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Chandra Position of Galactic Center X-ray Transient Swift J174540.7-290015

Baganoff, F.K.; Corrales, L.R.; Neilsen, J.; Nowak, M.A.; Rea, N.; Zelati, F. Coti; Haggard, D.; Markoff, S.; Ponti, G.; Bower, G.C.; Garmire, G.P.

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Chandra Position of Galactic Center X-ray Transient Swift J174540.7-290015

ATel #8746; *F. K. Baganoff, L. R. Corrales, J. Neilsen, M. A. Nowak (MIT), N. Rea (Amsterdam, CSIC-IEEC), F. Coti Zelati (Insubria, Amsterdam, INAF-OAB), D. Haggard (McGill), S. Markoff (Amsterdam), G. Ponti (MPE), G. C. Bower (ASIAA), G. P. Garmire (Huntingdon), on behalf of a larger collaboration*

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Credential Certification: [Frederick Baganoff \(fkb@space.mit.edu\)](mailto:Frederick.Baganoff@space.mit.edu)

Subjects: Radio, Infra-Red, X-ray, Binary, Black Hole, Neutron Star, Transient

Referred to by ATel #: [8793](#), [8881](#), [9236](#), [9551](#)

Swift monitoring of the Galactic Center (Degenaar et al. 2015) detected a new X-ray transient, SWIFT J174540.7-290015, on 2016 February 6 (UTC; ATel #8649). We observed the region with Chandra/ACIS-S twice for 25 ks each beginning at 2016 February 13 08:59:23 and 2016 February 14 14:46:01 (UTC) to continue our monitoring of the GC magnetar SGR J1745-29 (ATel #5222; Pennucci et al. 2015). ACIS-S was operated in single chip (S3), 1/8-subarray mode yielding a frame time of 0.4s. Despite this, the core of the PSF was heavily piled up in the CCD. Filtering on events within the energy range 0.3-8 keV and excluding those within the piled-up core, we calculated the centroid of events within an annulus with inner and outer radii of $2.5\hat{a}$ and $9\hat{a}$. The standard deviation of the means in RA and Dec are $0.0145\hat{a}$ and $0.0142\hat{a}$. To compute absolute positional errors, we used `celldetect` to determine the position and uncertainties of SGR J1745-29 and added the uncertainties in quadrature. As a check on the astrometry, we list below the ATCA position of SGR J1745-29 (PSR J1745-2900) from Shannon & Johnston (2013). All uncertainties are 1-sigma. ATCA position of SGR J1745-29 RA (J2000): $17:45:40.164 \pm 0.022''$ Dec (J2000): $-29:00:29.818 \pm 0.090\hat{a}$ Chandra position of SGR J1745-29 RA (J2000): $17:45:40.164 \pm 0.3430\hat{a}$ Dec (J2000): $-29:00:29.82 \pm 0.3260\hat{a}$ Chandra position of SWIFT J174540.7-290015 RA (J2000): $17:45:40.664 \pm 0.3433''$ Dec (J2000): $-29:00:15.61 \pm 0.3263''$ Reynolds et al. (ATel #8649) note two cataloged CXO sources, CXOU J174540.1-290016 and CXOGC J174540.0-290014, that lie just outside Swift's $2.2\hat{a}$ error radius (90%). We find that no previous CXO source in the catalog of Muno et al. (2009) is associated with the new transient and we have not detected the source in subsequent Chandra monitoring, until now. We confirm that SWIFT J174540.7-290015 is a previously

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- 9196 Continued Swift/XRT observations of the new Galactic center transients SWIFT J174540.2-290037 and

unknown transient X-ray source. For the CXO catalog, we designate the new transient as CXOGC J174540.6-290015. The two nearest known X-ray transients, CXOGC J174540.0-290005 and CXOGC J174541.0-290014 (Muno et al. 2005), are currently in quiescent states that would not contaminate the spectrum and flux measured by Swift. AX J1745.6-2901 is the only transient currently bright enough to contaminate the INTEGRAL observation (#8684). The outbursts of SGR J1745-29 and SWIFT J174540.7-290015 within the past three years have added two new faint X-ray transients to the four known to lie within $0.5\hat{a}$ of Sgr A*. The rate of discovery of faint X-ray transients within this region since 1999 September 21 (UTC) is 0.37 ± 0.15 per year, indicating that Swift, Chandra and XMM-Newton monitoring are likely to discover a significant number of new faint X-ray transients in this region over the next decade. ATels #8689 and #8737 report the positions of three ISPI catalog (DeWitt et al. 2010) and one VVV catalog (Minniti et al. 2010) NIR point sources that may be associated with the new transient based on the Swift error circle. ISPI 527175 and 540591 are firmly excluded by our improved Chandra position. ISPI 522271 is disfavored. Both ISPI 575458 and the VVV source lie northeast of the Chandra position with error circles overlapping that of Chandra and of each other. However, an unpublished K-band image taken with the PANIC camera on the 6.5-m Magellan Baade Telescope shows multiple overlapping NIR sources that are spatially coincident with these two sources. High angular resolution NIR imaging with an AO system will be required to cleanly identify the NIR counterpart. A joint timing search of both Chandra datasets found no significant periodicity above 0.9s. References: Degenaar et al. 2015, JHEAp, 7, 137 DeWitt et al. 2010, ApJ, 721, 1663 Minniti et al. 2010, New Astron., 15, 433 Muno et al. 2005, ApJ 622, L113 Muno et al. 2009, ApJ, 181, 110 Pennucci et al. 2015, ApJ, 808, 81, 15 Shannon & Johnston 2013, MNRAS, 435, L29

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R. E. Rutledge, Editor-in-Chief

Derek Fox, Editor

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`rrutledge@astronomerstelegam.org`

`dfox@astronomerstelegam.org`

`mansi@astronomerstelegam.org`