upper limits are uncorrected for the estimated Galactic reddening of $E(B-V) = 0.17$ mag.

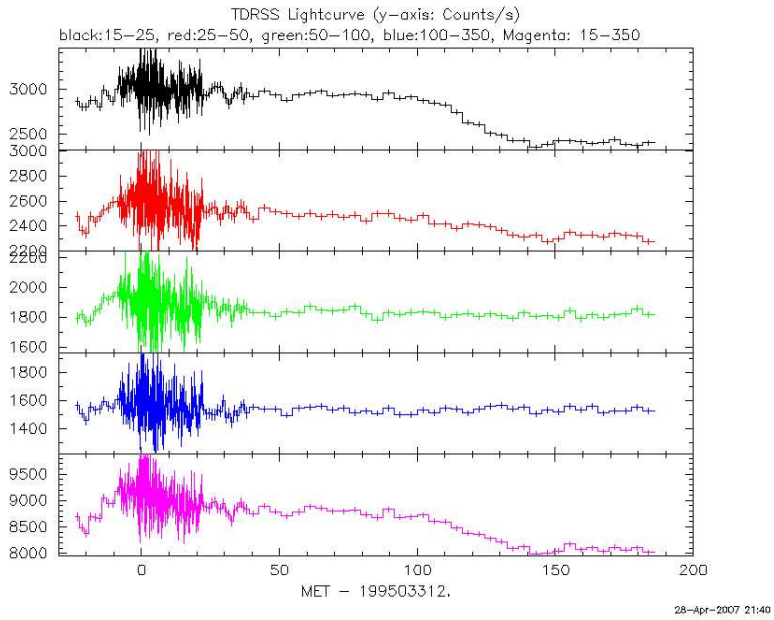

Figure 1: BAT Lightcurve. The light curve in the 4 individual plus total energy bands ($15-25$ keV, $25-50$, $50-100$, $100-150$, and $15-150$).

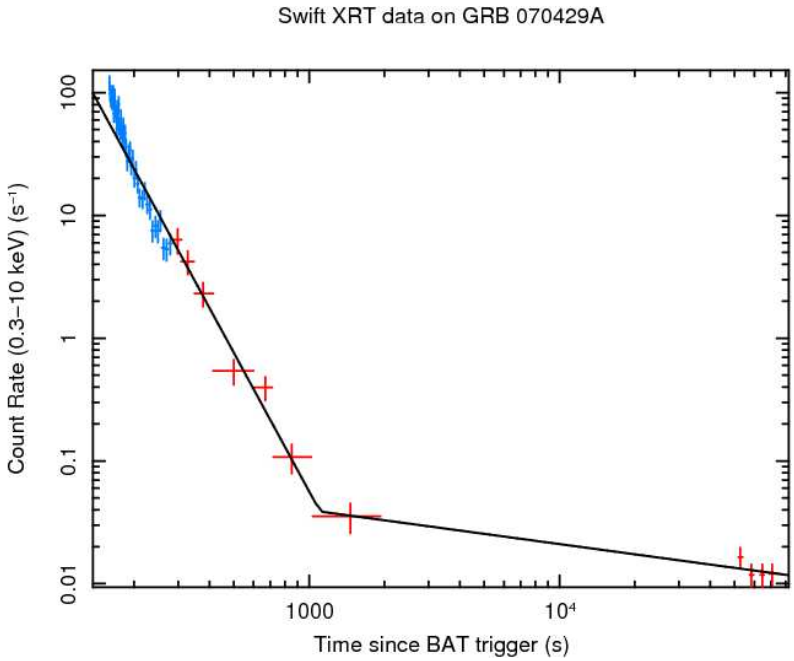

Figure 2: XRT Lightcurve. A broken powerlaw fit gives: $\alpha_1 = 3.75$, $t_{\rm break} = 1110$s, $\alpha_2 = 0.28$.