Swift Observations of GRB 121025A

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

1   Introduction

MAXI triggered on GRB 121025A at 07:46:30 on 25th October 2012. The X-ray emission lasted for at least 20 s, with no excess flux in either the previous or following transits at 06:13 and 09:18 respectively (Asada et al., GCN Circ. 13895). Swift performed a Target of Opportunity observation approximately 7.25 hours after the trigger, finding a single $> 3\,\sigma$ X-ray source within the MAXI error circle, at a position of RA, Dec = $16^h\ 33^m\ 31.64^s,\ 27^d\ 40'\ 18.8"$, with an estimated uncertainty of 3.8 arcsec (radius, 90% containment).

2   XRT Observations and Analysis

The XRT began observing the field 26.1 ks after the trigger (Page, Starling & Evans, GCN Circ. 13909). A series of four tiled pointings was performed, in order to cover the MAXI error circle. One significant source was detected, at RA, Dec = 248.38182, 27.67189, which is equivalent to:

RA(J2000): $16^h\ 33^m\ 31.64^s$
Dec(J2000): $27^d\ 40'\ 18.8"$

with an uncertainty of 3.8 arcsec (radius, 90% confidence). The mean count rate of this source during the observation was 0.022 +/- 0.004 count s^{-1} (0.3–10 keV).

The source was no longer detected during a second follow-up observation (Page, GCN Circ. 13941), performed 5.8 days after the burst, to a 3σ upper limit of 0.002 count s^{-1}, confirming the source as the X-ray afterglow of GRB 121025A. The XRT light-curve is shown in Fig. 1.

A spectrum formed from the PC data during the detection interval can be fitted with an absorbed power-law with a photon index of $\Gamma = 2.36^{+0.57}_{-0.56}$. The best-fitting absorption column is consistent with the Galactic value of 3.8×10^{20} cm^{-2} (Kalberla et al. 2005). The counts to observed (unabsorbed) 0.3–10 keV flux conversion factor deduced from this spectrum is 3.7×10^{-11} (4.5×10^{-11}) erg cm^{-2} count^{-1}.

3   UVOT Observations and Analysis

The UVOT began settled observations of the field of GRB 121025A at the same time as the XRT. There are two bright DSS objects at the edge of the XRT error circle, one of which is not a constant optical source, which has greatly complicated the photometry of this field. There is, however, no new source within the XRT error circle to a limit of $u > 21.5$ in the first follow-up observation, and $w1 > 22.1$ in the second dataset.
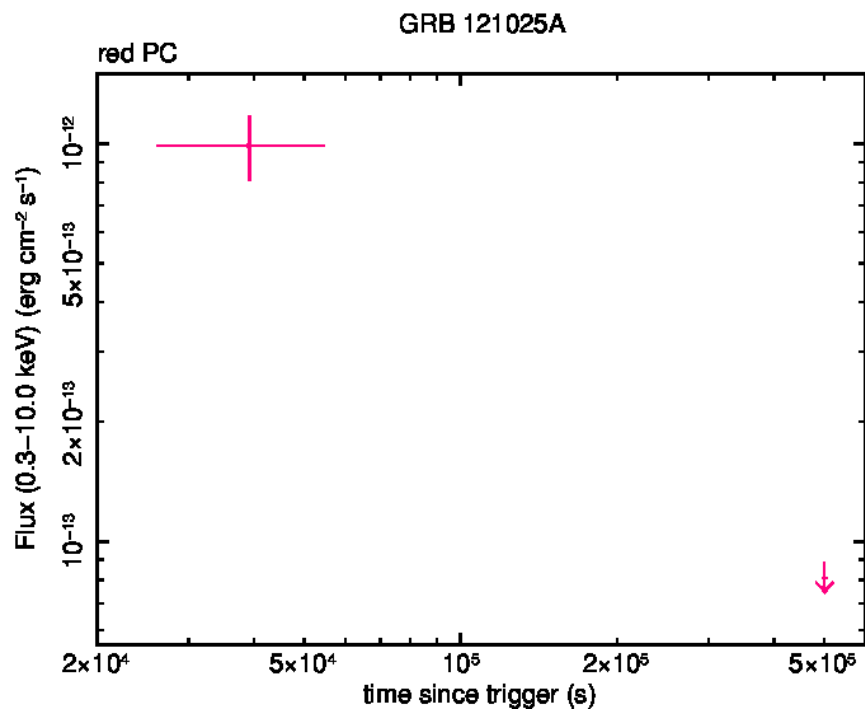
Figure 1: XRT light curve. Flux light curve in the 0.3-10 keV band; all the data were collected in Photon Counting mode. The approximate conversion is 1 count s^{-1} = $\sim 4.5 \times 10^{-11}$ erg cm^{-2} s^{-1}.