Swift Bulge Survey: Discovery of a new X-ray transient, Swift J174038.1-273712

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The Swift Bulge Survey performs biweekly mapping of 16 square degrees of the Galactic Bulge with short (~120 s) X-ray observations (Shaw et al. 2020, MNRAS, 492, 4344; Bahramian et al. 2021, MNRAS, 501, 2790).

The most recent epoch of this survey, performed on April 9th, 2021, reveals a new X-ray transient, Swift J174038.1-273712 with a Swift/XRT countrate of 0.25 ct/s (31 counts in 117 s, 0.5-10 keV). Using the online Swift/XRT products tool (Evans et al. 2009, MNRAS, 2009, 397, 1177) yields enhanced coordinates of the source as:

RA: 17h 40m 38.11s Dec: -27d 37m 12.1s

with a radial uncertainty of 3.4 arcsec (90% confidence). We found no previously cataloged X-ray sources consistent with these coordinates.

Fitting the X-ray spectrum of the source with an absorbed power-law and Galactic N_H of 5.5e21 cm^-2, and using W-statistics (Cash 1979, ApJ 228, 939), indicates a power-law photon index of 1.2+/-0.6, and an unabsorbed flux of 3.2(-1.1/+2.3)e-11 erg/s/cm2 in the 0.5-10 keV band. Assuming a d=8 kpc , the X-ray luminosity would be ~2e35 erg/s (in the 0.5-10 keV band). A substantially larger N_H and softer spectrum are found when N_H is allowed to float freely, which may be due to the low total number of counts, but hints at a quasi-thermal spectrum.

The source is in the region of the Chandra Galactic Bulge Survey (Jonker et al. 2011,ApJS,194,18), but was not detected by that survey, which has limits of 8e-14 erg/s/cm^2 for N_H=10^22 and Gamma=2 power law models.

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VVV reveals a moderately bright star (J=14.3, K=12.8) within the error circle, also detected by VPHAS+ with r=19.5. VLASS shows no source in the error circle.

Further Swift follow up observations have been requested. Multi-wavelength follow ups are encouraged. We thank the Swift team for their support of these observations, which are ongoing.

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