

Swift Observation of GRB 110903A

K.L. Page (U. Leicester), E.A. Hoversten (PSU), S.D. Barthelmy (GSFC), D.N. Burrows (PSU), M.H. Siegel (PSU) & N. Gehrels (GSFC) for the Swift Team

1 Introduction

INTEGRAL (Mereghetti et al., GCN Circ. 12322), Konus-Wind (Golenetskii et al., GCN Circ. 12323) and Fermi-GBM (McBreen & Fitzpatrick, GCN Circ. 12326) all triggered on GRB 110903A. The observed duration of the burst was ~ 400 s as reported by INTEGRAL, or 339.9 ± 2.3 s over 50–300 keV (Fermi). Following a Target of Opportunity request, Swift detected a clear X-ray source within the error circle (Page, GCN Circ. 12324). The best position for the afterglow is that derived from using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue to correct the X-ray location astrometrically: RA, Dec (J2000) = $13^h 08^m 15.82^s$, $+58^\circ 58' 53.8''$, with an estimated uncertainty of 1.6 arcsec (radius, 90% confidence).

2 XRT Observations and Analysis

The XRT began observing the field 33.8 ks after the trigger (Page, GCN Circ. 12324). Using 3.8 ks of PC mode data and 3 UVOT images, we find an enhanced XRT position (using the XRT-UVOT alignment and matching UVOT field sources to the USNO-B1 catalogue): RA, Dec = 197.06591, 58.98162 deg, which is equivalent to:

RA (J2000): $13^h 08^m 15.82^s$
 Dec(J2000): $+58^\circ 58' 53.8''$

with an uncertainty of 1.6 arcsec (radius, 90% confidence). This position is 15.5 arcsec from the INTEGRAL position, within their error circle.

The 0.3–10 keV light curve (Fig.1) can be fitted with a single power-law decay of $\alpha = 2.25_{-1.26}^{+0.95}$. This is a $>3\sigma$ improvement over a constant model fit to the data. The INTEGRAL trigger time of 02:39:55 UT is used for plotting purposes. A spectrum formed from all the PC mode data can be fitted with an absorbed power-law with a photon spectral index of $\Gamma = 1.88_{-0.32}^{+0.27}$. The best-fitting total absorption column is $(3.3_{-1.2}^{+1.3}) \times 10^{21}$ cm $^{-2}$, in excess of the Galactic value of 1.3×10^{20} cm $^{-2}$ (Kalberla et al. 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is 4.6×10^{-11} (6.9×10^{-11}) erg cm $^{-2}$ count $^{-1}$.

The results of the XRT-team automatic analysis are available at http://www.swift.ac.uk/xrt_products/00020184.

3 UVOT Observation and Analysis

The UVOT began settled observations of the field of GRB 110903A at the same time as the XRT. No optical afterglow consistent with the enhanced XRT position (Page, GCN Circ. 12324) is detected in the UVOT exposures. The 3σ upper limits are given in Table 1. These upper limits are not corrected for the Galactic extinction along the line of sight of $E(B-V) = 0.01$ (Schlegel et al. 1998). All photometry is on the UVOT photometric system described in Poole et al. (2008).

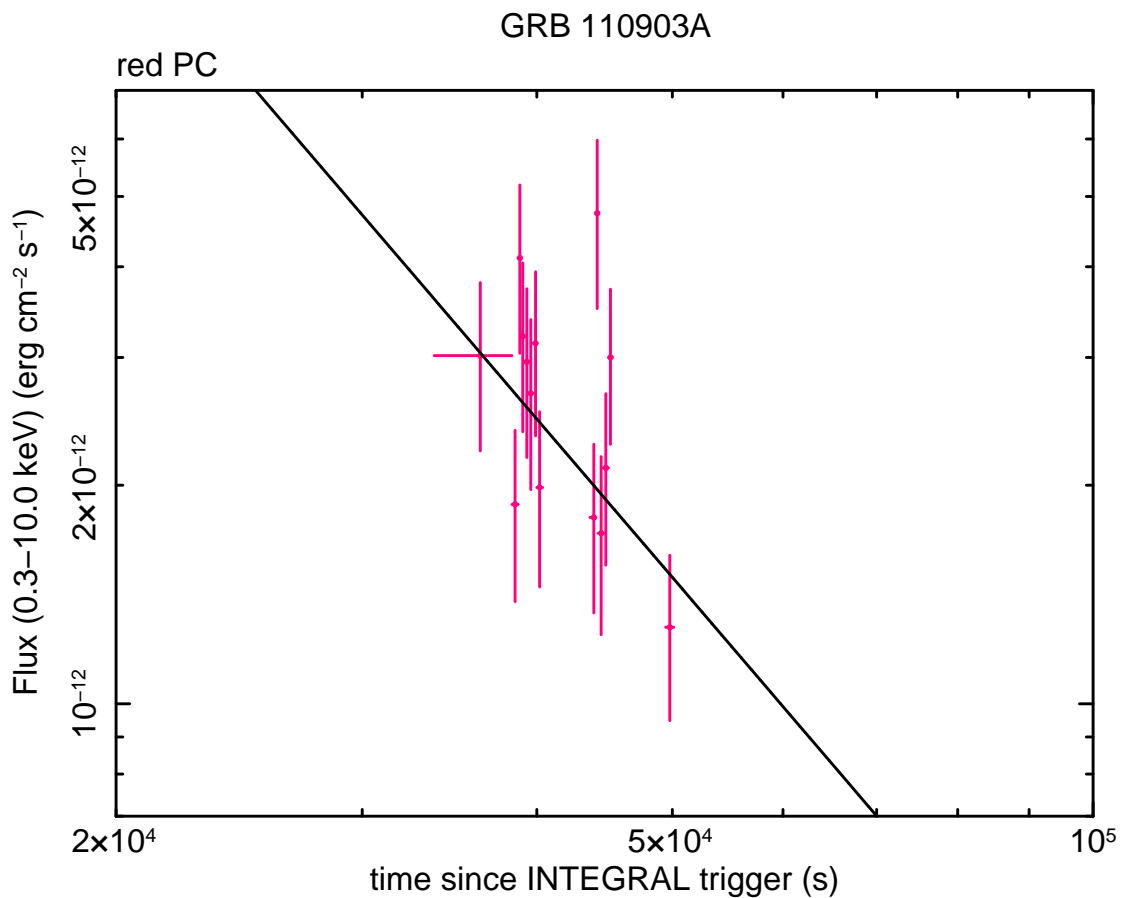


Figure 1: XRT Lightcurve; all data were collected in PC mode. The approximate conversion is $1 \text{ count s}^{-1} = 4.6 \times 10^{-11} \text{ erg cm}^{-2} \text{ s}^{-1}$.

Filter	Start	Stop	Exposure	3σ UL
white	38935	45300	1507	>21.94
v	39664	40380	705	>19.86
u	33776	44483	1589	>20.73

Table 1: Magnitude limits from UVOT observations