

Swift Observation of GRB 070125

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1 Introduction

GRB070125 was detected by Mars Odyssey (HEND and GRS), Suzaku (WAM), INTEGRAL (SPI-ACS), and RHESSI at 07:20:45 UT during a Swift slew. BAT detected the source marginally after the slew, but did not trigger. The marginal BAT source is coincident with the IPN triangulation (Hurley *et al.*, *GCN Circ.* 6024) of the burst. With processing, the source is detectable in the first 4 BAT 64-second images (15-50 keV) after the slew, or 6 minutes after T0. $T_{90} = 60$ seconds. Swift observed GRB070125 as a ToO observation beginning at 20:18:48 UT, 46.7 ks after the trigger.

Our best position is the XRT location $RA(J2000) = 117.82532deg$ ($7h51m18.08s$), $Dec(J2000) = +31.1506deg$ ($+31d09'02.2''$) with an error radius of 3.8 arcsec (90% confidence, including boresight uncertainties).

2 BAT Observation and Analysis

GRB070125 occurred while Swift was slewing and was not in the BAT field-of-view during the beginning of the prompt emission. BAT did not trigger, but did detect GRB070125 in 4 64-second images after the slew with a significance of 8.2 sigma. The BAT ground-calculated position is $RA(J2000) = 117.850deg$ ($07h51m24s$), $Dec(J2000) = +31.140deg$ ($-31d08'24.0''$) with an error radius of 2.5 *arcmin*, (systematic and statistical, 90% containment).

3 XRT Observations and Analysis

Using the data from the first four orbits of XRT data of GRB 070125 (5.4 *ksec* in Photon Counting mode), the refined XRT position is $RA(J2000) = 117.82541deg$ ($7h51m18.10s$), $Dec(J2000) = +31.1509deg$ ($+31d09'03.2''$), with an error radius of 3.7 *arcsec* (90% confidence, including boresight uncertainties). This position is 85 *arcsec* of the initial BAT position, and 4.4 *arcsec* from the optical afterglow candidate, reported by Cenko *et al.*, *GCN Circ.* 6034.

The 0.3 – 10 *keV* light curve (Fig.1) begins at 46 *ks* after the burst and shows a shallow slope of 0.9 ± 0.4 . At $1.2 \pm 0.3 \times 10^5 sec$ the light curve breaks with a slope of 2.5 ± 0.50 .

Two segments of the X-ray lightcurve can be modeled with an absorbed power-law with spectral indices of 2.05 ± 0.25 , and 2.10 ± 0.28 , respectively. The fit NH column density is $8.6 \pm 5.8 \times 10^{20} cm^{-2}$ consistent with galactic column density ($4.8 \times 10^{20} cm^{-2}$). The average observed (unabsorbed) flux over 0.3 – 10 *keV* for this spectrum (spanning a time of 46 – 120 *ks*, and 120 – 227 *ks* after the trigger) is 3.0×10^{-12} and $6.5 \times 10^{-13} ergs/cm^2/sec$, respectively.

4 UVOT Observation and Analysis

The afterglow of GRB 070125 (Hurley *et al.*, *GCN Circ.* 6024) has been detected in all 6 UVOT filters ranging from V (central wavelength of 546 nm) to UWW2 (central wavelength of 193 nm). The decay in the V filter is consistent with a $1/t$ decay rate. Detection in the UVW2 filter requires a redshift of < 1.5 , which is consistent with earlier suggestions by Prochaska *et al.* (*GCN Circ.* 6031 and *GCN Circ.* 6032) and Pelangeon and Atteia (*GCN Circ.* 6033).

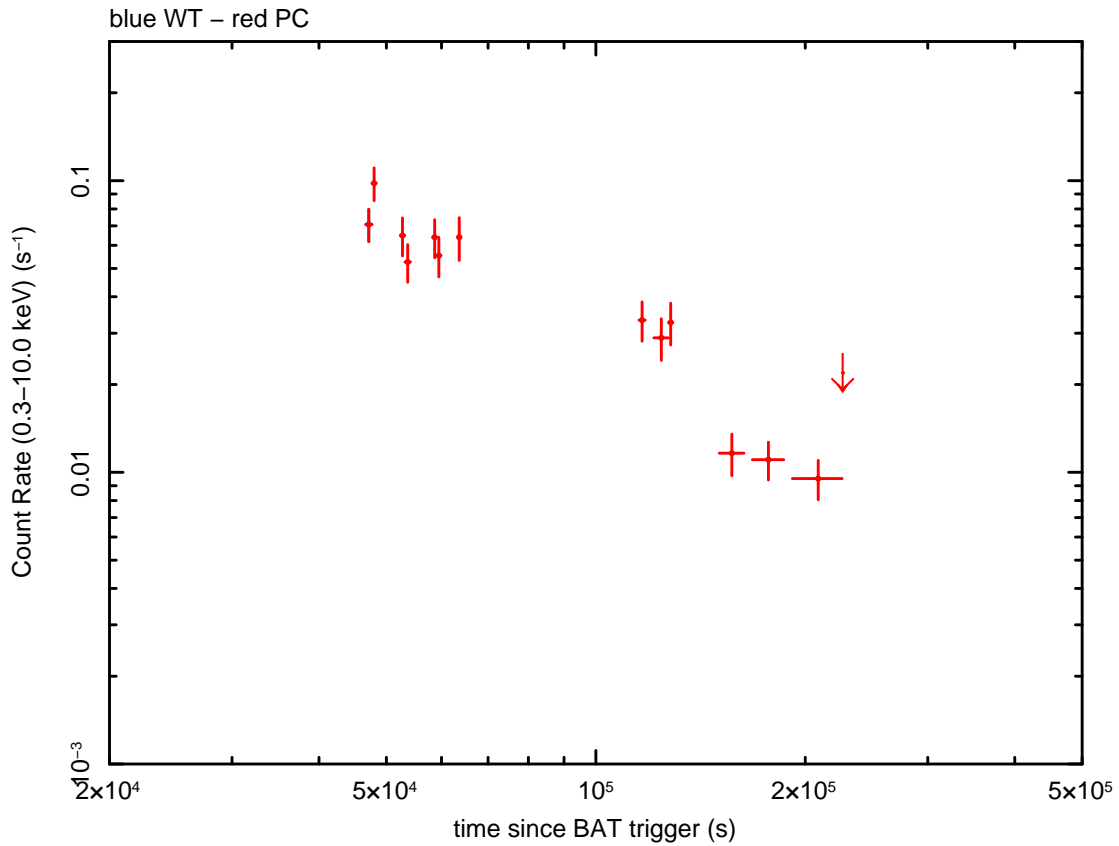


Figure 1: XRT Lightcurve. Counts/sec in the 0.3-10 keV band: Photon Counting mode (red). The approximate conversion is $1 \text{ count/sec} = \sim 2.5 \times 10^{-12} \text{ ergs/cm}^2/\text{sec}$.

The Table 1 gives the measured magnitudes for the currently available data. T_start and T_end are the start and stop times of the summed exposures in seconds from the trigger. No correction has been made for the expected Galactic reddening of $E(B - V) = 0.05$.

Filter	Start	Stop	Exposure	Mag	Error
V	46685	53261	1736	18.54	0.06
V	58269	63986	1590	18.74	0.07
V	116966	117176	205	19.26	0.27
B	47550	54163	1674	18.92	0.03
B	59126	59947	798	19.03	0.06
UVW2	116119	116959	840	19.26	0.10

Table 1: Measured magnitudes from UVOT observations