

Swift Observation of INTEGRAL GRB 071109

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1 Introduction

INTEGRAL triggered on and located GRB 071109 at 20:36:05 UT (Mereghetti et al., GCN Circ. 7046). The observed duration of the burst was ~ 30 s while the peak flux integrated over 1 s in the 20–200 keV energy range was 0.46 photons (3.6×10^{-8} erg cm $^{-2}$ s $^{-1}$). The fluence in the same band, integrated over 30 s, was 6.6×10^{-7} erg cm $^{-2}$ (Gotz, GCN Circ. 7048).

Following a Target of Opportunity request, Swift started observing the field at 22:21 UT, about 1.7 hours after the burst. No afterglow was detected by the two Swift narrow field instruments within the INTEGRAL error circle (Perri et al., GCN Circ. 7050-7053; Kuin et al., GCN Circ. 7054).

The best position is that determined from the INTEGRAL detection of the burst at RA(J2000)= 289.913 deg, Dec(J2000)= +2.048 deg, RA(J2000)= 19^h19^m39.1^s, Dec(J2000)= +02^d 02' 53", with an uncertainty of 2.5 arcmin (Mereghetti et al., GCN Circ. 7046).

The detection of a radio source 3.4 hours after the burst was reported by Chandra & Frail (GCN Circ. 7049) with a flux density of 188 ± 42 μ Jy at the position RA(J2000)= 19^h19^m51.67^s, Dec(J2000)= +02^d 01' 49.88", outside the INTEGRAL error circle. This radio source was not detected at later times (1.87 days from the trigger, Chandra & Frail, GCN Circ. 7055). No afterglow candidate from optical ground-based facilities has been detected.

2 XRT Observations and Analysis

Swift-XRT began observing the field of the INTEGRAL-detected burst at 22:21:50 UT, ~ 1.7 hours after the INTEGRAL trigger. In a Photon Counting mode exposure of 9.7 ks we did not detect any X-ray source neither within the INTEGRAL error circle (Mereghetti et al., GCN Circ. 7046) nor at the position of the VLA radio source reported in GCN Circ. 7049 (Chandra & Frail). We estimate a 3-sigma upper limit on the count rate of about 1.5×10^{-3} cts/s. Assuming a power-law spectrum with photon index $\Gamma = 2$ and a Galactic column density of 2.5×10^{21} cm $^{-2}$, this corresponds to an upper limit on the observed flux of $\sim 7 \times 10^{-14}$ erg cm $^{-2}$ s $^{-1}$ (0.3–10 keV).

Outside the INTEGRAL error circle two X-ray sources are detected by XRT:

Source # 1: RA(J2000)= 19^h19^m25.2^s, Dec(J2000)= +02^d 06' 02.1"; CR= $(1.4 \pm 0.5) \times 10^{-3}$ cts/s;

Source # 2: RA(J2000)= 19^h19^m53.8^s, Dec(J2000)= +02^d 02' 46.0"; CR= $(2.4 \pm 0.6) \times 10^{-3}$ cts/s;

These two sources lie 4.7 and 3.7 arcmin from the INTEGRAL position, respectively. Both sources are consistent with being constant during the XRT observation.

3 UVOT Observation and Analysis

The Swift-UVOT observed the INTEGRAL burst GRB 071109 starting at 22:21 UT, 105 minutes after the trigger, cycling through exposures in the the UVW1, U, B, UVW22, V and UVM2 filters. No afterglow is detected at the position of the VLA measurement (Chandra & Frail, GCN Circ. 7049). A possible source at position RA(J2000)= 19^h19^m42.303^s, Dec(J2000)= +02^d 01' 21.14" was investigated, since it was detected at the 3-sigma level (U= 20.9 ± 0.6 mag) in the coadded U-filter images at 1.7 arcmin from the INTEGRAL position. This source is considered spurious since it was not found in any of the other filters, taken before or after the U-filter exposures.

No other fading source is found within the INTEGRAL error circle in this crowded field. The 3-sigma upper limits for detecting a source at the position of the VLA detection are reported in Table 1. The reported upper limits are not corrected for the expected Galactic extinction corresponding to a reddening of $E_{B-V} = 0.61$ mag in the direction of the burst (Schlegel et al. 1998).

Filter	T_start (s)	T_stop (s)	Exp (s)	3-sigma UL mag
UVW1	6350	24158	1678	21.47
U	6782	24373	835	21.17
B	7000	24588	835	21.56
UVW2	7220	25435	3346	22.25
V	8078	25651	835	20.58
UVM2	8300	26033	2189	21.73

Table 1: Magnitude limits from UVOT observations.