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Radio Non-Detection of the Currently Outbursting Transient Source in NGC 6440

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Radio Non-Detection of the Currently Outbursting Transient Source in NGC 6440

ATel #10843; *A. J. Tetarenko (Alberta), A. Bahramian (Michigan State), G. R. Sivakoff, C. O. Heinke, A. W. Shaw (Alberta), R. Wijnands, N. Degenaar (Amsterdam), J. C. A. Miller-Jones, R. Plotkin (Curtin) E. Kuulkers (ESA), L. Chomiuk, J. Strader, E. Tremou (Michigan State), J. A. Kennea (Penn State), D. Altamirano (Southampton), J. J. M. in 't Zand (SRON), A. Deller (Swinburne), and T. J. Maccarone (Texas Tech)*

*on 12 Oct 2017; 08:55 UT**Credential Certification: Alexandra Tetarenko (tetarenk@ualberta.ca)*

Subjects: Radio, X-ray, Binary, Neutron Star, Transient

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We report follow-up VLA radio observations of NGC 6440, which has recently shown evidence of transient X-ray activity (ATel #10821, #10826). Our VLA observations occurred on 2017 Oct 11, with scans on source between 01:07:09 - 02:48:18 UTC (MJD = 58037.0466 - 58037.1169), in X band (8 - 12 GHz). The array was in the B configuration during our observations.

We do not significantly detect a radio source (in the combined 4 GHz bandwidth centered on 10 GHz) within the X-ray error circle reported in ATel #10826; we estimate a 3 sigma upper limit on the source flux density of ~11 microJy/bm.

To make a preliminary classification of the source, we place this object on the L_r - L_x plane (e.g., Tetarenko et al., 2016, MNRAS, 460, 345; Tudor et al. 2017, MNRAS, 470, 324), assuming a flat radio spectrum to derive the radio luminosity ($L_r = \nu L_\nu$) at 5 GHz, 1.0-10 keV X-ray luminosity (from the closest Swift observation on 2017 Oct 9, from 23:18:12 to 23:36:51 UT), and a distance of 8.5 kpc (Harris W.E. 1996, AJ, 112, 1487 - 2010 Edition). We estimate a 5 GHz (upper limit) radio luminosity of $4.5e27$ erg/s, and 1.0-10 keV X-ray luminosity of $2.1e36$ erg/s. Based on these measurements, this transient is inconsistent with typical black hole X-ray binaries (see figure here). It also appears to be weaker in the radio than most neutron star systems; however, we note that this transient is not the only radio-quiet neutron star source, where for example both EXO 1745-248 (Tetarenko et al., 2016) and another AMXP source, IGR J17511-3057 (Tudor et al. 2017), both show a radio luminosity near our radio upper limit at similar X-ray luminosities as this source.

While the X-ray position of this transient is consistent with one of the known transient sources in NGC 6440 (SAX J1748.9-2021; in 't Zand et al., 2001, ApJ, 563, L41), this cluster contains numerous XRBs (Pooley et al. 2002 ApJ, 573, 184), and thus we cannot rule out a new transient source.

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Additional radio observations are planned, and X-ray observations will continue.

We thank the NRAO staff for rapidly scheduling our observations.

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