

Swift Observation of INTEGRAL GRB 070309

S.D. Vergani (Dunsink Observatory, DIAS-DCU), P. Romano (Univ Bicocca&INAF-OAB), C. Guidorzi (Univ Bicocca&INAF-OAB), A. Moretti (INAF-OAB), S. T. Holland (CRESST/USRA/GSFC), Cucchiara A. (PSU), J. Cummings (GSFC), S.D. Barthelmy (GSFC), D.N. Burrows (PSU), P. Roming (PSU), N. Gehrels (GSFC) for the Swift Team

1 Introduction

At T+13.9 ks Swift executed a target of opportunity (ToO) observation of GRB 070309, which triggered INTEGRAL at 10:01:03 UT on March 09, 2007 (Paizis *et al.*, *GCN Circ.* 6182), resulting in a localization of RA, DEC (J2000) = 263.6848 deg, -37.9446 deg with an uncertainty of 2.5 arcmin (90% c.l.). The burst was below the horizon from Swift, so BAT did not see it. There are no afterglow detections. We report on UVOT upper limits and on the XRT detection of a possibly varying source inside the INTEGRAL error circle at RA(J2000) = (263.6629 deg), Dec(J2000) = (-37.9300 deg).

2 BAT Observation and Analysis

No BAT observations were made for this GRB, since the burst was below the horizon from Swift and the satellite then slewed in the context of a ToO at T+13.9 ks. Analysis by INTEGRAL resulted in a burst duration of ~ 50 s, with a peak flux of $0.2 \text{ ph cm}^{-2} \text{ s}^{-1}$ (20-200 keV, 1 s integration time) and a fluence of $5 \times 10^{-7} \text{ erg cm}^{-2}$ (Paizis *et al.*, *GCN Circ.* 6182).

3 XRT Observations and Analysis

Using the first two segments of XRT data of GRB 070309 (~ 17 ks in Photon Counting mode), inside the INTEGRAL error circle we find one source (Vergani *et al.*, *GCN Circ.* 6187, see Fig. 1) at the position RA(J2000) = 17h 34m 39.1s (263.6629 deg) Dec(J2000) = -37d 55' 48.2" (-37.9300 deg) with an estimated error radius of ~ 5 arcsec (90% confidence). This position lies 81 arcseconds from the INTEGRAL position. The source has an average count rate of $1.4 \pm 0.4 \times 10^{-3}$ counts/s and, assuming a Crab spectrum, an observed flux of about $5 \times 10^{-14} \text{ erg cm}^{-2} \text{ s}^{-1}$. We collected a total of 21 counts. It is not possible to extract a proper light curve or spectrum. The average count rate of the first segment of observations is $2.5 \pm 0.6 \times 10^{-3}$, for the second segment we only have a 3-sigma upper limit of 2.04×10^{-3} . The probability that this source is constant is less than 10^{-2} . We conclude that it seems to be a varying source but at the present time we cannot confirm that this is the X-ray afterglow of GRB 070309. Further observation are planned for next April to put stronger constraints.

4 UVOT Observation and Analysis

Swift/UVOT observed the field of GRB 070309 starting 13,906 s after the INTEGRAL/IBAS trigger. UVOT did not detect any source inside the INTEGRAL error circle, down to the following 3 sigma upper limits, summarized in Table 1. These upper limits (Holland *et al.*, *GCN Circ.* 6185) are not corrected for the Galactic extinction, corresponding to a reddening of $E_{B-V} = 1.46$ mag (Schlegel *et al.* 1998), in the direction of this burst. We note that this burst lies in the Galactic plane towards the Galactic centre and the field is very crowded.

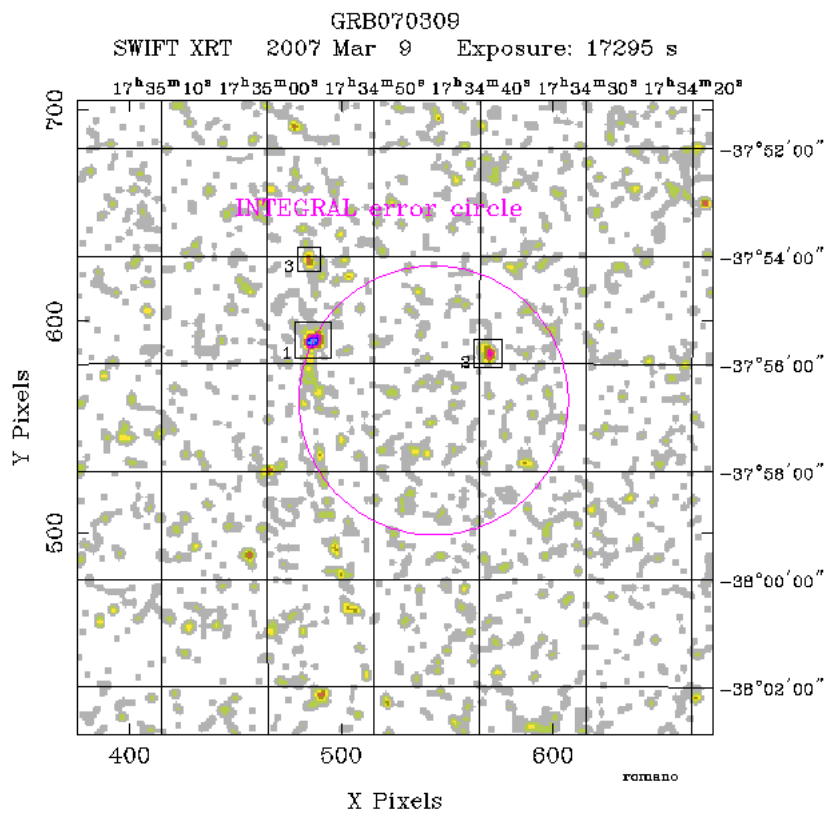


Figure 1: XRT field image showing the afterglow candidate as source number 2.

Filter	Start	Stop	Exposure	3-Sigma UL
V	14,525	14,868	274	19.3
B	14,215	14,365	147	20.0
U	14,061	14,211	147	19.7
UVW1	13,906	14,056	147	19.6
UVM2	14,930	15,080	147	19.5
UVW2	14,371	14,446	147	19.8

Table 1: Magnitude limits from UVOT observations