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# IGR J17062-6143 is likely a bursting neutron star low-mass X-ray binary

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On 2012 June 25, Swift/BAT triggered on an event consistent with the location of the unclassified X-ray transient IGR J17062-6143 (GCN #13386). This source undergoes long faint outbursts (ATel #1840, #1853). We investigated the BAT, XRT and UVOT data to asses the nature of the BAT trigger.

The BAT lightcurve shows a single broad peak of ~200 s. We extracted a spectrum around the peak, using data from t=0-70 s after the trigger. The spectrum is very soft and can be described by a blackbody model with a temperature of 2.5+/-0.5 keV and an emitting radius of ~5 km for an assumed distance of 5 kpc (see below). Extrapolating the fit to the 0.01-100 keV energy range suggests an average bolometric luminosity of ~5E-8 erg cm-2 s-1, and a fluence of ~4E-6 erg cm-2. These values are typical of thermonuclear bursts from accreting neutron stars, and suggest that the BAT likely triggered on such an event. We estimate that the peak BAT count rate was a factor ~3 higher than the average rate in the 70-s interval that was used for the spectrum, which would suggest that the burst reached a bolometric peak flux of ~2E-7 erg cm-2 s-1. Assuming that this is equal to the empirical Eddington limit of thermonuclear X-ray bursts, we estimate a source distance of ~5 kpc.

The XRT started to observe the source field in WT mode ~150 s after the BAT trigger. The lightcurve shows a continuous decay along the 925-s observation from ~300 to ~10 counts s-1. We performed time-resolved spectroscopy to investigate any possible spectral evolution. The data fits to a blackbody that cools from ~2 to ~1 keV along the decay. This is typical of thermonuclear X-ray bursts. During an interval of ~600 s, the intensity strongly fluctuates up to a factor of ~3 on a timescale of ~10-30 s. Such behavior has sometimes been observed during the tails of (long) thermonuclear X-ray bursts (e.g., in 't Zand et al. 2011, A&A 525, 111). Preliminary timing analysis does not reveal a periodicity. The count rate continues to decrease till the end of the observation, which suggests that the X-ray burst was likely ongoing. The implied duration of >1100 s is considerably longer than that typically observed (~10-100 s), and suggests that it was possibly an energetic intermediately long X-ray burst. Such rare events have been observed with Swift from a few neutron star X-ray binaries that accrete at similarly low intensities as that seen for IGR J17062-6143 (e.g., in 't Zand 2008, A&A 485, 183; Degenaar et al. 2010, MNRAS 404, 1591).

Simultaneous UVOT observations detect IGR J17062-6143 in all bands. The longest exposure (~250 s) was obtained with the u-filter and started ~300 s after the BAT trigger. Similar to that

seen in the XRT, the UVOT u-band data shows a continuous decay in intensity from ~15 to ~5 counts s-1. Such behavior is also consistent with a thermonuclear X-ray burst and provides strong evidence that IGR J17062-6143 caused the BAT trigger.

Between 2008 May 1 and 2008 July 13, IGR J17062-6143 was observed with the XRT during a series of 7 exposures (~30 ks in total), during which it was detected at ~5 counts s-1. The averaged spectrum can be described by an absorbed powerlaw model with a hydrogen column density of N_H=(2.0 +/- 0.1)E21 cm-2 and a photon index of 2.1+/-0.1 (see also ATel #1840). The resulting 0.5-10 keV unabsorbed flux is ~2.1E-10 erg cm-2 s-1, which translates into a luminosity of ~6E35 erg s-1 for a distance of 5 kpc. The spectral parameters and inferred flux are consistent with a neutron star X-ray binary nature. The spectral energy distribution of the optical/infra-red counterpart of IGR J17062-6143 was found to very blue, as expected for an accretion disk spectrum (ATel #4214).

The above considerations suggests that Swift/BAT trigger 525148 was likely caused by a thermonuclear X-ray burst and identifies IGR J17062-6143 as a new neutron star low-mass X-ray binary.

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