Swift Observation of GRB 131011A

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1 Introduction

At 17:47:34.99 UT on October 11 2013 Fermi-GBM triggered on and located a source (trigger 403206457). At 05:26 UT on October 12, the intermediate Palomar Transient Factory (iPTF) collaboration imaged the area using the Palomar 48-inch Oschin telescope (P48; Kasliwal, Singer & Cenko, GCN Circ. 15324), finding an uncatalogued optical afterglow candidate, which was named iPTF13dsw. Subsequent follow-up observations by NOT (Xu et al., GCN Circ. 15325), Weihai (Xu et al., GCN Circ. 15326), P60 (Perley, Cenko & Kasliwal, GCN Circ. 15327), GROND (Sudilovsky, Tanga & Greiner, GCN Circ. 15328) and the AAO (Volnova et al., GCN Circ. 15341) showed that the source was fading, strongly suggesting that this was the afterglow of the Fermi trigger. Rau, Kruehler & Greiner (GCN Circ. 15330) obtained a redshift of 1.874 for the source using the X-shooter spectrograph on the VLT.

Jenke (GCN Circ. 15331) provided the Fermi details of what was then named GRB 131011A. T_{90} is ~ 77 s (50–300 keV), with a time-averaged spectrum (T−3 s to T+25 s) well-fitted by a Band function with $E_{peak} = 220 \pm 30$ keV, $\alpha = -0.79 \pm 0.08$ and $\beta = -2.0 \pm 0.1$. The 10–1000 keV fluence over this time interval is $(6.60 \pm 0.03) \times 10^{-5}$ erg cm^{-2}, while the 1.0-s peak photon flux, measured starting from T+4.3 s is 4.3 ± 0.4 ph cm^{-2} s^{-1} (10–1000 keV).

Swift performed a Target of Opportunity observation approximately 24 hours after the Fermi trigger. The best Swift position is that determined from the XRT data: RA, Dec(J2000) = $02^h\ 10^m\ 06.11^s$, -04^d 24' 42.5", with an estimated uncertainty of 4.2 arcsec (radius, 90% confidence).

2 XRT Observations and Analysis

The XRT began observing the field 83.9 ks after the Fermi trigger (Page, GCN Circ. 15329), obtaining 4.9 ks of data between 17:06 and 20:54 UT on October 12. A faint X-ray source consistent with the iPTF13dsw position was detected, at RA, Dec = 32.5255, -4.4117, which is equivalent to

RA(J2000) = $02^h\ 10^m\ 06.11^s$
Dec(J2000) = -04^d 24' 42.5"

with an uncertainty of 4.2 arcsec (radius, 90% confidence). The mean 0.3–10 keV count rate of the source during this time was $(5.9^{+0.9}_{-0.8}) \times 10^{-3}$ count s^{-1}. It was not possible to determine whether the source was fading.

A spectrum formed from these PC data can be fitted with a power-law of photon index of $\Gamma = 1.5^{+0.6}_{-0.7}$, absorbed by the Galactic column in this direction of 1.85×10^{20} cm^{-2}. The counts to observed (unabsorbed) 0.3–10 keV flux conversion factor deduced from this spectrum is 4.9×10^{-11} (5.1×10^{-11}) erg cm^{-2} count^{-1}.

3 UVOT Observation and Analysis

The UVOT also began observing the field 83.9 ks after the Fermi trigger (Hagen & Page, GCN Circ. 15343). No optical afterglow consistent with the PTF position is detected in the initial UVOT exposures. The preliminary 3σ upper limit using the UVOT photometric system (Breeveld et al. 2011, AIP Conf. Proc. 1358, 373) for the initial exposures is given in Table 1. The magnitude in the table is not corrected for the Galactic extinction due to the reddening of E(B−V) = 0.02 in the direction

Filter	Start (s)	Stop (s)	Exposure (s)	3σ UL
uvw2	83920	97601	4896	>22.10

Table 1: Magnitude limits from UVOT observations

of the burst (Schlegel et al. 1998).