Search for the NIR counterpart to GRB130807A/SWIFTJ1759.2-2736 in quiescence

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Publication date
2013
Document Version
Final published version
Published in
The astronomer's telegram

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Search for the NIR counterpart to GRB130807A/SWIFTJ1759.2-2736 in quiescence

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*on **6 Sep 2013; 16:09 UT***
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Subjects: Infra-Red, X-ray, Gamma Ray, Transient

In order to search for the counterpart of the transient source SWIFTJ1759.2-2736 (Atel #5268), we investigated near-infrared (NIR) data of the Galactic Bulge region obtained as part of the VVV survey (Minniti et al. 2010, New Astronomy, Volume 15, 433). The observations took place while the source was in quiescence. The data have been acquired using the 4-m VISTA telescope at Paranal observatory (Chile), using a camera with pixel sampling of 0.34 arcsec. We analysed JHKs images obtained on the 11th of April 2010, at airmass 1.15 and under average seeing conditions of 0.80 arcsec. Total on source exposure times were 24s for the J-band images and 8s for both H- and Ks-band frames. VVV has an additional Ks-band variability survey, which we exploited in order to obtain as much information as possible on the transient prior to the outburst. In this region, we find 11 Ks-band observations, spanning from April 2010 to June 2012. In the band-merged catalogues, we find 3 NIR sources within the 90% confidence ~3.8 arcsec error circle (including the X-ray and NIR matching errors) from the SWIFT position reported in Atel #5268. The nearest source was found at ~1.9 arcsec (RA = 17:59:12.04, Dec = -27:36:58.5) with the following magnitudes: J = 14.52 +/- 0.03, H = 13.61 +/- 0.02 and Ks = 13.30 +/- 0.02. The second nearest source is at ~2.5 arcsec (RA = 17:59:12.25, Dec = -27:36:55.5) with J = 17.14 +/- 0.29, H = 15.88 +/- 0.18 and Ks = 16.15 +/- 0.29. Finally the third closest match is found at ~3.8 arcsec (RA = 17:59:11.92, -27:36:59.5) with J = 16.37 +/- 0.14, H = 15.31 +/- 0.10 and Ks = 14.89 +/- 0.09. When inspecting the VVV Ks-band variability data, none of them show significant variability in their light-curves. However, in the Ks-band images, we notice a faint object, closer to the transient's SWIFT position but not detected in the VVV catalogues. We stack all 11 Ks-band exposures we have and perform optimal photometry to estimate a magnitude value for this object. We find the source to lie at ~1.3 arcsec of the transient's reported position (RA = 17:59:12.21, Dec = -27:36:56.4) with Ks ~ 16.31 +/- 0.2. VVV only performed the additional variability survey in the Ks-band, therefore we do not have colours for this object. Extinction values in this region obtained using red clump giants with VVV data (Gonzalez et al. 2011, A&A, 534, 3) return the following values: A_J = 0.91 mag, A_H = 0.60 mag and A_Ks = 0.38 mag, when using Cardelli et al.(1989, ApJ, 345, 245) extinction law towards the Galactic Center. We look at the de-reddened colours of the three matches for which we have JHKs magnitudes. The colours of the match at ~1.9 arcsec seem consistent with a late-type K dwarf, whereas those of the source at ~3.8 arcsec seem more consistent with a K giant or supergiant. The match at ~2.5 arcsec is at the faint limit of the VVV survey and its magnitudes (hence colours) can not be trusted for any sort of rough spectral classification. In summary, we have detected several NIR sources near the reported 3.6 arcsec

error circle radius of SWIFT (Atel #5268). None of these sources seem to be variable. We encourage deeper NIR and optical photometric and spectroscopic observations of this region to find the true counterpart of SWIFTJ1759.2-2736.

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