Swift Observation of SuperAGILE GRB 071104

K.L. Page (U. Leicester), S. Immler (NASA/CRESST/GSFC), S.D. Barthelmy (GSFC), D.N. Burrows (PSU), P. Roming (PSU) and N. Gehrels (GSFC) for the Swift Team

1   Introduction

SuperAGILE triggered on and located GRB 071104 at 11:41:23 UT (Donnarumma et al., GCN Circ. 7042). The observed duration of the burst was ~ 12 s in the 20–60 keV range. Following a Target of Opportunity request, Swift started observing the field at 17:24:19, about 20.6 ks after the burst. The XRT clearly detected a fading source within the AGILE error circle (Page, GCN Circ. 7043) and the UVOT also identified a possible optical candidate (Immler, GCN Circ. 7044). The best certain position is that determined from the XRT data: RA(J2000) = $19^h\ 42^m\ 26.81^s$, Dec(J2000) = $+14^o\ 36'\ 37.4''$

2   XRT Observations and Analysis

Using the first 10 ks of Photon Counting mode data, we derived a position of RA(J2000) = $19^h\ 42^m\ 26.81^s$, Dec(J2000) = $+14^o\ 36'\ 37.4''$, with an error radius of 4.2 arcsec (90% containment, including boresight uncertainties). This is 131 arcsec from the AGILE position, within their error circle.

Although the X-ray light-curve (Figure 1) can, to first order, be fitted by a single power-law, there is an indication that the decay has broken (around 50 ks after the trigger) from an initial slope of $\alpha_1 \sim 0.7$ to a steeper value of $\alpha_2 \sim 4$, although this decay slope is not well-constrained because of the limited data after the break time (a 90% range of $\alpha_2 = 2.4$–5.8 is estimated).

A spectrum formed from the first 20 ks of data (20.6–66.7 ks after the trigger) can be modelled with a power-law, photon index = 1.7 ± 0.2, absorbed by the Galactic column density of 2.69×10^{21} cm^{-2}. (The 90% upper limit on this absorption is 4.9×10^{21} cm^{-2}.) Over this period, the 0.3-10 keV observed flux is 1.0×10^{-12} erg cm^{-2} s^{-1}, with the unabsorbed value being 1.4×10^{-12} erg cm^{-2} s^{-1}.

3   UVOT Observation and Analysis

Swift UVOT started observing the field of the burst 20.6 ks after the AGILE trigger. In the first 120 s and co-added 5037 s of data obtained in the white filter, a possible UVOT afterglow candidate is found, consistent with the XRT position, with a magnitude of 20.6 ± 0.1 mag, overlaying the coincidence-loss structure of a nearby bright star.

The value quoted above is not corrected for the expected Galactic extinction corresponding to a reddening of E$_{B-V} = 0.54$ mag in the direction of the burst (Schlegel et al. 1998).

Note that there is possible contamination with the coincidence-loss structure of the nearby star and the high source density of the field in the Galactic plane.
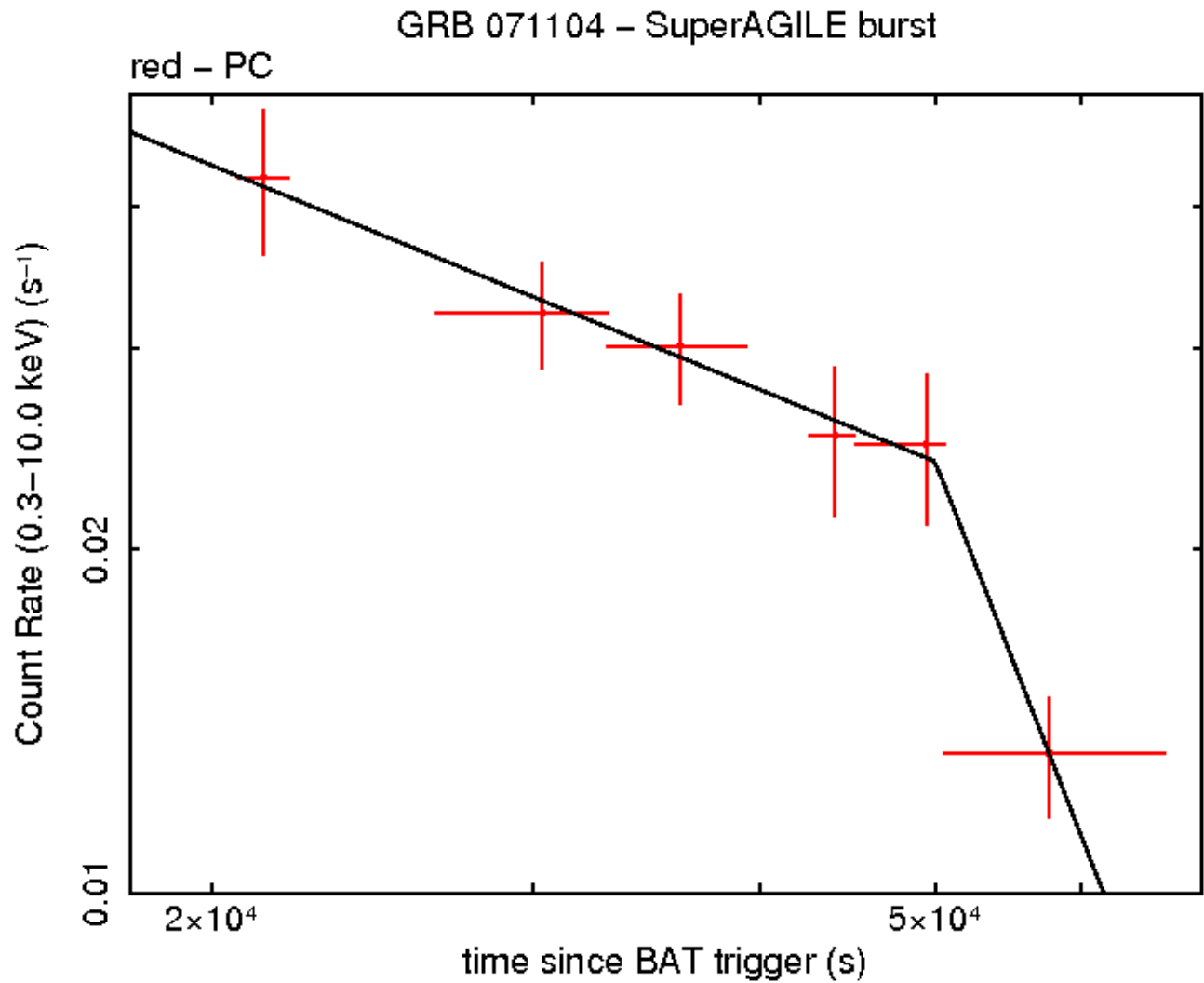
Figure 1: XRT Lightcurve. Count s^{-1} in the 0.3-10 keV band: Photon Counting mode (red). The approximate conversion is 1 count s^{-1} = 5.7 $\times 10^{-11}$ erg cm^{-2} s^{-1}.