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**Variability from 1SXPS J1742150-291453**

*a very nearby X-ray source?*

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## Variability from 1SXPS J1742150-291453: a very nearby X-ray source?

ATel #10419; *Thomas J. Maccarone (Texas Tech University), Arash Bahramian (Michigan State), Craig Heinke, Aaran Shaw, Greg Sivakoff (Alberta), Jamie Kennea (Penn State), Rudy Wijmands, Nathalie Degenaar (Amsterdam), Jay Strader (MSU), Jean in 't Zand (SRON), Erik Kuulkers (ESA)*

on 23 May 2017; 22:28 UT

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Subjects: X-ray, Request for Observations, Black Hole, Cataclysmic Variable, Neutron Star, Star, Variables

Referred to by ATel #: [12751](#)

We report the discovery of likely flaring activity from 1SXPS J1742150-291453 as part of the ongoing Swift Bulge Survey (ATel #10265). On May 19 at 14:43 the source was detected with 4 counts in 60 seconds (0.3-10 keV). The source was undetected in the earlier Swift Bulge Survey observations from April through early May 2017, but with upper limits that do not require it to have varied over the past few weeks. In the 1SXPS survey data (Evans et al. 2013, ApJS, 210, 1) taken from 2008-2012, the source showed an average count rate of 0.012 counts/sec over the same energy range. We have also briefly inspected an archival XMM observation of the same field (PI Ponti), and have found the same source present, with the standard product pipeline giving a count rate of 0.3 counts/sec with the combination of EPIC instruments, roughly consistent with the expectations from the older Swift data. The source thus appears to be flaring, with factor of  $\sim 5$  variability. The probability that it has been nonvariable, assuming Poisson statistics, is  $6 \times 10^{-3}$ , although this does not take into account the multiple trials on different sources and on different epochs for this source; we have not yet clearly established the number of sources in the region, so this is not straightforward, but it seems unlikely that there is more than a 10% chance of this variability being spurious.

Within the error circle is a bright star at 17 42 14.9701, -29 14 59.786 according to Gaia data release 1 (Gaia collaboration, 2016, A&A, 595, 1). The star has a proper motion of  $-7.5 \pm 1.0$  mas/year in RA and  $-45.9 \pm 1.0$  mas/year in Dec, according to UCAC5 (Zacharias et al. 2017, AJ, in prep; Vizier catalog I/340/ucac5). This star is also extremely red, but with a blue excess relative to M dwarf spectral energy distributions, with  $u=15.1$ ,  $g=13.74$  (Drew et al. 2014, MNRAS, 440, 2036),  $B=14.2$ ,  $V=12.8$ ,  $r=12.2$ ,  $i=11.4$  (Zacharias et al. 2017) and  $J=9.6$ ,  $H=8.9$ ,  $K_s=8.6$  from 2MASS (Skrutskie et al., 2006, AJ, 131, 1163), and  $UVM2=20.5$  in old Swift data, based on the standard pipeline products.

A preliminary double blackbody fit suggests a  $\sim 2800$ K and  $\sim 4800$  K component, with the cool component having a radius about 6 times that of the hot component. Spitzer and WISE data reveal

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no convincing mid-IR red excess (an apparent W4 excess appears consistent with smooth emission from the Galactic Plane). The lack of a flat IR spectrum, plus a lack of H-alpha emission from SuperCosmos (Parker et al. 2005, MNRAS, 362, 689) appear to be points against a protostar origin.

The large proper motion implies that this star must be nearby (at 1 kpc, the proper motion would imply a 250 km/sec velocity), so that the red part of the spectrum likely comes from photospheric emission from a red dwarf. The blue part of the spectrum could potentially arise from a rather extreme chromosphere, which might be possible given that the ratio of X-ray to bolometric luminosity in the XMM and early Swift data are very close to the saturation limit for coronally active stars. The alternative is that the blue excess might be from accretion in a compact object binary.

2800 K corresponds to roughly M6V, and the object would then be at a distance of about 8 pc. The peak  $L_X$  would then be about  $1.5e28$  erg/sec.

The Bochum variability survey (Hackstein et al. 2015, AN, 336, 590) shows marginal evidence for a periodicity of 84 minutes, although with poor sampling and heavy aliasing. If this period is confirmed, it could be a period bouncing CV (although 4800K is quite cool for a white dwarf) or a period bouncing accreting black hole or neutron star.

A SOAR optical spectrum is scheduled for Saturday. Additional follow-up observations at other wavelengths are encouraged.

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